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Functionally-driven language change: Prosodic focus and sentence type marking in German-Turkish bilingual yes/no questions

by

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To my abuelica AMO…

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PRELIMINARIES

Since the 1960ies, Germany has been host to a large Turkish immigrant community. Due to the scarcity of workers in Western Europe in this decade, many Turkish people moved to Europe, especially to Germany which hosts the biggest Turkish population with about 2.8 million (Woellert et al. 2009). While migrant communities often shift to the majority language over the course of time, Turkish is a very vital minority language in Germany and bilingualism in this community is an obvious fact which has been subject to several studies. The main focus usually is on German, the second language (L2) of these speakers (e.g. Hinnenkamp 2000, Keim 2001, Auer 2003, Cindark & Aslan (2004), Kern & Selting 2006, Selting 2009, Kern 2013). However, research on the Turkish spoken by Turkish bilinguals has also attracted attention mainly in the framework of so called heritage language research. Although there is no clear definition for the term heritage language and no clear delimitation to other concepts, such as minority language, heritage language basically refers to the first language (L1) of bilingual speakers in the diaspora (cf. Polinski 2011).

Turkish in the diaspora has been investigated with respect to the speech styles of the community mainly under the perspective of code-switching and codemixing (e.g. Kallmeyer & Keim 2003, Keim 2003, 2004, Keim & Cindark 2003, Hinnenkamp 2003, 2005, 2008, Dirim & Auer 2004), but also with respect to changes in the grammar and the orthographic system (e.g. Rehbein & Karakoç 2004, Schroeder 2007). Backus, Jorgensen & Pfaff (2010) provide an overview of studies on Turkish in the diaspora. Attention to the changes in the prosodic system of bilingual Turkish on the other side has so far been limited for the German-Turkish contact situation. Queen (2001, 2006) reports of fused structures in the conversations of bilingual Turkish children.

With the present dissertation, I provide a study on linguistic changes on the prosodic level in the Turkish heritage language of adult early German-Turkish bilinguals. The study is motivated by its contribution to the research on contact-induced linguistic changes in Turkish in the diaspora and also by its contribution to bilingual intonation research. Although the description of phonological differences in bilingual speech has a long tradition on the segmental level, studies on prosodic features of bilingual speakers or bilingual speech communities have been conducted only in the last decade. Still, most of these studies refer to prosodic changes in the second language (L2) of bilingual speakers. The present study describes structural changes in the L1 Turkish intonation of yes/no questions of a representative sample of bilingual Turkish speakers.

All speakers share a similar sociolinguistic background. All acquired Turkish as their first language from their families and the majority language German as an early L2 at latest in the kinder garden by the age of 3.

A study of changes in bilingual varieties requires a previous cross-linguistic comparison of both of the involved languages in language contact in order to draw conclusions on the contact-induced language change in delimitation to language-internal variation.

While German is one of the best investigated languages with respect to its prosodic system, research on Turkish intonational phonology is not as progressed. To this effect, the analysis of bilingual Turkish, as elicited for the present dissertation, is preceded by an experimental study on monolingual Turkish. In this regard an additional experiment with 11 monolingual university students of non-linguistic subjects was conducted at the Ege University in Izmir in 2013. On these grounds the present dissertation additionally contributes new insights with respect to Turkish intonational phonology.

The results of the contrastive analysis of German and Turkish bring to light that the prosodic systems of both languages differ with respect to the use of prosodic cues in the marking of the pragmatic features investigated in the present study, namely the marking of information structure (IS) and sentence type. Information structure refers to the way how information is partitioned in communication in order to meet communicative needs (cf. Chafe 1976). The structuring as well as the linguistic devices used to indicate IS categories is language specific. The categories considered in the present study are focus and givenness constituting a binary opposition. Whereas givenness basically refers to the information which is already shared by the interlocutors, focus principally refers to new information. The sentence type investigated in the present studies are yes/no questions. Von Essen (1964) denominates yes/no questions as "Entscheidungsfragen" referring to the task that a decision has to be presented in the answer which needs to correspond either to yes or to no. This is in contrast to another question type known as wh–question or content question, in which the answer requires more than a yes or no, but a sentence.

To elicit yes/no questions in bilingual Turkish which differ with respect to their information structure the methodology of Xu (1999) to elicit in-situ focus on different constituents was adapted in the experimental study. A data set of 400 Turkish yes/no questions of 20 bilingual Turkish speakers was compiled at the Zentrum für Allgemeine Sprachwissenschaft (ZAS) in Berlin and at the University of Potsdam in 2013. The prosodic structure of the yes/no questions was phonologically and phonetically analyzed with respect to changes in the *f0* contour according to IS modifications and the use of prosodic cues to indicate sentence type.

The results of the analyses contribute surprising observations to the research of bilingual prosody. Studies on bilingual language change and language acquisition have repeatedly shown that the use of prosodic features that are considered as marked by means of lower and implicational use across and within a language cause difficulties in language contact and second language acquisition. Especially, they are not expected to pass from one language to another through language contact. However, this structurally determined expectation on language development is refuted by the results of the present study. Functionally related prosody, such as the cues to indicate IS, are transferred from German L2 to the Turkish L1 of German-Turkish bilingual speakers. This astonishing observation provides the base for an approach to language change centered on functional motivation. Based on Matras' (2007, 2010) assumption of functionality in language change, Paradis' (1993, 2004, 2008) approach of language activation and the Subsystem Theory and the theory of language as a dynamic system (Heredina & Jessner 2002), it will be shown that prosodic features which are absent in one of the languages of bilingual speech communities are transferred from the respective language to the other when they contribute to the contextualization of a pragmatic concept which is not expressed by other linguistic means in the target language. To this effect language interaction is based on language activation and inhibition mechanisms dealing with differences in the implicit pragmatic knowledge between bilinguals and monolinguals. The motivator for this process of language change is the contextualization of the message itself and not the structure of the respective feature on the surface. It will be shown that structural consideration may influence language change but that bilingual language change does not depend on structural restrictions nor does the structure cause a change.

The organization of the present dissertation is dictated by the presentation of the monolingual Turkish experiment and the bilingual Turkish experiment. Since the monolingual experiment provides the baseline for the following analyses of bilingual speech it is presented first. Both experiments are preceded by an introduction to the relevant theoretic background, including information structure, yes/no questions, features of Turkish and German prosody, general characteristics of bilingualism as well as bilingual prosody and the impact of L1 on L2.

In chapter I I will give a brief overview about the aspects of IS which are relevant for the understanding of this study. After a general introduction into the notions of IS, the semantic concepts of focus and givenness are discussed. With respect to focus, special attention is paid to contrastive focus which is the type of focus elicited in the experimental sections. The chapter on IS closes with a special section dedicated to cross-linguistic prosodic focus marking. The background provided here is of crucial relevance for the further classification of the prosodic cues of IS marking in Turkish investigated in experiment 1.

In the second chapter a review of prosodic aspects of Turkish will be provided. Several studies will be presented providing description models for Turkish intonation which still lacks a conventionalized annotation system. Furthermore, research focusing on the prosodic marking of IS and sentence type in Turkish will be discussed motivating the conduction of a Q-particle placement test with Turkish native speakers to justify the target sentences used in the design of the experimental studies.

In chapter III experiment 1, conducted with monolingual Turkish speakers, will be presented. It offers a reliable baseline for comparison with the bilingual data of experiment 2. Additionally, new insights with respect to the prosodic realization of IS and sentence type marking by means of *f0* in monolingual Turkish will be provided.

Chapter IV provides an overview of several aspects of bilingual language research. The presented aspects are chosen by their relevance with regard to the results of experiment 2, by their relevance to the general understanding of the motivation for the present study, and by their relevance with respect to generating an understanding of the functional approach of bilingual language change provided in the present dissertation on the base of the results of experiment 2.

In chapter V an overview of German prosody with regard to the crucial aspects of the present study is provided completing with the requirement of a cross-linguistic comparison of both languages of a bilingual language contact situation.

The largest part of the dissertation is occupied by chapter VI where experiment 2, conducted with 20 bilingual German-Turkish speakers is presented. A detailed phonetic and phonologic analyses of IS modified yes/no questions will be presented followed by a discussion of a functional motivation in bilingual language change.

All translations used in the examples and target sentences of the presentation are done by myself unless the source is indicated. The glossings used in the examples are done according to the Leipzig glossing rules, unless the source is indicated.

CHAPTER I: INFORMATION STRUCTURE

I.1 INTRODUCTION

In the following I will give a brief overview about the central aspects of information structure (IS) including its reference to linguistic and extra-linguistic aspects. Within the work of this study I will mainly follow the understanding of the concepts of IS as developed in the framework of Alternative Semantics (Rooth 1985, 1992, Schwarzschild 1999, Féry, Fanselow & Krifka 2007, and Krifka 2008).
IS includes a wide range of notions, categories and subcategories. However, within the limits of this study, the survey is not exhaustive and primarily focuses on the theoretical discussion of the concepts that are relevant for the present study: focus and givenness. Within the concept of focus special attention will be paid on contrastive focus which is the investigated focus type in the following studies. Since the following experiments are based on the realization of IS by prosodic means, the outlining of the semantic theory of IS also includes basic references to the structural tools that are used to indicate focus and givenness. Although both semantic concepts exist almost cross-linguistically, their realization is highly language dependent. To this effect a further subchapter is dedicated to the cross-linguistic prosodic realizations of IS. An understanding of IS marking strategies is crucial with respect to a classification of IS marking in Turkish which will be investigated in Experiment 1. How the realization of information structure in Turkish and German is described in the literature is explicitly outlined later in separate chapters which provide a general theoretical discussion of both languages.

I.2 NOTIONS OF IS

Information structure is identified since the medieval Arab grammatical tradition and described since then by different linguistic schools in different ways. The term information structure goes back to Halliday (1967) and though there are indications of structure-hood it may be better described in terms of information based partitions (cf. Tomioka 2007). Although IS is a representation of non-linguistic objects, it is linguistically relevant since the way information is organized has a meaningful impact on linguistic structures. Traditionally, binary oppositions such as *focus* and *background, topic* and *comment, given* and *new* or *theme* and *rheme* are used to describe IS. However, binary distinction, such as focus and givenness, which are used in the present study, are not the only categorization of IS. Valduví (1993:36) gives an overview of the different denominations, amongst others *theme-rheme, topic-commet*, and *topic-focus*. Notions are ambivalent and may refer to extra-linguistic cognitive referents, or to the formal aspects of language, especially to the way information is transmitted through grammar.

With respect to the extra-linguistic function of IS, Chafé (1976) speaks about *information packaging.* Following Chafe, IS is the *packaging* of information in order to meet the immediate communicative needs restricting it to those aspects responding to the temporary state of the address´s mind. Chafe(1976: 28) defines the term *packaging* in the following way.

> I have been using the term packaging to refer to the kind of phenomena at issue here, with the idea that they have to do primarily with how the message is sent and only secondarily with the message itself, just as the packaging of toothpaste can affect sales in partial independence of the quality of the toothpaste inside.

In that sense, a sentence is a mean of structural transportation of some piece of knowledge (proposition) from the speaker to the hearer. The transfer of knowledge is the propositional content. The purpose of information packaging is precisely to optimize the entry of data into the hearer´s knowledge-store. It is taken to consist of a small set of instructions with which the speaker directs a hearer to retrieve the information encoded in a sentence and enter it into her/his knowledge-store (cf. Vallduví 1993, Prince 1988). Accordingly, the premises a speaker has with respect to the hearer´s suggestions within a discourse at a certain moment with respect to the linguistic message are relevant for the packaging of information. Information packaging is taken to be responsible for what enters in the hearer´s knowledge store. By that means an efficient and non-redundant update of the knowledge store is achieved (cf. Prince 1986).

Crucial for the way how information is packed is its relation to the Common Ground (CG). With CG Stalnaker (2002:701sq) refers to the *presumed background information shared by participants in a conversation* or *what speakers take for granted – what they presuppose when they use certain sentences*. CG describes the information that is mutually shared and continuously modified in the course of communication. In other words it shapes the background to which new information is added, hence CG is dynamic. Stalnaker (2002) points out that speaker could change CG by the accommodation of presuppositions and that uncontroversial facts can be added implicitly. Two sentences with the same propositional content may carry different information in different speaker-hearer interactions depending on how much of that propositional content is unknown by the hearer at the time of utterance. To this effect and in order to avoid roaring recursion Lee (2001), Krifka

(2008) or Repp (2011) amongst others propose to characterize CG from the points of view of both, speaker and hearer.

Furthermore, Krifka (2007) distinguishes between CG content and CG management. This distinction provides a differentiation between the true conditional impacts of IS on the CG and those aspects that are related to the pragmatic use of expressions with CG management. CG management refers to the way the CG content should develop. Krifka (2007) describes that CG management is shared with the understanding that the responsibility for it may be *asymmetrically distributed among participants.* In that sense, e.g. questions usually do not provide information, but do indicate informational needs, which should be satisfied by conversational moves of the hearer. In that way the ordinary enrichment of what is said on the basis of CG rests upon knowledge of social and cultural conventions and the cognitive principles that govern our thinking.

In conversation CG is constantly developing and as themes change so does CG. The packaging of information has to correspond to the continuously changing CG (cf. Krifka 2007). In order to develop the CG, information is packaged using techniques that optimize the form of the message to be well understood by the addressee. Such techniques are focus and givenness marking. In Halliday´s (1967) complex system of IS, the notions of given and new are induced. Givenness describes the information that the speaker believes to be known and accepted as true by the listener. New describes the information that the speaker believes to be not yet known by the listener. However, the concept of new does not directly correspond to the concept of focus. Focus most commonly represents new information but the same information can have occurred in the preceding context as in second occurance focus (SOF). In the present study I will refer to *givenness* and *focus* as the crucial IS categories under investigation. Both concepts however, are not considered as the represents of an implicational binary relationship. As shown later, *new* does not necessarily correspond to focus and focus does not exclude a *givenness* status of a constituent.

With respect to the formal aspects of IS, the relation between IS meanings and the surface structure of linguistic expression is most challenging. To contextualize IS categories, languages display of a variety of possibilities. To this effect, notions are not expressed by invariant syntactic, phonologic or morphologic grammatical correlates. Various subsystems of the linguistic faculty interact with each other and through IS. This interesting and challenging aspect also involves the risk that fundamental notions of IS are understood differently in different subfields and approaches. In the literature diverse grammatical correlates for IS are assumed, such as specific syntactic positions, or specific pitch accents for specific notions. The correlates can be helpful in assigning IS roles to constituents and improve speech processing but the correlates themselves are independent features of a certain language (Féry 2007:162). With respect to the formal aspects of IS marking, special attention has been paid to prosodic prominence by means of pitch accent assignment and prosodic alignment.

Pitch accents are usually assigned to word stressed syllables. The most prominent pitch accent in an utterance is usually assigned to the focused constituent on the sentence level. Prosodic alignment in the framework of IS refers to a strategy, where a focused constituent is realized relative to a prosodic boundary (cf. Truckenbrodt 1995, Ladd 1996, Féry 2011, Büring 2010). Since the present dissertation focuses on the prosodic marking of IS, a subsection of the present chapter is dedicated to cross-linguistic observations of prosodic marking of IS. In the corresponding section the baseline for a subsequent classification of the focus typology of Turkish by means of the results of experiment 1 will be provided.

However, the structural devices used for the expression of IS are not only language specific, they can also be ambiguous and are by no means exclusive since they may be used in relation with other contexts as well. There are no obligatory structural correlates of IS. Correlates (may they be phonetic, phonologic, syntactic or morphologic in nature) are used to mark certain constitutes of IS but they also may be structural implications for different linguistic phenomena. Gussenhoven (2007) refers to potential disturbances in the establishment of a one-to-one relation between the semantic focus constituent and the phonological structure used to encode it. To this effect, the expression of IS may be frustrated by ambiguity. In English, i.e. de-accentuation, corresponding to lack of pitch accent implementation, can be used for multiple purposes. Beside, indicating constituents that are outside the focus constituent, it is used to indicate the second constituent of compounds. Hence, the phonological structure of a compound and a focus constituent can be the same as shown in (1.1). The pitch accent and following de-accentuation can either be a correlate of the compound *the white house* in (a) or refer to focus marking in (b) by representing an alternative to other denominations as, e.g. *the black house*. Furthermore, Gussenhoven (2007) remarks that structural devices to indicate focus have a minimal intrinsic size which may frustrate a one-to-one mapping as shown in (c). No focus constituent below the level of a syllable can be phonologically encoded, since pitch accents are aligned to stressed syllables, usually to the nucleus and not to consonants as demonstrated in (1.1) (c) though phonetic differences may occur:

(1.1) The WHITE house

%L H*L L%

(a) The [(white house)$_{N}$]$_{FOC}$

('What's the name of the presidential palace in the USA?')

(b) (The [white]$_{FOC}$ house)$_{NP}$

('Which house do you mean?')

(c) (The [wh]$_{FOC}$ite house)$_{NP}$

('You mentioned the lighthouse')

I.3 FOCUS

In the previous section it was outlined that the common ground in communication is constantly developed. To correspond to the continuous changing, information is packaged using techniques that optimize the form of the message (cf. Krifka 2007). One such technique is focus. The term focus has its origin in Halliday (1967) who describes a subset of the *rheme* which represents the informative part within a *theme-rheme* distinction as focus. For Halliday the focus constituent is always marked by prosodic prominence. Accordingly, Vallduví (1993) describes focus as the highlighted carrier of sentence information. Focus has also been described as the assertion of the utterance where assertion means to give information to some kind of audience (Chomsky 1971, Stalnaker 1978, Jackendoff 1972, von Stechow 1981 and Lambrecht 1987). Assertion furthermore, refers to the reduction of the context set in the way that all possible situation and all incompatible situations are eliminated from the context (Stalnaker 1978:323). Related to Stalnaker´s understanding of reduction, one of the most commonly used descriptions of focus is based in Alternative Semantics (Rooth 1985, 1992). Here focus indicates the presence of alternatives that are relevant for the interpretation of linguistic expressions. This concept of focus allows languages to differ in the way of focus marking and the specific interpretational effects of focus marking. Krifka (2007) mentions the possibility that different ways of focus marking may signal different ways of how alternatives are exploited. Two common ways to mark focus in German are e.g. cleft sentences and in-situ focus marking. Both may cause different interpretations. Whereas clefts often signal exhaustive interpretation, in-situ focus marking does not.

In Rooth´s (1992, 1996) multidimensional model of meaning it is stated that every expression has an ordinary semantic value and an additional focus semantic value. In other words, beside the general semantic value of a focus, a focus has an additional optional value. This value is provided by the different alternatives that contrast with the normal semantic value. Accordingly, Krifka (2007) distinguishes between a semantic and a pragmatic use of focus which has a direct relation to the distinction made for CG. The pragmatic use of focus is related to CG management since it concerns the common communicative goals of the participants. It has no immediate influence on truth conditions but leads communication towards a certain direction. One pragmatic use of focus e.g. is to highlight the part of an answer that corresponds to the question constituent in a question-answer pair. The formation of the question as well as the induced alternatives in the answer constitute CG management. Further pragmatic uses of focus are to highlight parallels, to make the addressee aware of a delimitation, which is often used in contrastive topics, or to correct or confirm information, as in (1.2). The example in (1.2) is repeated from Krifka (2007:25). In (B) the previous statement of (A) is corrected, whereas in (B') the previous statement is confirmed. In both cases focus restricts the possible context and interpretation.

(1.2) A: Mary stole the cookie.

B: (No,) [PEter]$_F$ stole the cookie!

B': Yes, [MAry]$_F$ stole the cookie.

The semantic use of focus on the other side is related to the CG content, since it concerns the factual information and affects the truth conditional content of the CG. According to Krifka (2008) semantic focus associates with an operator. The interpretational effects of focus operators, such as focus sensitive particles, depend on focus. Generally, such particles resort to the notion of alternatives by stating, e.g. that the focus denotation is the only one among the alternatives that lead to a true assertion, as in the case of *only* as demonstrated in (1.3) repeated here from Krifka (2007:26).

(1.3) (a) Mary only said that JOHN stole a cookie.

(b) Mary said that only JOHN stole a cookie

A term which is often related to focus in the literature is topic.[1] Both categories share crucial semantic features for what reason a clear distinction between them is not always easy like in the case of contrastive topics, where topics also contain a focus. (e.g. Zimmermann 2007, Tomioka 2009). Contrastive topics, as exemplified in (1.4) consist of an aboutness topic which contains a focus which indicates alternatives.

(1.4) A: What are your parents doing?

B: [My [mother]$_{Focus}$]$_{Topic}$ works as a [secretary]$_{Focus}$ and [my [father]$_{Focus}$]$_{Topic}$ is a [pilot]$_{Focus}$.

However, topic is an IS category in its own right and since topic is not relevant for the experimental design of the present study I refer the reader to Reinhard (1982), Jacobs (2001), Büring (1997, 2003), Zimmermann (2007), Krifka (2007) amongst others.

Apart from the demarcation of topic and focus as independent IS categories, focus is often used as a cover term for several focus types. Krifka (2007), Féry (2007) and others distinguish between broad

[1] The Prague School calls the topic a theme and associates it with old information. But sometimes the topic or comment is also mixed up with a focus-background distinction. For Halliday (1967) the theme is defined as the complement of the rheme. Von der Gabelentz (1869) already distinguishes between a psychological subject, which refers to the object the speaker is thinking about, and a psychological predicate, which refers to what the speaker is thinking about the object.

focus, contrastive (parallel) focus, association with focus and verum focus. Furthermore, Krifka (2007) distinguishes between expression focus and denotation focus. Different types of focus can be classified by their size; i.e. constituents of different sizes can be put into focus.

I.3.1 SIZE OF FOCUS

Most crucially in the description of different focus types is the distinction between different sizes of focus. Broad and narrow are relative terms for the size of the focus constituent as introduced by Ladd (1980). In (1.5) (a) the focus constituent is bigger than in (1.5) (b). In (a) the whole sentence is in the scope of focus representing a case of broad focus indicated by a neutral w*hat happens* –question. In (b) on the other side, an example of narrow focus is provided where only the argument *Lama* is in the scope of focus whereas all preceding constituents are contextually given as demonstrated in the preceding question.

(1.5) (a) Was ist los? (What happens?)
[Lena malt ein Lama]$_{FOC}$ (Lena is painting a Lama.)
(b) Was malt Lena? (What is Lena painting?)
Lena malt ein [Lama]$_{FOC}$ (Lena is painting a Lama.)

In the following, the concepts of broad focus and narrow focus will be outlined in more detail. Concerning narrow focus special attention will be payed to the features of contrastive focus

I.3.1.1 BROAD FOCUS (ALL-NEW)

All-new sentences are considered as the typical broad focus sentences. They have been described alternatively as out-of-the-blue sentences or wide focus sentence in the literature. They typically represent sentences where none of the constituents has been mentioned previously in the discourse. All parts are newly introduced into the discourse, like in (1.5) (a). All-new sentences are typically represented in production experiments, similar to the one of the present study, where a contextless sentence is read out from a computer screen. Other typical broad focus situations are e.g. the beginnings of radio and television news where the speaker cannot refer to a CG with the hearer. All-new sentences can either be thetic, i.e. when they have no topic constituent or eventiv or have a topic-comment structure (cf. Féry 2011). Eventiv sentences introduce a whole incident and contrast with topic-comment sentences. Lambrecht (1994) provides the following example (1.6) to state the difference between both:

(1.6) My car broke down.

The example in (1.6) is associated with an eventiv reading when it provides an explanation for a certain behavior, like for example when someone is coming late. In a topic-comment reading on the other side *car* is introduced first into the discourse and afterwards information about the *car* is added, i.e. that it *broke down*. With respect to phonology Lambrecht (1994) claims that both sentences crucially differ in accent assignment. Whereas in the first reading only one pitch accent is implemented on the argument, in the topic-comment sentence a further pitch accent is realized on the predicate.[2]

I.3.1.2 NARROW FOCUS

In contrast to the example of broad focus in (1.5) (a) above, (1.5) (b) represents a type of focus which has been described as narrow focus in different ways. In (1.5) (b), it is not the whole sentence that is introduced into the CG as new information. Only one constituent, namely the object is newly introduced and in the scope of focus. Nonetheless, in both examples of (1.5) main pitch accent is assigned to the same constituent. By that means there is no phonological difference between broad and narrow focus in (1.5) since the main pitch accent is realized on the object which corresponds to general accent assignment in German as outlined in chapter V. To this effect, broad and narrow focus sentences can have an ambiguous intonation contour in German. However, there is a clear semantical difference between both sentences with respect to the scope of the focus as outlined above. Nonetheless, there are also clear cases where narrow focus is expressed unambiguously, semantically as well as phonologically like in (1.7)

(1.7) Wer malt ein Lama? (Who is painting a Lama?)
[Lena]$_F$ malt ein Lama. (Lena is painting a Lama?)

In the answer in (1.7) which is a repetition of the sentences in (1.5) main pitch accent is assigned to the subject *Lena*, whereas no other pitch accent is assigned to the argument *Lama* as in (1.5), which

[2] In chapter II and V more detailed information is provided with respect to pitch accent placement in all-new sentences in Turkish and German.

remains unaccented. To this effect the domain of focus narrows and the scope of focus does not spread over the whole sentence.

A crucial distinction in the identification of narrow focus concerns the size of the set of alternatives. A classification is made upon the distinction between information focus and contrastive focus. In (1.8) the difference between information focus and contrastive focus is demonstrated. Though the answers in (a) and (b) both represent narrow focus in the way that the scope of focus is on the subject and not on the whole utterance, they differ with respect to the set of alternatives. Whereas in (a) the set of alternatives is relatively open, it is reduced to two possible answers in (b) determined by the preceding question.

(1.8) (a) Wer malt ein Lama? (Who is painting a Lama?)
[Lena]$_F$ malt ein Lama. (Lena is painting a Lama.)

(b) Malt Lena oder Heike ein Lama? (Is it Lena or is it Heike who is painting a Lama?)
[Lena]$_F$ malt ein Lama. (Lena is painting a Lama.)

However, this distinction is discussed controversially in the literature. Whereas some authors argue for a notion of narrow focus, which does not differentiate between both subtypes (e.g. Ladd 1996, Gussenhoven 2004), other researchers crucially claim that contrastive focus is a separate category (Rooth 1992, 1996, Krifka 1992, Kiss 1998). In the following it will be shown by the discussion of different studies of different backgrounds (semantic, prosodic, and morphologic) that there are good reasons to assume a separate category for contrastive focus. The emphasis on the description of contrastive focus is made at this point due to the experimental design of the following empirical studies of this dissertation which elicit contrastive in-situ focus.

I.3.1.3 CONTRASTIVE FOCUS

For the type of focus for which I use the term contrastive focus, different terms have been defined in the literature, such as identification focus, alternatives focus, simply focus, or parallel focus (cf. Jackendoff 1972, Rooth 1992,1996, Krifka 1992, Kiss 1998, Valduvi & Vilkuna 1998, Féry 2007). All denominations agree on its property to represent the part of a sentence which is compared and elicited from a set of alternatives which are explicitly mentioned or arise from the context and are somehow compared with each other. Accordingly, Selkirk (2007) uses the term contrastive focus to designate the status of a constituent. A main criterion in the identification of contrastive focus marking is that it is typically absent in answers to *wh*-questions (15 a) and typically present in e.g. correcting statements as pointed out by Krifka (2007) and demonstrated in (1.9) (b):

(1.9) (a) Which color is your new car?
It is yellow.

(b) Surely, your new car is red.
No, it is yellow.

Following Tomioka (2006) the notion of contrastivity includes diverse linguistic phenomena like exhaustivity in question-answer pairs (1.10) (a), contrastive statements (1.10) (b), or corrective focus (1.10) (c). For Krifka on the other hand exhaustive focus as represented in (1.10) (a) would represent a separate type of focus.

(1.10) (a) Who did you talk to?
I talked to MARY (but no one else).

(b) I did not talk to REBECCA, but to MARY.

(c) Did you talk to REBECCA?
No, I talked to MARY.

Zimmermann (2007) on the other side argues that contrastive focus is best approached as a discourse-pragmatic phenomenon with grammatical reflexes. Grammatical marking by means of e.g. intonation contour, syntactic movement, clefts, morphological markers, provide the way for a speaker to direct the hearer´s attention. The special grammatical marking depends on specific discourse requirements at a specific point in the discourse, determined by the speaker´s intentions and assumptions about the knowledge of the hearer. On this base Zimmermann argues that it is impossible to predict contrastive focus marking only on the basis of its inherent properties or immediate discourse functions (answer, correction, etc. as shown in (1.10)). To this reason and departing from Steedman`s (2006) approach, Zimmermann formulates the semantic import of contrastive focus in a Contrastive Focus Hypothesis (1.11):

(1.11) **Contrastive Focus Hypothesis**

Contrastive marking on a focus constituent α expresses the speaker´s assumption that the hearer will not consider the content of α or the speech act containing α likely to be(come) common ground.

According to the Contrastive Focus Hypothesis, contrastive focus does not mark a contrast between explicit or implicit alternatives but it expresses a contrast between the conveyed information and the assumed expectation state of the hearer.

Despite the diversity of instances of contrastive focus as shown in (1.10) and its role as a discourse-pragmatic phenomenon, there are different analyses with respect to the grammatical representation of contrastive focus, including phonology. Whilst some scholars working on the focus-prosody interface do not assume any distinctive prominence for contrastive focus (Ladd 1996, Gussenhoven 2004), others claim special grammatical principles that cause a prominence distinction between contrastive and non-contrastive focus (Truckenbrodt 1995, Kiss 1998, Féry & Samek-Lodovici 2006, Büring 2006). The assumption that there is no phonological distinction for contrastive focus is going back to Chomsky (1971) and Jackendoff (1972) who claim that sentence stress is present on a constituent that is merely new in the discourse as well as on a correction to an assertion. This effect is similar to the phonological ambiguity outlined in example (12) above. Also later approaches concentrating on the relation between focus and pitch accents and contrastive focus vs. discourse newness keep the view of indistinguishable prominence (e.g. Selkirk 1984, Schwarzschild 1999).

However, facts do not always support this view to which reason Truckenbrodt (1995) and Rooth (1996b) independently propose a theory where the representation of contrastive focus in the syntax is different from that of non-contrastive focus. Evidence from intonation languages show that contrastive focus differs gradually from non-contrastive focus. To this effect, both propose a principle for the phonological interpretation of the syntactic representation and semantic interpretation of contrastive focus where focus marking (F-marking) is reduced to contrastive constituents. This claim is formulated by Kratzer & Selkirk (2007:99) in the Contrastive Focus Prominence Rule:

(1.12) **Contrastive Focus Prominence Rule (CFPR)**

Within the scope of focus interpretation operator, the corresponding F-marked (contrastive focus) constituent is the most metrically prominent.

As formulated in CFPR the level of stress on an F-marked contrastive focus constituent is greater than that of any other constituent within the scope of the focus operator. Phonetic evidence for this rule is provided e.g. by Katz & Selkirk (2005) and Selkirk (2006) for English and Truckenbrodt (2002), Baumann et al. (2006, 2007) and Féry & Kügler (2008) for German. They experimentally show that the phonetic prominence by means of *f0* and duration of a contrastive focus constituent is significantly greater than that of non-contrastive constituents. Selkirk (2007) shows that a contrastive focus and a narrow focus can occur in the same sentence but a contrastive focus is stronger than a narrow focus, whereas a narrow focus itself is stronger than the same part of an all-new sentence.

However, contrastive focus may also bear the lowest possible degree of phrase stress in so called Second Occurrence Focus (SOF), i.e. when a focused constituent has previously been introduced into the discourse. It has been established that SOF typically bears no pitch accent since it is syntactically marked by givenness (G-marked). Nonetheless, it is experimentally shown that SOF may bear some degree of phonetic prominence despite its givenness status (e.g. Féry & Ishihara 2005). In between theses extremes of stress, CFPR also predicts a level of phrase stress on contrastive focus constituents which is at the same level of that predicted for non-contrastive constituents. In this regard Selkirk (2007) argues that CFPR has erroneously caused the assumption that there is no grammatically driven distinction between contrastive and non-contrastive focus. Evidence for a categorical distinction between information focus and contrastive focus is also provided in the grammatical systems of West Chadic languages. Hausa and Bole, e.g. show a clear tendency to leave information focus unmarked, whereas contrastive focus has a grammatical correlate. The same distinction is drawn with respect to the prosodic marking of p-focus and c-focus in Turkish by Işsever (2003) which will be outlined in detail in chapter II. In Hausa syntactic movement of contrastive elements is implemented and in Bole contrastive elements are morphologically marked. Gúrúntúm marks all kind of foci morphologically. Additionally, they can be highlighted by fronting them to the sentence initial position, thus creating a contrastive focus interpretation.

I.3.2 FOCUS PROMINENCE AND ALIGNMENT

Apart from the notion of focus in the framework of Alternative Semantics (Rooth 1985, 1992) as mentioned above, focus has been described in further ways, in particular as highlighting a part of an utterance, or as prominence. Though highlighting as a term remains relatively unclear with respect to its actual meaning, intuitively it is somehow related to the important part of an utterance. Erteschik-Shir & Lappin (1983:420) describe *dominance* as crucial in the intent of the speaker to direct the attention of the hearer to the constituent that is the carrier of the information that stacks out from the rest of the sentence. In Erteschik´s (1986) framework, stress pattern follow from the assignment of dominance. Within this assumption intonational prominence is a structural manifestation of focus-hood and focus is defined by means of nuclear stress assignment. More precisely the dominant constituent corresponds to the focus of the sentence. Nonetheless, the structural manifestation of focus is not reduced to intonational prominence. Prominence can also be reflected in the morpho-syntax. Gussenhoven (2007) provides a list of structural devices used to express information structure across languages (1.13):

(1.13) Cross-linguistic structural expressions of IS (Gussenhoven 2007: 188)

1. Syntax:
    a) position in syntactic structure
    b) focus particle
2. Morphology:
    a) affixiation
3. Phonology
    a) presence of pitch accent
    b) type of pitch accent
    c) prosodic phrasing

As demonstrated in (1.13) prominence may be achieved in different ways by different means. To this effect, languages vary in choosing some aspect of their grammatical structure, prosodic, syntactic, or morphological to realize focus, but among all cross-linguistic variation they still have a common analytical apparatus that capture cross-linguistic variation in the realization of focus which Büring (2010) calls focus prominence:

(1.14) **Focus Prominence**

Focus needs to be maximally prominent.

With respect to prominence marking by prosodic means the list in (1.13) is not exhaustive. Further prosodic means have been observed as prosodic correlates of focus, such as break introduction (e.g. D'imperio & Michelas 2010). Furthermore, focus marking can work at the syntax-prosody interface, since it has also been associated with prominent prosodic positions in certain languages. For Turkish and Hungarian e.g. the immediately pre-verbal position has been claimed as the syntactical position for prominence marking resulting from general prosodic requirements such as sentence stress assignment (cf. Özge & Bozșhain 2010 for Turkish, Kiss 1998 for Hungarian).

However, most approaches that relate the marking of focus by prosodic prominence assume a direct correspondence between semantics and phonology by means of pitch accent assignment, i.e. a focused constituent requires the nuclear pitch accent (e.g. Jackendoff 1972, Rooth 1985, Selkirk 1995, Zubizaretta 1998, Schwarzschild 1999, Truckenbrodt 1999). Based on Gussenhoven (1992), prosodic phrases are formed upon pitch accents. The most prominent pitch accent of a prosodic phrase is assumed to be the head of it. The nuclear pitch accent is assigned to the most prominent head of an utterance. In Jackendoff (1972:247) the following rule is formulated:

(1.15) If a phrase P is chosen as the focus of a sentence S, the highest stress in S will be on the syllable of P that is assigned highest stress by the regular stress rules.

Truckenbrodt (1995:160) similarly proposes:

(1.16) If F is a focus and DF is its domain, then the highest prominence in DF will be within F."

Based on the results of previous cross-linguistic research (e.g. Hayes & Lahiri 1991 for Bengali, Elordieta 2007 for Basque, Skopeteas & Féry 2010 for Georgian, Féry 2013 for French) it has been shown that pitch accent assignment is not the only strategy across languages to indicate prosodic prominence. Prominence can also arise from changing the prosodic phrasing of an utterance. Based on Selkirk's (e.g. 1986, 1995) influential interface approach, for most languages a mapping between syntactic structures and phonological structures by means of their boundaries is expected. To this effect, syntactic phrases are mapped onto prosodic phrases. Information structure however, can initiate a restructuring of prosodic phrases resulting in an increase of prominence on focused constituents without necessarily modifying their acoustic correlates, e.g. by means of pitch increase.
Instead of reducing prominence to pitch accent implementation and modification, Truckenbrodt (1995) proposes a broader concept of prominence and its relevance for focus realization adapting McCarthy & Prince's (1993) alignment constraint ALIGN. The constraint is used in Truckenbrodt (1995) to conceptualize the typical correspondence of focused constituents and rightmost or leftmost prosodic boundaries. In other words, focused constituents are aligned to prosodic boundaries since they tend to be realized at the edges of prosodic constituents. Crucial in the understanding of Truckenbrodt's (1995) concept of prosodic alignment is Truckenbrodt's (1995) concept of mapping. Based on Silkirk´s proposal that the prosodic boundaries of phonological phrases correspond roughly to maximal projections of lexical categories, which is problematic in the case that various XP's are contained in another, such as objects in a VP, Truckenbrodt (1995) proposes WRAP, which offers at least three strategies for mapping. In the following prosodic phrases are indicted with (φ).

(i) **Radical splitting:** $(xp)_{\varphi}$ $(yp)_{\varphi}$ $(z)_{\varphi}$
Each XP gets its own φ.

(ii) **Moderate wrapping:** $(xp)_{\varphi}$ $(yp\ z)_{\varphi}$
Each XP gets its own φ and non-phrasal elements are wrapped with the closest phrase

(iii) **Radical wrapping:** (xp yp z)$_{\varphi}$

Every element of the biggest Xp gets wrapped into one φ

Adopting these ways to phrase prosodic constituents, focused constituents can be wrapped according to the requirements of prosodic prominence. When a focused constituent is not located at a prosodic boundary, the mapping can undergo changes. If an element is not by default the head of the next higher prosodic constituent, then focus prominence wants the prosodic structure to change to make the element the head of the next higher prosodic constituent, aligning the constituent to a prosodic boundary. To this effect, two options arise to make the focused constituent the most prominent in its domain. Either a boundary has to be inserted to improve alignment, or boundaries are deleted, most typically by post-focal de-accentuation which aligns the focused constituent to the right-most prosodic boundary.

On the base of Truckenbrodt`s (1995) established theory of WRAP for mapping and ALIGN for prominence, Büring (2010) describes three ways to make a focused constituent maximally prominent in its phrase. L1 and L2 in Büring's (2010) approach represent different prosodic levels. According to Libermann & Prince (1977), Selkirk (1984), Nespor & Vogel (1986), Hayes (1989) amongst others, the prosodic structure is composed of different constituents in a hierarchical structure, where a higher leveled category dominates the lower one. The two levels represented here, indicate the level of the phonological phrase and the intonation phrase (cf. Pierrehumbert 1980). Asterisks mark the pitch accents of the phrases in (1.17). Only the most prominent pitch accent corresponding to the focused constituent is projected to the higher level and constitutes the head of the intonation phrase.

(1.17) **Prominence marking strategies:**

Swap: The head swaps to the focused element on the next higher prosodic Constituent.[3]

(*)$_{L2}$

(*)$_{F}$(*)$_{L1}$

[3] Note that the outlined examples from (Büring 2010: 181ssq) represent a right-headed language which in the default representation would show main prominence on the right branch side.

Insert: Phrasing is changed by the insertion of an additional boundary which makes the focused constituent the head of its own phrase.[4]

(*) (*)$_{L2}$

(* $_F$ *)$_{L1}$

Delete: Phrasing is changed by the deletion of a boundary which makes the focused constituent the head of the whole phrase.[5]

(*)$_{L2}$

(*)$_F$ (*)$_{L1}$

Focused constituents, representing the prosodic heads of their domain, become the most prominent constituents of an intonation phrase either by swaping the pitch accent or via the deletion or introduction of prosodic boundaries. To this effect, prosodic boundary alignment works on prominence without actually modifying the pitch accent itself. The prominence of nuclear pitch accents is related to alignment, since focused constituents are preferably aligned at the edge of a syntactic and/or prosodic constituent. Once a constituent is aligned it becomes prominent. Büring (2010) classifies languages which relate prominence to prosodic boundaries as boundary languages.

This view of focus is well motivated for a variety of languages however, Féry (2013a) shows that the equivalence of alignment and prominence might not be convincing for other languages. For Féry (2013a) alignment and prominence are separate prosodic correlates and the most common prosodic realization of focus is alignment. Languages can vary in the implementation of prominence and languages may differ in the phonetic realization of phrase boundaries and heads (e.g. via stress, pitch, lengthening and pauses). Furthermore, the relation between focus and pitch accent is not systematic and languages may not even mark IS by prosodic means at all. Phrase- and tone languages have been shown to not use prosody for information structural advices to the same extend as intonation languages do (e.g. Zerbian 2006, Hartmann & Zimmerman 2007). French, e.g. has no obvious phonetic marking of higher level heads but clear boundary markings (Féry 2013b). The correlation of pitch accent, prominence, and alignment is therefore difficult from a cross-linguistic perspective. To this effect, Féry (2013a) states that not all languages associate focus with prominence, but all try to align focus.

Féry & Ishiahara (2009) furthermore, claim for German, that prosodic phrasing is not determined by IS, but solely relies on the syntactic structure. IS instead, is related to a higher register scaling of the

[4] Büring (2010) additionally mentions that the insertion alone is not sufficient in this case to make the focused constituent more prominent, it just does not make it less prominent than the right constituent. To become more prominent it has to be the head of a next higher level (L3).

[5] Büring (2010) additionally mentions that the deletion only makes sense if the left constituent manages to become the head of the whole phrase, which is supposed to be left headed in the example.

whole phrase. This will be outlined in more detail in chapter V, providing an overview of IS marking in German.

I.4 GIVENNESS

A further technique to package information corresponding to and in order to develop the CG is givenness, which beside focus is of special interest for the present study. Just as focus, givenness represents an extra-linguistic aspect of IS and shapes the grammatical devices implementing them. Givenness describes the information that the speaker believes to be known and accepted as true by the listener in contrast to new or focused information which the speaker believes to be not yet known by the listener.

For Vallduví (1993) and other followers of the Prague School, given elements are most commonly related to the CG. The informational force is a relational property and depends on its relation with the ground. In contrast to the concept of focus, where the focused constituent is the carrier of the information of a sentence, the ground is not considered as information. It only permits the appropriate entry of information into the hearer´s knowledge store. Therefore it is not in the scope of information. Focus on the other side is always within the scope of information, but it is not the only thing which can appear in the scope of focus.

Schwarzschild (1999) contributes a formal status to the notion of givenness. He assumes that a given element is entailed in the previous discourse and the use of the notion givenness is reduced to textual bounded givenness in contrast to contextual givenness. Accordingly, Krifka (2007:26) provides the following general definition of givenness (1.18).

(1.18) A feature X of an expression α is a Givenness feature if X indicates whether the denotation of α is present in the CG or not, and/or indicates the degree to which it is present in the immediate CG.

The definition in (1.18) allows saying that an expression is given to a particular degree, since it includes expressions which are maximally salient in the immediate CG or just present, as well as expressions which are given in the general CG or not given at all. Based on Rooth´s (1985, 1992), who states that every expression has an ordinary semantic value and an additional focus semantic value, Selkirk (2007) proposes that the ordinary semantic value and the focus semantic value are involved in the definition of a given (G-marked) constituent (1.19):

(1.19) **The G-marking Condition**

An F-marked constituent α will be G-marked if the phrasal scope φ of the focus~ operator corresponding to it has an antecedent in the discourse for its focus semantic value [[φ]]f. Otherwise, a constituent φ will be G-marked if it has an antecedent in the discourse for its ordinary semantic value [[α]]o.

As for focus, human languages have developed devices for givenness with which interlocutors can contextualize that something that is present in the discourse is taken up again. In contrast to the relation of prominence and focus, givenness is often indicated by a lack of pitch accents. Schwarzschild (1999) proposes de-accenting as the probably most relevant phonological category of information structure, indicating givenness. Krifka (2007) furthermore, distinguishes between two phenomena that refer to givenness. On the one hand structural devices, such as de-accentuation, word order and deletion, on the other hand specific anaphoric expressions can refer to it. Anaphoric expressions have a givenness feature in their lexical specification, such as personal pronounce, clitics, person inflections, demonstratives and so on. (1.20) Represents an example for de-accentuation.

(1.20) Ten years after John inherited an old farm, he SOLD [the shed]$_{\text{Given}}$.

In (1.20) according to Umbach (2004) who originally provided this example, *the shed* has to be de-accented to be understood as referring to the farm, otherwise it would provide a different meaning, such as the shed that came with the farm. To this effect, Féry & Samek-Lodivici (2006) propose that discourse given constituents are identified by a G-marked feature in the grammar which imposes destressing of given constituents. Accordingly they propose the constraint Destress Given as formulated in (1.21).

(1.21) **Destress Given**

A given phrase is prosodically non-prominent.

Destress given refers to the absence of phrase stress on a discourse-given constituent. However, given elements do not necessarily have to be de-accented. Apart from the fact that not all languages use prosodic devices to mark IS and in particular givenness by de-accentuation, in the example in (1.22), adopted from Féry (2007), problems arise with respect to the de-accenting of given constituents.

(1.22) (Who was loved by two men, Audrey or Lucy?)

It was LUCY.

Lucy in (1.22) is discourse given, since it has been mentioned in the preceding question but it is also accented since it is contrastively focused. The crucial question here is whether a given constituent can also be associated with an F-marked feature and remain accented.

A typical example which combines elements that are associated with focus and givenness is Second Occurrence Focus (SOF) (e.g. Rooth 2004, Féry & Ishihara 2005). Féry & Ishihara (2005) show for German, that weak correlates of pitch accents can be found in the post-nuclear position on a given element. In (1.23) an example for SOF is provided, adopted from Partee (1999).

(1.23) Everyone already knew that Mary only eats [vegetables]$_{F.}$

If even [Paul]$_F$ knew that Mary only eats [vegetables]$_{SOF,}$ then he should have suggested a different restaurant.

Büring (2006) derives the distinct prosody of SOF as shown in (1.23) entirely from the general CFPR as outlined above. He distinguishes it from other types of contrastive focus on the base of focus embedding, stating that SOF is special in its status since it is embedded within the domain of another contrastive focus. Accordingly, SOF occurs only when embedded within the scope of some higher focus. Selkirk (2007) on the other side argues that the presence of another primary focus as in (5) is not a necessary condition for SOF. However, a SOF has to be distinguished from a merely discourse given constituent, which is only G-marked. To this effect, Selkirk (2007) proposes that it involves both features: given and contrastive focus. Hence, the G-marking Condition predicts both, F-marking and G-marking.

The cases of SOF show that de-accentuation is a common feature to indicate givenness, especially in intonation languages, but it is not even an obligatory feature in those languages. A further example for different ways of prosodic marking of givenness is provided in Swerts, Krahmer & Avesani (2002) where it is shown that Dutch and Italian both signal information status with respect to givenness by prosodic means but in a rather different way. In Dutch accent distribution is the main discriminative feature: new and contrastive information is accented whereas given information is de-accented. In Italian on the other side distribution is not a discriminative factor, since constituents are always accented, irrespective of its information status. However, a gradient difference is observed since accents on given constituents are perceived as less prominent by the Italian speakers of their study. According to previous similar observations by Cruttenden (1997), Swerts, Krahmer & Avesani (2002) call this strategy re-accenting. Previous to this study, Cruttenden (1993) also mentions with respect to Romance languages that the tendency for de-accentuation of givenness is not a universal fact. In particular Spanish and Catalan sometimes resist de-accentuation. The same effect is found by D'Imperion (1997) for Neapolitan Italian and by Farnetani & Zmarich (1997) for Northern Italian. However, de-accentuation of given constituent is crucial in the marking of givenness in monolingual and bilingual Turkish as will be outlined by the results of experiment 1 and 2 of the present dissertation.

Due to the observations of SOF and its relation to contrastive focus the traditional view based on Schwarzschild (1999), who proposes that givenness is squared recursively; i.e. focus is restricted by givenness, is scrutinized. By that means focus cannot be understood as a marked feature in the syntax whereas givenness is threatened as unmarked. To this effect Féry & Samek Lodivici (2006), Selkirk (2007), and Krifka (2008) propose marking rules for both categories: F-marking and G-marking. With respect to F-marking, the phonology of contrastive focus as outlined above furthermore, indicates that there cannot be a unitary focus marking (F-marking) feature. Based on the additional observations of a distinction between informational focus and contrastive focus outlined above, Selkirk (2007) furthermore proposes a three-way distinction based on previous work by Jackendoff (1992), Rooth (1992, 1996), Féry & Ishihara (2005). Contrastive focus, givenness, and discourse new should be represented differently in the syntax accompanied by a different phonological representation:[6]

- F-marking for contrastive focus
- G-marking for discourse given
- No marking for discourse new

I.5 SUMMARY

In the previous chapter the basic notion of IS with respect to the emphasis in the following experiments was outlined. It was shown that IS has formal concepts, referring to the linguistic means used to indicate IS categories, and also refers to extra-linguistic concepts. One of the most influencing extra-linguistic concepts of IS is the notion in the tradition of Chafe (1976) who describes

[6] Note that Fanselow (2007) proposes an IS-free syntax. He claims that the computational part of syntax does not refer to positions and processes directly linked to IS. By that means e.g. syntactic movement of a focused constituent or a topic is not an IS inherit property, but independent of it and related to the presence of formal features in the syntax. This view of IS goes in hand with Gussenhoven`s assumption that structural properties that correlate with IS are not exclusively related to IS. Fanselow (2007) and also Féry (2007) assume the three way distinction of IS marking is not anchored in syntax, but a property of IS itself. Syntax is just one device where IS features can be implemented.

IS as a phenomenon of *information packaging* to fulfill the immediate communicative needs of interlocutors. The concept of *information packaging* is involved into a further central concept of IS theory: Stalnaker's (1974) notion of *Common Ground* (CG) which is dynamically developed by means of formal aspects. The formal aspects of IS, precisely the relation between meaning and surface structure, are manifold and language specific. Furthermore, it was shown that focus and givenness marking are two techniques which are used to develop the CG by means of packaging. With respect to focus marking the size of focus is crucial in the distinction between broad and narrow focus. Furthermore, the size of the alternatives is crucial in the distinction between informational focus and contrastive focus. Furthermore, it was shown that contrastive focus is more likely to be indicated by linguistic means cross-linguistically than information focus. This aspect is considered in the elicitation of the experimental data of the present study. Since focus marking is in the center of the present research and it is cross-linguistically more likely to be found in contrastive focus, it is more likely to find a prosodic correlate of focus marking in Turkish concentrating on contrastive focus. With respect to the investigation of focus marking in Turkish by means of its prosodic correlates furthermore, different cross-linguistic strategies to mark IS were outlined. Prosodic prominence and prosodic alignment have been discussed here as the crucial approaches. Both provide the baseline for the following typological classification of focus marking in Turkish.

CHAPTER II: ASPECTS OF TURKISH PROSODY

(…) en turc, la demarcation du segment initial par la hauteur intonative depend d'une mise en contraste énonciative, liée au changement de theme ou de propos. En d'autres termes, s'il n'existe pas de changement de théme ou de propos, l'intonation represent une configuration trés peu module. (Nacar Logie 1997: 271)

II.1 INTRODUCTION

In this chapter an overview of various aspects of Turkish prosody is provided. It describes the Turkish word stress system, the remarks of general intonational phonology and the prosody of yes/no questions and information structure which are in the center of the whole study. The chapter closes with the presentation of an experimental production study conducted with Turkish monolingual speakers to shed light on the prosodic correlates of IS in contrastively in-situ focused Turkish yes/no questions. The results of the study serve as a baseline for comparison with the Turkish of the bilingual German-Turkish speakers of experiment 2 in order to describe structural changes in the realization of both varieties. The results of the monolingual study offer new insights with respect to the prosodic realization of in-situ focus marking in monolingual Turkish. It will be shown that *f0* by means of de-accentuation is a prosodic correlate of IS marking in monolingual Turkish. By that means it will be shown that focus alignment is the most adequate strategy to describe prosodic focus marking in Turkish and that it can be classified as a boundary language by means of focus typology.

II.2 WORD STRESS IN TURKISH

To start my overview of Turkish prosody I will refer to the phenomenon of stress on the word level, before going over to the characters of sentence intonation in Turkish. An introduction into the basic rules of word stress is of advantage for two reasons. First, the phonological classification of Turkish in the literature either as a stress-accent (e.g. Kornfilt 1997, Kan 2009), a pitch accent (Levi 2005, Kamali 2011), or as a phrase language (Güneș 2013) depends in great aspects on the respective assumptions about the word stress system in Turkish. Second, exceptional word stress is crucial for the design of the target sentences of the following experiments.

Turkish word stress has been described within purely phonological systems as in Kabak & Vogel (2001), but also within syntactic approaches such as Kahnemuyipour & Kornfilt (2007) arguing for syntax-derived stress domains. Kamali (2011) tries to show a systematic interaction between phonological, lexical, information structural and syntactical rules, but ends up favoring a syntax driven-stress system.

The term stress has been used in studies of Turkish phonology to refer to acoustic prominence on the word level as well as on the sentence level. Likewise the term accent has been used for both prosodic levels. I will use the term word stress referring to prominence on the word level and sentence stress to refer to prominence relations on the sentence level.

Apart from Kamali (2011), who assumes *accentlessness* for some Turkish words, most approaches agree that canonical word stress in Turkish is realized on the last syllable of a word. Additionally, stress can be anchored in lexical roots or it can be determined by stressed and pre-stressing suffixes. These suffixes are crucial in the target sentence design since they are described to have an impact on the intonation contour in Turkish.

II.2.1 REGULAR STRESS

It is generally assumed that only one main stress[7] is implemented on a prosodic word (PW)[8] and that two different systems co-exist in Turkish: final non-lexical stress and non-final lexical stress (Lee 1961). Final non-lexical stress is described as the regular stress pattern in Turkish.

Final stress is implemented on the designated syllable independent of morphological modifications. To this effect, word stress always swaps over to the final syllable in regular non-lexical stress as demonstrated in (2.1). The nucleus of the stressed syllable is indicated by capitals in all following examples.

[7] Kornfilt (1979) argues that compounds do have a secondary stress on the right member.

[8] The prosodic word has been defined in order to account for the non-isomorphy between morphology and phonology (cf. Selkirk 1984, Nespor & Vogel 1986)

(2.1) **Regular word stress** (from Sezer 1983)

Tan**I**	(know)
Tanı-d**I**k	(acquaintance)
Tanı-dık-l**A**r	(acquaintances)
Tanı-dık-lar-**I**m	(my acquaintances)
Tanı-dık-lar-ım-**I**z	(our acquaintances)
Tanı-dık-lar-ım-ız-d**A**n	(from our acquaintances)

To represent the prosodic phonology of regular word stress in Turkish, Kabak & Vogel (2001:324) postulate the following stress assignment rule (2.2):

(2.2) **Stress Assignment Rule:**

Stress the final syllable of a phonological word.

Kamali (2011) instead proposes that finally stressed words are actually truly *accentless* words.[9] Based on the acoustic measurements of correlates of word stress in Levi's (2005), which propose that *f0* is the most reliable acoustic feature of word stress in Turkish, Kamali (2011) assumes that only words with non-final stress are aligned with pitch accents in the form of (H*L), whereas all remaining words are not aligned with pitch accents and remain almost plain in their *f0* contour. Accentlessness on the word level has been described as typical phenomenon of pitch accent languages such as Basque or Japanese (cf. Hualde 2002, Beckmann & Pierrehumbert 1988). However, Levi's (2005) measurements also show a significant increase of other acoustic correlates of word stress for both; final and non-final stressed syllables. I will refer to this study in more detail in the next subsection on acoustic correlates of word stress.

In contrast to the controversial discussion with respect to the existence of a regular stress pattern in Turkish, the literature agrees by and large that Turkish has an (additional) non-final stress pattern (cf. Inkelas 1999, Göksel & Kerslake 2005 among many others).

II.2.2 NON-FINAL WORD STRESS

In the traditional view of word stress in Turkish, the final stress rule as proposed by Kabak & Vogel (2001) is overridden in certain cases of lexically stressed roots and some lexically or pre-stressing

[9] The term accentlessness is based on her classification of Turkish as a pitch accent language as will be outlined later. Here it refers to words without word stress.

suffixes and certain types of compounds. Non-final stress can be classified into (i) stems with lexical or idiosyncratic word stress and (ii) bound morphemes with a stress specification. A common characteristic of (i) idiosyncratic word stress is that the lexical stress overrides all possible accents, as long as further suffixiation does not disturb the stress placement as shown in (2.3). [10]

(2.3)	b**E**bek	(baby)
	b**E**bekler	(babies)
	Ankara	
	Is**tA**nbul	

Since idiosyncratic word stress is not crucial for the experimental design of the present study I will not go into further detail here, but refer to (ii) morphemes with stress specification which are used in the segmental design of the following experiments.

II.2.2.1 MORPHEMES WITH STRESS SPECIFICATION

Besides idiosyncratic word stress, some Turkish morphemes cause exceptional word stress. These morphemes are lexically stressed suffixes and pre-stressing suffixes. Of special importance for the following experiments are the progressive marker –İyor, and the question marker –mI.

II.2.2.1.1 LEXICALLY STRESSED SUFFIXES

The first group of morphemes with stress specification are locally stressed suffixes, which require word stress on a non-final syllable on themselves. Inkelas (1999) identifies three stress-bearing suffixes outlined in (2.4). Korkmaz (2003) adds the negative potential marker to the group of lexically stressed morphemes. All are bi-syllabic and bear stress on their first syllable.

[10] Ankara and Istanbul are representatives of so called sezer stems (Inkelas 1999), first described by Sezer (1981). Especially Turkish place names show a distinct stress pattern which follows the Latin Stress Rule. That is a heavy penult bears stress in the presence of a light antepenult. Otherwise the antepenult bears word stress as demonstrated

(2.4) **Stress-bearing morphemes in Turkish**

- **İ**yor (progressive)
- **E**rek (adverbial) 'by'
- **İ**nce (adverbial) 'when'
- (y)**E**me (negative potential marker)

For cases in which several accented suffixes are combined in one word Van der Hulst & Van de Weijer (1991) propose that the leftmost stress-bearing suffix will bear the word stress (2.5).[11]

(2.5)	heyecanlan-**İ**yor	(gets exited)
	heyecanlan-**İ**ver	(get quickly excited)
	heyecanlan-**İ**ver-iyor	(gets quickly excited)

In the design of the following experiments all sentences contain a verb in the sentence final position which ends with the progressive marker –İyor and bears stress on itself, precisely on the penultimate syllable. The exceptional word stress pattern on sentence final constituents is chosen in order to avoid tonal clash of pitch accents and final boundary tones which might be of crucial relevance in the implementation of prosodic markers for IS and sentence type.

II.2.2.1.2 PRE-STRESSING SUFFIXES

In addition to the outlined stress-bearing suffixes which change regular word stress in Turkish, some suffixes exist which do not bear lexical stress on themselves, but trigger the preceding syllable to bear word stress. In (2.6) three pre-stressing suffixes from Kamali (2011) are outlined: the instrumental, the negation, and the question marker. This list is by no means exhaustive.

(2.6) **Pre-stressing suffixes**

arab**A**	bir**A**k	ok**U**
(car)	(leave(IMP))	(sleep(IMP))
arab**A**yla	bir**A**kma	ok**U** mu?
(car-INSTR)	(leave-NEG(IMP))	(sleep (IMP) Q)

In the literature several approaches provide explanations for the pre-stressing phenomenon of these morphemes. Kahnemuyipour & Kornfilt (2007) provide a syntactic analysis which is followed by

[11] Levi (2005) describes this culminativity property of Turkish as a common characteristic of pitch accent languages.

Kamali (2011). Pre-stressors are related to certain syntactic configurations, meaning that the prosodic structure is determined by the syntactic structure up to the point that syntax determines the location of word stress. Syntactical restrictions determine the stress bearing syllable in the way that, e.g. word order conditions restrict stress implementation. With respect to the question morpheme –mI, Kamali suggests that word order restrictions do not allow any other stress bearing elements after the element the question-suffix attaches as outlined in (2.7) an example taken from Kamali (2011).

(2.7) *ALI mi ISKAMBIL oynadi? (Intended: Is it Ali who played CARDS?)
(Ali Q card play-past)

In (2.7), the subject *Alı* is adjacent to the question particle. To this effect, the following object *ıskambıl* cannot bear further stress. However, this observation is a phenomenon related to sentence stress and IS, as will be shown later.

In addition to accounts which provide a non-phonological explanation to a phonologically reflected phenomenon, Kabak & Vogel (2001) provide a phonological approach. The pre-stressing property of some Turkish morphemes is explained in terms of prosodic organization. Pre-stressing suffixes such as the question particle -mI are defined as prosodic word adjoiners (PWA) which are not part of the PW itself, but are morphemes which attach to them, as demonstrated in (2.8). To this effect, the stress that surfaces as pre-stress is indeed the expected final stress plus an additional PWA in form of an adjoined morpheme.[12]

(2.8) **Prosodic Word Adjoiners**

gid-ecék	(go-FUT)	regular stress
(gid-ecék)$_{PW}$-mi	(go-FUT Q)	pre-stressed by interrogation suffix

II.3 ACOUSTIC CORRELATES OF WORD STRESS IN TURKISH

Since approaches of the prosodic classification of the Turkish phonological system are in great aspects based on the observation of the acoustic realization of word stress, it is worth to have a look at this aspect of prosody too. *F0* has been argued to be the most reliable cue for word stress in Turkish in contrast to intonation languages which primarily use it on the phrase level (Konrot 1981). Nonetheless, other acoustic correlates, such as intensity and duration seem to be involved in the

[12] A complete list of prosodic word adjoiners is provided in Kabak & Vogel (2001).

realization of word stress in Turkish canonically stressed words, as well as in words with non-final word stress. Departing from Konrot (1981), Levi (2005) provides a phonetic examination of word level stress in Turkish which motivates her to classify Turkish as a pitch accent language[13, 14]. In a production study Levi (2005) tests near minimal pairs which were either regularly stressed or pre-stressed through suffixation and embedded in the same carrier phrase.[15] The results indicate a statistically significant difference between stressed and unstressed syllables in terms of duration, *f0* and intensity and a clear significant difference between words with final and non-final stress with respect to *f0*.

With respect to duration, the results show that stressed syllables have greater length than unstressed syllables and that nouns with stress on the final syllable show an increase in duration, while those with penultimate stress show a decrease on the final syllable. Although Levi's measurements show a statistically significant difference between stressed and unstressed syllables, she considers the difference "undramatic". She concludes that duration is not a reliable correlate for stress location, referring to studies which claim that duration differences between 10-15 ms on a 100 ms target would be necessary in order to be perceptible. The overall difference of her measurements is approximately 4 ms, excluding voice onset time (VOT). However, a perception study is not included into her analyses.

Likewise, Levi (2005) considers the differences in intensity between stressed and unstressed syllables. Although her measurements show that finally stressed verbs have a significantly higher intensity in the stressed than in the unstressed syllable, Levi (2005) doubts the perceptual relevance of that difference. Her measurements indicate an overall average difference of five dB, which she considers outside perceptibility.

Levi's data furthermore, show significant differences in the *f0* peaks of stressed and unstressed syllables. In figures (2.1) and (2.2) the sample pitch tracks of a minimal pair of Levi's data are provided.

[13] According to Beckman (1986) pitch accent languages modulate only pitch in marking a phonological prominent syllable.

[14] In contrast to my notion, Levi denominates word stress as word accent based on her assumption that Turkish is a pitch accent language.

[15] Note that it is a common practice to elicit acoustic correlates of word stress by embedding words in carrier sentences. However, an influence of sentence level stress on the results cannot be excluded.

Fig. (2.1): Pitch track for the word *banMAK* from Levi (2005: 80)

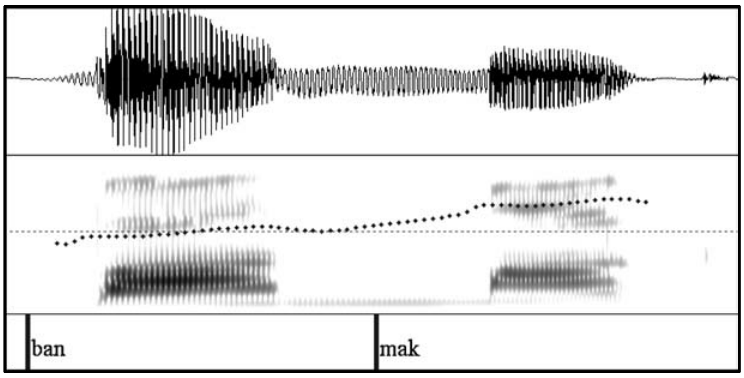
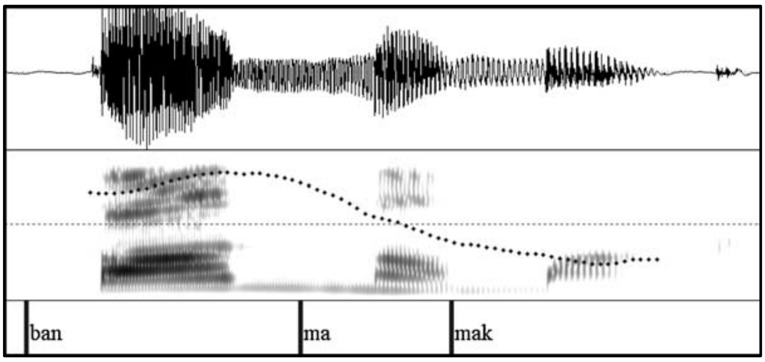


Fig. (2.2): Pitch track for the word BANmamak from Levi (2005: 81)



What can be seen in the pitch tracks in figures (2.1) and (2.2) is a rise in *f0* in the ultimate syllable in the final stress condition *banmAk* and an *f0* drop on the final syllable in the non-final stress condition *bAnmamak.* The magnitude of the rise in pitch in regular stressed words is on average 29 Hz for nouns and 21 Hz for verbs. The magnitude of the *f0* fall after a non-final stressed syllable is -98 Hz for verbs and -62 Hz for nouns. An additional discriminant analysis furthermore identifies *f0* as the best predictor for word stress, allowing for over 90% classification accuracy. To this effect, Levi proposes pitch as the most reliable indicator of prominence on the word level in finally stressed and exceptionally stressed words, motivating her classification of Turkish as a pitch accent language. On the base of observation of pitch accent realization on final and non-final syllables, Levi (2005) proposes that an (H*) pitch accent is aligned to words with canonical word stress and that an (H*L) pitch accent is aligned to words with non-final word stress, since they show a drop of *f0* after the stressed syllable.

However, Levi does not argue that pitch is the only indicator for stress as typical for pitch accent languages. Actually, she proposes that the pitch increase on finally stressed words (21-29 Hz) is too small and cannot be the sole indicator for final word stress in Turkish. Since intensity also increases on finally stressed syllables, it might be considered as an additional cue in cases where pitch movement is not very salient. What can be concluded from Levi's study for the acoustic correlates of word stress is that there is no clear correlate to it, but pitch, duration and intensity are involved to some extend in Turkish word stress.

II.4 SENTENCE LEVEL PROSODY IN TURKISH

Based on the previously outlined assumptions on word stress in Turkish, three distinct classifications of the Turkish sentence level prosodic system have been proposed: Turkish is either classified as (i) a stress-accent language (e.g. Lee 1961, Lewis 1967, Sezer 1981, Kornfilt 1981, Kan 2009, Özge & Bozșhain 2010, İpek & Jun 2013,2014), (ii) a pitch accent language (Levi 2005, Kamali 2011), or as a phrase language (Güneș 2013ab).

In the traditional approach (i) Turkish is basically described on the base of previous description of intonation languages, mainly Pierrehumbert's (1980) analyses of English. To this effect, the PW is the domain of word stress which serves as the anchor point for the implementation of pitch accents on the sentence level. The term pitch accent is defined by a pitch movement associated with the prominent syllable of a word (cf. Boilinger´s 1958, Pierhumbert & Hirschberg 1990). Additionally, phrase boundary tones are implemented. Both may share the same segmental anchor point, however, the role of phrase tones is generic and therefore not reduced to the assignment to segmentally predestinated syllables like pitch accents, but can be aligned to each syllable as long as it is a phrase final syllable.

In contrast to the traditional classification as a stress-accent language, a different view of Turkish prosodic typology is initiated by Levi (2005) and further developed by Kamali (2011). Based on the acoustic data analyses outlined in the previous chapter, Levi (2005) assumes pitch accent as the most reliable correlate of stress in Turkish concluding that Turkish is a (ii) pitch-accent language. According to Beckman (1986), pitch-accent languages are supposed to use pitch as the main or single acoustic correlate to prominence in contrast to stress-accent languages, like German or English, which also make systematic use of other acoustic parameters, i.e. intensity and duration.

Departing from the observation of phrase boundary tones and a supposed lack of post-lexical meaning of pitch accents in Turkish, Güneș (2013ab) classifies Turkish as a (iii) phrase language. Based on Féry's (2010) observations of Indian languages and Jun's (2005) prosodic typology, phrase languages make only use of phrase boundaries and lack pitch accents on the word level as well as in the intonation contour. Despite this clear categorization, Güneș' (2013) approach is somehow double tracked since she also assumes the existence of (H*L) pitch accents on non-finally stressed words in

Turkish following Kamali's (2011) approach.

The differentiation between word stress bounded pitch accents and positional bounded phrase tones is crucial in the classification of Turkish by means of prosodic typology. Though there are several studies on Turkish intonation (e.g. Kan 2009, Kamali 2011, Güneş 2013, İpek & Jun 2013), there is no conventionalized model of intonational phonology at hand so far. None of the existing description models provides a fully established phonological inventory for Turkish. The existing studies deliver partial descriptions of phonological categories sometimes based on small and uncontrolled datasets as well as on intro-perspective assumptions of the native speaking authors. Nonetheless, generalizations about phonological categories are made on these bases in addition to postulating Turkish as a fellow language of much better investigated languages, which serve as a role model for description. In the following, I will provide an overview on the different descriptions of sentence level prosody in the framework of autosegmental-metrical phonology (AM). Ladd (1996) initially uses the term to refer to the approaches to intonation, which are developed following Pierrehumbert´s (1980) description of American English intonation. In AM-phonology intonation contours are analyzed as sequences of tones. Tones specify phonetic targets which are determined by pitch levels. The intonation contour of an utterance is described by means of a sequence of target points and their transitions. For a detailed description of AM-phonology I refer the reader to Peters (2014).

II.4.1 AM-MODELS OF TURKISH PHONOLOGY

In the present subsections four different AM-models of Turkish phonology are provided: The stress-accent language based model of Kan (2009) and it's further development by İpek & Jun (2013, 2014), the pitch accent language based approach of Kamali (2009), and the phrase language based description assumed by Güneș (2013). This representation is not exhaustive and the models are partly chosen by their representation of different typological classifications and their relevance for the description of the data set elicited for the present study on focus and sentence type. Although Özge and Bozșhain's (2010) study provides a phonological description of AM-categories, which explicitly refer to IS categories, the model is left beside at this point, since it is by and large based in the intonation model of Kan (2009), and will be discussed in a later chapter explicitly referring to the prosodic marking of IS in Turkish.

After the presentation of the four intonation models for Turkish, I will explain the categories which are used in the phonological annotation of the following experiments in monolingual Turkish.

Kan´s (2009) master thesis was the first study offering a tonal description of Turkish in the AM-framework and it still constitutes the bases for all further descriptions of Turkish intonation. Her model is based upon the biggest monolingual data set analyses conducted so far for Turkish. In order to primarily investigate the phonetics and phonology of phrasal domains in Turkish a corpus of semi-naturally recorded speech including 1152 sentences extracted from 1144 spoken dialogs of 8 native speakers was analyzed in Kan (2009). Within that corpus 148 declarative target sentences with a focus neutral context (all-new sentences) were extracted and analyzed with respect to the modes of mapping between syntax and phonology.

Similar to what has been proposed for Germanic languages, Kan (2009) reveals two levels of prosodic phrasing for Turkish: the phonological phrase (PPh) and the intonation phrase (IP). Both phrasing levels differ by means of boundary tone placement, pause distribution, head prominence and phrase final lengthening. Ip's can consist of several PPh's and PPh's can consist of several prosodic words (PW) of which only one bears a pitch accent. By that means phrase formation exclusively relies on pitch accent representation. Although PPh's can consist of several PW only the leftmost constituent of the phrase bears a pitch accent which constitutes the prosodic head of the phrase. Kan (2009) states that the assumption of prosodic heads which are represented by pitch accents is adapted here from Pirrehumbert's (1980) analysis of American English intonation (for a detailed analysis of phrase-level headedness consult Gussenhoven 1992). On the base of Kabak & Vogel's (2001) Phrase Stress Rule for Turkish which postulates stress on the first word of a PPh and Pierrehumber´s (1980) assumption of heads for phonological phrases Kan (2009:31) proposes a rule for Turkish phrase stress as formulated in (2.9).

(2.9). **Pitch Accent Placement Rule (PAPR)**

The head of a phonological phrase requires an intonational pitch accent.

To this effect prosodic boundaries may coincide with syntactic boundaries however, *syntactic clausehood does not have a direct reflex in prosodic organization; it does not result in prosodic partitioning at a unique level* (Kan 2009:115).

With respect to pitch accent prominence on the IP level, Kan (2009) proposes that the pitch accent of the final PPh represents the nuclear pitch accent of the IP. Assuming that prosodic domains are hierarchically organized as proposed by e.g. Selkirk (1981, 1986) and Nespor & Vogel (1986), the gridmark in (2.10) demonstrates Kan's assumption on phrase formation and head projections. The stress property of the stressed syllable of the left-most PW in a PPh is projected to the next higher prosodic level, corresponding to the PPh constituting the head of its phrase. The stress property of the right-most PPh is than projected to the next higher level (IP), representing sentence stress and IP-headedness, realized by means of the assignment of a the nuclear pitch accent.

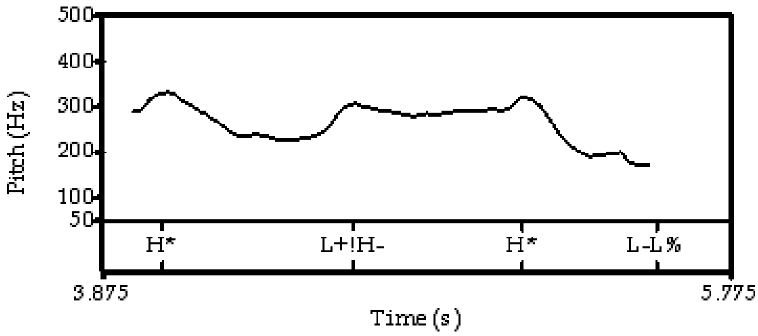
```
(2.10)  (                    x        )IP
        ( x          )(      x        )PPh
        ( x  )(   x    )(      x)(     x)PWd
        [On Yalovalı anılarını yazmış]
        (Ten people.of.Yalova memory-PL-POSS-ACC write-EVID)
        (Ten people of Yalova have written their memoirs.)
```

Despite the formation of PPh's upon a single pitch accent, PPh's are tonally marked by non-final low or high phrase boundary tones based on Pierrehumbert's (1980) assumption of phrase accents in English intonation. Kan (2009) assumes four phonetic variations of PPh-final boundary tones, which are associated with the right edge of each PPh, namely (L+H-), (L+!H-), (L-), and (H-). Following Pierrehumbert's analysis the L+ leading tone is instantiated in PPh's where a high pitch accent precedes the high phrase boundary tone to contrast the tune from a monotonous interpolation of both high tones. In her analysis high PPh-fianl boundary tones are restricted to pre-nuclear phrases, whereas a low PPh-final boundary tone is usually assigned to the last PPh in an IP.

In addition to PPh- final boundary tones, Kan (2009) also proposes IP-final boundary tones, namely a high final boundary tone (H%) and a low final boundary tone (L%). In her data, an additional *f0* drop is observed on the final syllable after the PPh-final drop, legitimating the existence of (L%).

Apart from the large inventory of boundary tone categories, Kan (2009) provides the largest inventory of pitch accent categories in Turkish. Kan (2009) describes four pitch accent categories for Turkish: H*, !H*, L+H* and L+!H*. Kan (2009) claims that they are used in free variation, i.e. the use of the tones does not create a semantic difference in her examples. All pitch accents include an (H*) which is modified through downstep indicated by "!" or leading tones, indicated by "+", which precede the nuclear tone, most typically assigned to the nucleus of a syllable. Downstep was originally observed in Pierrehumbert´s (1980) analysis for English and describes the relative scaling of subsequent high tones in an intonation contour. In the original model it was assumed that certain tonal configurations trigger downstep, for which it was considered a phonetic phenomenon. In certain languages however, downstep has an impact on the semantic meaning of an utterance and therefore has to be distinguished from a natural declination pattern. For German for example it has been observed that an interruption of a downstepped contour causes differences in phrasing by means of indicating the beginning of a new prosodic phrase or the marking of a focused constituent (e.g. Truckenbrodt 2002, Féry & Kügler 2008). This observation will be discussed in more detail in chapter V on German prosody. In Pierrehumbert & Libermann (1984), downstep and declination is treated as the same phenomenon and by that means it is predictable and an exclusively phonetic phenomenon. However, for a detailed analysis about the phonetics and phonology of downstep I refer the reader to Ladd (2008). For Turkish, Kan (2009) describes downstep as a phenomenon, which is purely phonetically motivated and which does not determine the semantic value of a prosodic phrase, as in German or English. The all-new sentences in her corpus can be either realized by downstep or not. However, a change in the semantic meaning of the utterance is not observed. By that means the outlined categories should basically constitute alternations of a single category (H*). Nonetheless, no concrete experimental studies which confirm declination and/or the existing of downstep in Turkish have been conducted so far. In figure (2.3) a sample pitch track from Kan (2009) is provided representing the tonal inventory of Turkish by means of pitch accents, PPh-final boundary tones, and IP-final boundary tones.

Fig. (2.3): Pitch track of a default intonation contour in Turkish from Kan (2011: 94)



H* L+!H- H* L- L%

[[**On** Yalovalı]PPh [anıları**nI** yaz-mıṣ]PPh]IP

(Ten Yalovalı memoir-Pl-3Sg.Poss-Acc write-Evid)

(Ten people of Yalova have written their memoirs.)

In figure (2.3) the intonation contour of the gridmark in example (2.10) is shown. It consists of two PPh's forming one IP. Each PPh is formed upon a high pitch accent on the leftmost PW; that is on *on* and on the final syllable of *anılarını*. Furthermore the pitch accent on *anılarını* represents the most prominent accent on the IP level and is considered the nuclear pitch accent realized on the immediately preverbal constituent. Furthermore, the figure in (2.3) indicates PPh and IP-final boundary tones. The first one is represented as (L+!H-) and aligned with the end of the PPh *on Yalovalı*. The second PPh-boundary tone is represented as a single (L-) tone, aligned after the verbal phrase. After this low phrase boundary tone an additional decrease is observed in the intonation contour, which Kan (2009) describes as IP final boundary tone L%.

Since regular word stress in Turkish is implemented on the word final syllable, as described in chapter II.2, it is likely that word stress bounded pitch accents and position bounded phrase tones share the same syllable. In those cases of tonal crowding, Kan (2009) supposes for Turkish that the high boundary tone (H-) is not realized in favor of the realization of the pitch accent.

In (2.11) the tonal inventory of Turkish is summarized as established by Kan (2009) consisting of four pitch accents and four PPh-phrase boundary tones in free variation in addition to two IP-final boundary tone categories.

(2.11) **Tonal inventory in Kan (2009)**

Pitch accents:	H*, !H*, L+H*, L+!H*
PPh-final boundary tones:	L+H-, L+!H-, H-, L-
IP-final boundary tones:	L%, H%

II.4.1.2 İPEK & JUN (2013)

Based on the data of question-answer pairs of 3 Turkish speakers, which repeated several neutral focus sentences three times, which varied in the location of stress, syntactic structure and length of words and phrases İpek & Jun (2013) contribute new generalizations for a model of intonational phonology in the stress-accent language classification. Following Kan (2009), they assume word stress bounded pitch accents and positional bounded phrase tones. As general remarks of their study they propose that (i) a stressed syllable is realized with a high pitch accent (H*) independent of the location of stress, that (ii) the beginning of each PW is indicated by a low tone, that (iii) focus neutral sentences exhibit a downstep pattern, that (iv) a high boundary tone (LH-) is located at the end of an PPh corresponding to the right edge of a syntactic Noun Phrase (NP) or Postpositional Phrase (PP), and that (v) a further boundary tone (LHn, H*n) marks the left edge of a nuclear word.

With respect to (i), İpek & Jun (2013) show that every PW of a PPh is realized with a high pitch accent (H*). Kan (2009) on the other side proposes that only the leftmost PW of a PPh is realized with a pitch accent. Furthermore, they assume a low tone (L) at the beginning of each PW based on Kamali's (2011) model outlined in the following subchapter. The implementation of (H*) however, is reduced to pre-nuclear PPh's, whereas the nuclear pitch accent is realized by an almost plateau-like contour indicated as (!H*). Related to the implementation of a downstepped nuclear pitch accent in all-new sentences, İpek & Jun claim that (iii) Turkish intonation contours show *f0* downtrend over the course. They claim that the (H!*) pitch accent on nuclear words is much lower than that of the preceding word, almost at the same level as the preceding word initial (L) tone. Although they claim a downstepped nuclear pitch accent (!H*), nothing is said though about its motivation. It remains unmentioned if downstep is assumed to be a phonetic phenomenon or if it has a categorical function indicating a semantic meaning. However, no other study of Turkish intonational phonology observes a systematic downstep pattern in focus neutral sentences. To this effect, the observation of downstep may be influenced by the elicitation of the data. Whereas other studies, such as Kan (2009) and Kamali (2011) work with purely monolingual data, Ípek & Jun (2013, 2014) gather their data from Turkish speakers living in the USA. According to Pierrehumbert's analyses of American English (AE) intonation, a characteristic feature of AE is downstep. Considering bilingual research it has been shown that prosodic features of L2 can influence the prosody of the first language. To this effect a bi-directional influence cannot be excluded as an influencing factor in İpek & Jun´s (2013) observation of downstep and the lack of downstep attested by the remaining studies on Turkish intonation. The importance of bi-directional influences in prosody will also be central with respect to the results of experiment 2 of the present dissertation conducted with bilingual Turkish speakers.

With respect to the implementation of boundary tones (iv), they propose a low final boundary tone (L%) and a complementary high boundary tone (H%) at the end of IP's, in addition to a high PPh-final boundary tone (LH-) which is designated as (H*-) in cases where a high pitch accent and a PPh-final boundary tone are realized on the same syllable. In contrast to Kan (2009), who considers PPh-formation as a purely prosodic phenomenon, İpek & Jun (2013) assume that (LH-) is only used to mark the end of syntactic NP's and PP's. To legitimate the existence of high PPh-final boundary tones, İpek & Jun (2014) show that NP and PP-final high tones have a higher *f0* range than pitch accents on word final stressed syllables. To this effect they propose a simultaneous implementation of pitch accent and phrase boundary tone (H*-).[16, 17]

In addition to PPh and IP-final boundary tones İpek & Jun (2013) assume a left-aligned nuclear boundary tone (v). The nuclear boundary tone is either indicated by (LHn) when it coincides with a right-aligned PPh-final boundary tone, or it is indicated as (H*n) in cases where it shares the same

[16] For the respective study they collected data from five native Turkish speakers from Istanbul living in Los Angeles for less than five years. To examine the acoustic properties of word final (H*) and (H*-) they recorded 5 pairs of five word sentences with varying number of words within the subject NP. The target word of the paired sentences was always the same, but differed in the position within the NP. Either it was in a final position where it should bear (H*-) or in a non-final position where it should bear (H*). Peak measurements on the final syllables of the respective target items reveal that the *f0* value at the ip boundary (H*-) was higher than the non-final word pitch (H*), though the difference is not significant. Nonetheless, the magnitude of the *f0* rise was significantly larger at an PPh boundary than at the end of a non-final word within the NP (β=1,435, t=5,925, p=0,05). Additionally, they observe that the duration of the last syllable is longer in a NP final target and the degree of co-articulation is less across the PPh boundary than across the prosodic word boundary. However, it remains unclear so far if İpek & Jun (2014) indeed assume that both tonal values add up as proposed Liu & Xu's (2005) functional view of intonation, according to which components of intonation are defined and organized by individual communicative functions that are independent of each other but are encoded in parallel. İpek & Jun (2014) do not relate their assumptions to the respective theory.

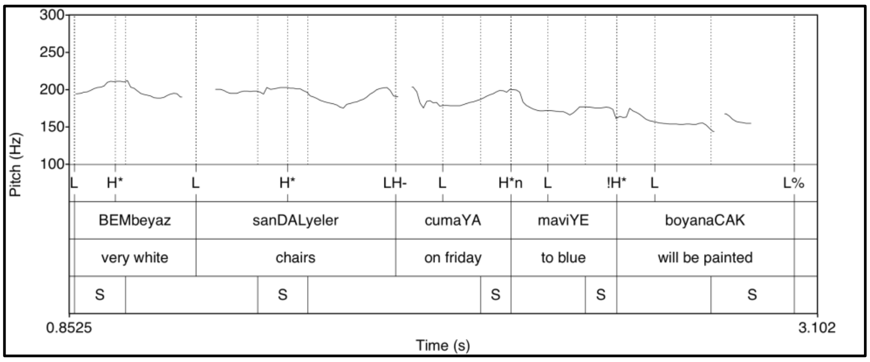
[17] Remember that Kan (2009) proposes that only the pitch accent is implemented in cases where a PPh-final boundary tone and a pitch accent share the same syllable.

syllable with a high pitch accent realized on the final syllable of the word immediately preceding the nuclear constituent of the IP. For words where the PPh-final syllable and the immediately pre-nuclear syllable overlap, i.e. when (LH-) and (LHn) share the same location, İpek & Jun assume that (LHn) overrides (LH-). To justify that nuclear tones override PPh-final boundary tones they refer to the prosodic hierarchy (e.g. Selkirk 2004) claiming that syllables of a higher constituent show higher *f0*, greater degrees of lengthening and less degree of co-articulation. However, they assume at the same time for the designation of (LHn) that the host syllable is not lengthened and that listeners perceive the juncture between the immediately pre-nuclear syllable and the nuclear item as weaker in the case of the overriding nuclear boundary tone. However, their assumption is not verified by perception tests as in the case of higher phonetic values on PPh-final boundary tones in contrast to simple pitch accent assignment on word stressed syllables. Still, the assumption of overriding categories continues to be contradicting in the case of a ranking between pitch accented PW's and the realization of PPh-final boundary tone on the level of PPh. If higher ranked categories (here the PPh) overrides a lower category (here PW), it remains unclear why they propose a simultaneous implementation of both tones then, indicated as (H*-).

Besides, their argumentation for a left-edge nuclear boundary is based on intro-perspective assumptions and it appears premature to assume pre-nuclear boundary tones by the help of pitch tracks based solely on the observation of all-new sentences. It will be shown later in experiment 1 on the base of data from 11 monolingual Turkish speakers that the prosodic focus marking of IS is realized via prosodic alignment by means of post-focal de-accentuation and the introduction of a pre-nuclear boundary tone will be refuted based on acoustic measurements.

However, for the understanding of the intonation model proposed by İpek & Jun (2013), a sample pitch track of an all-new sentence provided by the authors is demonstrated in figure (2.4). As demonstrated in figure (2.4), the first PPh, indicated by a (LH-) on the final syllable of sandAlyeler (chair), consists of two pitch accents. In modified noun phrases, as demonstrated in figure (2.4), adjectives do not form a proper prosodic phrase but are integrated into the NP. The adjective phrase appears inside the NP since it does not instantiate a phrase boundary on its own. In Kan's (2009) model on the other side, only one pitch accent is allowed in the formation of a PPh.

Fig. (2.4): Sample pitch track of a modified NP from İpek & Jun (2013: 7/ fig. 10)



In figure (2.4) the pitch track of a declarative sentence *Very white chairs will be painted to blue on Friday* is demonstrated. All words in the subject NP *bembeyaz sandalyeler* are non-finally stressed. The adjective and the noun are marked by a high pitch accent (H*) and together they form one PPh indicated by an LH- boundary tone realized at the right edge of the noun. As in the first syllable of *cumaya* (on Friday) each PW of the whole IP is indicated by a low tone (L). Furthermore, *cumaya* is aligned with an obligatory high pitch accent realized on regularly stressed words. It additionally represents the immediately pre-nuclear syllable of the following nuclear item *maviyi* (blue) and is indicated by a nuclear boundary tone (H*n). The nuclear item is realized with the downstepped nuclear pitch accent (!H*). The last constituent of the VP and the whole IP is represented by the verb *boyanacak* where no further pitch accent or PPh-final boundary tone is assigned to, but a low IP-final boundary tone (L%).

To summarize the different tonal categories established by İpek & Jun (2013), (2.12) provides an overview of the tonal inventory classified by their function as word initial tone, word stress bounded pitch accents, PPh-final boundary tones, IP-final boundary tones and nuclear boundary tones.

(2.12) **Tonal inventory in İpek & Jun (2013)**

Word initial tone:	L (left aligned)
Pitch accents:	H* (pre-nuclear), !H* (nuclear)
PPh-final Phrase boundary tones:	LH-,H*- (right aligned)
Nuclear boundary tones:	LHn, H*n (left aligned)
IP-final boundary tones:	L%, H%

Kamali (2011) offers an alternative model of Turkish intonation, which is based on the classification of Turkish as a pitch accent language. Crucial to her classification is the assumption that Turkish consists of words without word stress. According to what has been shown for Japanese (Pierrehumbert & Beckmann 1986) and Basque (Hualde 2002), Kamali (2011) proposes that finally stressed words in Turkish are truly accentless. To her, the regular word final stress pattern, as outlined in the preceding, does not have a phonetic reality. Based on Levi`s (2005) study of the acoustic correlates of word stress which revealed a plateau-like pattern on words with supposed final word stress, Kamali assumes that these words are accentless. On words with non-final stress on the other side the systematic implementation of a pitch accent is proposed. Although Levi's (2005) study also reveals significant differences for duration and intensity for word stressed syllables (regular and non-final), Kamali however, assumes that *f0* is the only indicator for prominence, and exclusively used on non-final word stressed syllables in Turkish. Levi (2005) on the other side proposes pitch as the indicator of prominence in finally stressed and exceptionally stressed words.

Kamali's study on Turkish intonation is based on three randomized repetitions of 81 sentences and isolated words red by 4 native speakers coming from 4 different Turkish cities. For all sentences an all-new context was evoked with the exception of two predicate focus conditions. The design of all sentences was in the form of a nominative argument > accusative argument > dative argument > verb. The normative argument was always unstressed, according to Kamali's understanding of word stress in Turkish. The remaining constituents were minimal pairs with either unstressed or lexically stressed words.

As a general remark of her analyses of all-new sentences, Kamali (2011) observes that Turkish generally exhibits a quite limited pitch range unless various emotional exaggerations such as surprise. She supposes a steady mid-range encompassing the nuclear and pre-nuclear area with the exception of the high tone (H-) at the right edge of each pre-nuclear element, to which she refers as a reference level. The post nuclear area remains low throughout the sentence and is beneath this reference line, usually at the bottom of a speakers pitch range.

Similar to the observations of Kan (2009), Kamali attests the realization of a high tone at the right edge of each pre-nuclear PPh indicated by (H-). In contrast to Kan (2009), Kamali (2011) relates prosodic phrase formation to the mapping of syntactic categories onto phonological phrases. Each PPh in Turkish is formed upon a syntactic phrase. The high tone (H-) indicating the PPh boundary is realized independent of the word stress status of the corresponding phrase final word. In words where word stress and phrase final stress are associated with different syllables, a pitch accent is aligned to the word stressed syllable and an additional high phrase boundary tone is assigned to the final syllable.[18] In contrast to the traditional analyses of downstepped pitch accents, Kamali refers to the absence of a downstep relation between phrase tones. The analysis of the all-new sentences of her study reveals that the second PPh-final boundary tone is quite often higher than the preceding one. In addition to the high PPh-final boundary tone (H-) assigned to each pre-nuclear phrase, a low PPh-final boundary tone (L-) at the final PPh of an IP is claimed.

Besides the implementation of PPh-final boundary tones, Kamali proposes an initial low left-aligned boundary tone at the beginning of each PPh and PW indicated by (L-).[19] The low left-edge tone is used to come down from a previous high phrase boundary and is supposed to spread until the next pitch accent or right edge boundary tone of the same item.

With respect to the implementation of IP-final boundary tones, Kamali (2009) does not assume that they are obligatory at the end of Turkish sentences. Based on Féry`s (1993) description of German intonational phonology, she states that Turkish does not dispose of tonal evidence for a low final boundary tone (L%) due to the absence of an additional fall indicating additional final tonal movement.[20] An optional high final boundary tone (H%) on the other side is possible.

As for pitch accent categories, Kamali (2011) solely assumes a rise-fall pitch accent (H*L) on the word stressed syllable of lexically stressed words, following Levi (2005) who argues that non-final stressed syllables instantiate an (H*L) pitch accent. Assuming (H*L) as the only category for Turkish pitch accents results in the representation of exactly the same pitch accent inventory as described for typical pitch accent languages such as Japanese (Pierrehumbert & Beckman 1986) or Basque (Hualde 2002). Levi (2005) on the other side, also proposes (H*) for finally stressed words as outlined above.

Since Kamali (2009) does not assume the existence of pitch accents related to finally word stressed syllables this assumption includes the realization of the nuclear pitch accent. A nuclear item remains without a pitch accent unless it is realized with non-final word stress. The absence of a nuclear pitch accent on nuclear constituents is motivated by the consideration that the tonal movement on the final syllable of her data is too small to be noteworthy since it basically represents a nuclear plateau pattern. The observation of the nuclear plateau contour leads Kamali (2011) to the argumentation that prominence is not related to pitch accents in Turkish. Kamali (2011: 82) argues that:

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[18] Although Kamali (2009) assumes that finally stressed words in Turkish are not realized with a pitch accent, she hypothesis that the H-tone at the end of a finally stressed word is a combination of (H-) and (H*) as shown by İpek & Jun (2014).

[19] Kamali claims that the low tone is a result from syntactical mapping. To resolve the conflict which arises from claiming (L-) for the left edge of each word in addition to (L-) for the left edge of each PPh mapped from syntax, where obviously not every single word forms a phrase, Kamali assumes recursivity in prosodic phrasing for Turkish based on Kratzer & Selkirk's (2007) proposition of recursivity.

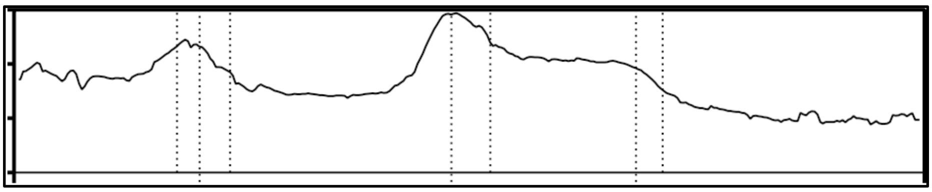
[20] Note that Kan (2009) observes an additional tonal movement at the end of some sentences of her data. Note that for other languages such as German or Dutch final boundary tones in the form of (L%) are assumed even in the absence of a clear tonal movement which is explained by tonal leftward spreading (Gussenhoven 2004).

[…]prominence is not strictly associated with accent in Turkish […] main prominence relies on a mere transition of tones at a critical juncture […] final stress seem to be an epiphenomenon at the word level […]the perception is possibly a perceptual elsewhere condition, where in fact there is no tonal marking of the relevant syllable.

Kamali (2011) states, that the juncture initiating the post-nuclear fall, which follows a mid-level plateau on the nuclear item, is a relevant indicator for main prominence as felt by native speakers. The respective fall after the nuclear constituent is systematic and distinctively lower than the starting points of argument phrases. Furthermore, the post-nuclear area does not allow pitch accents with the exception of verbs containing a pre-stressing or lexically stressed morpheme, such as -mA, -mI or -íyor as described in subchapter II.2.2.

In figure (2.5) a sample pitch track of Kamali (2011) is provided demonstrating the implementation of PPh-final boundary tones and the nuclear plateau. All translation and annotations are from Kamali (2011). The IP consists of two pre-nuclear PP's mapped from a subject and an accusative NP followed by the nuclear phrase build upon the VP. Each pre-nuclear argument is realized with a high PPh-final boundary tone (H-). Each PW is indicated by a low PW-initial boundary tone (L-) with the exception of the IP-initial subject. The nuclear constituent is represented by the dative argument showing the nuclear pattern where no pitch accent is assumed. Although Kamali assumes PPh-initial and PPh-final boundary tones they are not indicated here by means of a low tone before the subject and a further low tone at the end of the verb which constitutes the final constituent of the last PPh and the IP.

Fig. (2.5): All-new pitch track from Kamali (2011: 68)



elemanlar	bunalanlarI	limonluya	yönlendirmeli
NOM	ACC	DAT	V
H- L-	H- L-	L-	

(The employees should direct those who get overheated to the one with lemon.)

In (2.13) the tonal inventory for Turkish as stated by Kamali (2011) is summarized. She reduces the tonal inventory to a single pitch accent category (H*L) only implemented on lexically stressed words, two PPh-final boundary tones (L-, H-), a PW-initial low boundary tone (L-) and a single IP-final boundary tone category (H%).

(2.13) **Tonal inventory in Kamali (2011)**

Pitch accents:	H*L
PW-initial boundary tones:	L-
PPh-final boundary tones:	L- , H-
IP-final boundary tones:	H%

II.4.1.4GÜNEŞ (2013)

A further alternative approach for Turkish intonation is provided by Güneş (2013a,b). In contrast to Kamali's (2011) approach outlined above, who bases her classification of Turkish as a pitch-accent language on similar descriptions of Japanese and Basque, Güneş (2013a,b) argues on the base of classifications of Indian languages such as Hindi, Bengali, Tamil and Malayalam (cf. Féry 2010c) that Turkish should be classified as a phrase language. To this effect, the tonal inventory of Turkish as proposed by Güneş (2013b) is based on the observations of the previously outlined models of intonational phonology of Turkish and additionally on basic aspects of phrase languages.

Güneş (2013a,b) establishes her language classification upon the observation of two basic features for which she claims that Turkish contrasts crucially from intonation languages: (i) limited *f0* reflex of syntax, and (ii) limited *f0* reflex of information structure. Güneş (2013a,b) claims that the formation of PPh's and IP's in Turkish is usually syntactically driven and realized on the prosodic level by boundary tone insertion. However, based on a study of Féry & Schubö (2010), who observe that recursive syntactic structures are reflected in a recursive prosodic structure in German, but not in Hindi, Güneş (2013) examines a lack of prosodic reflex of the syntactic structure of Turkish parentheticals and non-restrictive clauses.[21] The syntactical isolated phrases are prosodically integrated motivating her argumentation of the limited reflex of syntax in *f0* in Turkish as typical for phrase languages.

With respect to (ii) Güneş (2013b) states that Turkish has a designated prosodic position for focus. Based on Kan's (2009) observation that the nucleus of an IP is the leftmost item of the rightmost PPh, Güneş (2013b) argues that a focus in an IP is aligned to exactly this position. She argues that intonation languages introduce pitch accents as correlates to IS, the prosodic patterns in Turkish

[21] According to theories of syntax-prosody mapping, parentheticals and non-restrictive relative clauses are typically analyzed as syntactically isolated from their host-clauses in Turkish and should form an independent IP. However, the results of Güneş' (2013a) experiment, conducted with 7 speakers (44 sentences x 7 speakers = 308 sentences) show that they do not form an isolated prosodic phrase at the IP-level. They behave like a typical PPh in Turkish, since pitch range and speech rate do not differ from the other PPh's that occur within the host-clause.

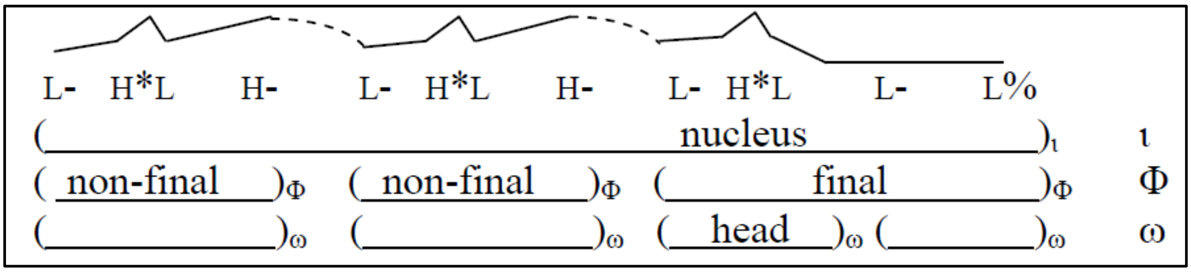
however, show limited effects to the variation of information structural conditions. The following chapter will provide a more detailed analysis with respect to the prosodic correlates of IS in Turkish.

Related to the formation of prosodic phrases in Turkish, Güneș (2013b) furthermore claims that the sentence melody of Turkish is based on the principles of phrase languages by means of primarily using phrase formation and boundary tone implementation at the level of IP and PPh. In the general language classification of phrase languages, no word stress related pitch accents are documented (Jun 2005, Féry 2010c). Féry (2010c) furthermore proposes that phrasing in phrase languages plays the role of pitch accents in intonation languages.

As proposed by Kan (2009), Güneş (2013b) assumes a prosodic phrase determining right edge high PPh-final boundary tone (H-). Güneş (2013b) argues that the (H-) boundary tone is defined by its position in relation to the nucleus and to this effect only implemented on pre-nuclear PPh's. Additionally, Güneş assumes a low boundary tone (L-) at the left edge at the level of PW as proposed by Kamali (2009). Furthermore this left edge low boundary tone (L-) is also present at the level of PPh. When more than one PW is hosted by a PPh the (L-) of the second PW is leveled lower than the (L-) preceding it. At the level of IP she assumes a low and a high final boundary tone (L%, H%). For the nuclear PPh, Güneş (2013b) assumes that the constituent, which immediately precedes the verb, corresponds to the head of the PPh realized as a nuclear plateau, which is neither aligned to any boundary tone nor pitch accent following Kamali (2011). Although Güneş (2013a,b) does not clearly argue for accentless words in Turkish as Kamali (2011), she assumes that general word stress on final syllables is not realized on the PPh-level by means of pitch accent implementation. For this reason she does not assume pitch accent at the final syllable of a nuclear word, leaving the tonal realization of the final syllable of the nuclear item unlabeled. Nonetheless, Güneş also assumes pitch accents in her model of Turkish phonology. Words with non-final word stress, for which a representation on the PPh-level is assumed in contrast to finally stressed words, are realized with a rising-falling pitch accent (H*L). However, the observation of pitch accents unhinges the classification of Turkish as a phrase language which only implements phrasal tones (no pitch accents, no lexical tones).

In figure (2.6) an example pitch track from Güneş (2013b) is provided which demonstrates the general tonal features, including PPh and IP final boundary tones, PW-initial boundary tones, and also pitch accents on words with non-final stress.

Fig. (2.6): All-new sentence pitch track from Günes (2013b: 13)



The sample pitch track in figure (2.6) represents an IP (indicated as ι) consisting of two pre-nuclear PPh's and a nuclear PPh (indicated as ф) each containing one to two PW's with non-final word stress (indicated as ω). Each PW is indicated with a low left-aligned boundary tone, each pre-nuclear PPh is indicated by a further right-aligned high PPh-final boundary tone (H-). The nuclear phrase on the other side is indicated by an IP-final low boundary tone (L%). The word stressed syllables of each PW is realized with a pitch accent (H*L) including the nucleus of the final PPh which usually would be realized with a plateau-like contour without tonal specification of the word stressed syllable. Furthermore, the nuclear item is supposed to be the prosodic head of the final PPh and the IP.

In (2.14) the tonal inventory as used by Güneş (2013a,b) in her framework of Turkish as a phrase language is summarized.

(2.14) **Tonal inventory in Güneş (2013a,b)**

Pitch accents:	H*L
Word boundary tone:	L- (left aligned)
PPh-final boundary tones:	L- , H-
IP-final boundary tones:	L%, H%

II.4.1.5 SUMMARY

The previous subsection provided an overview of several models of Turkish intonational phonology in the AM-framework: Kan 2009, Kamali 2011, İpek & Jun 2013, Güneş 2014. Despite several similarities in the tonal inventory proposed by the models, differences are largely settled in the diverging typological classification of Turkish intonation and also in the diverging sizes of the databases on which each theory is based.[22] Differences in the categorical inventory are furthermore related to the

[22] Whereas Kan`s (2009) model is based on more than 1000 sentences of 8 monolingual speakers, Kamali (2011) bases her model on the observations made in 81 sentences of four speakers, İpek & Jun (2013)

degree of integrating phonetic variation. Whereas Kan (2009) identifies different phonological categories mainly on a phonetic base, the other models tend to be more simplistic with respect to the categorical relevance of phonetic variation.

However, all studies agree on the existence PPh's and IP's. Both phrasing levels were first identified by Kan (2009). Phrase formation for Kan (2009) is purely phonologically determined by claiming that a PPh is formed upon one pitch accent only. The head of a PPh is leftmost whereby the most prominent head (nucleus) in an IP is the head of the final PPh, generally a VP with its argument. İpek & Jun (2013,2014) show that a PPh can also include several pitch accents and that PPh-final boundary tones show higher phonetic values than pitch accents in the same location. In cases were both tones fall on the same syllable a simultaneous implementation is assumed indicated by (H*-). Additionally, the assignment of pre-nuclear PPh-final boundary tones is reduced to NP's and PP's. By that means they assume that phonological phrase formation is also achieved from syntactical mapping which is confirmed by Güneș (2013a,b). Kamali (2011) exclusively assumes phonological phrasing on the base of syntactic mapping. Each of the models assumes the implementation of a PPh-final boundary tone on pre-nuclear phrases in the form of (H-) or its phonetic variations. PPh-final boundary tones on non-pre-focal constituents in the form of a low PPh-final boundary tone (L-), is only assumed by Kan (2009) and in Kamali (2011) in cases of phonetic evidence of an additional fall on the final syllable. Kamali (2011) on the other side does not assume low IP-final boundary tones (L%) related to the lack of visible evidence for an additional fall. The absence of low IP-final boundary tone is adopted in Güneș' (2013a,b) approach. The remaining two models on the other side assume (L%) and all models assume optional high IP-final boundary tones (H%). Despite Kan (2009), all models additionally assume a PPh-initial low tone which is also present at the level of the PW and indicated by a left-aligned boundary tone (L-). İpek & Jun (2013) moreover claim the existence of a nuclear boundary tone realized on the syllable immediately preceding the nucleus of an IP.

Furthermore, all models assume the existence of word stress assigned pitch accents. In Kan's model, each PPh including the nuclear phrase is formed upon a pitch accent (H*, !H*, L+H*, L+!H*) on the head of the phrase. İpek & Jun (2013) assume a high pitch accent on pre-nuclear items and a downstepped high tone (!H*) for the head of the IP, which is shown to be realized as a plateau pattern. The assumption of a plateau pattern is also supposed in the approaches of Güneș (2013a,b) and Kamali (2011). Both however, refute the realization of a pitch accent on the nuclear constituent, unless it shows word stress on a non-final syllable. The existence of final word stress in Turkish is completely refuted by Kamali (2011), who proposes accentlessness for those words, based on observations of pitch-accent languages (Japanese and Basque in this case). To this effect they assume

generate their model by the help of three speakers with second language knowledge living in the USA. Güneş (2013b) remains silent about her speakers and the database volume unless in her (2013a) study on parentheticals where she records 8 speakers.

that the nuclear phrase has a prosodic head to which no pitch accent is assigned. This is in contrast to Gussenhoven's (1992) theory of prosodic heads, who originally proposed that prosodic phrases are formed upon prosodic heads which are represented by pitch accents. Kamali (2011) and Güneș (2013a, b) assume that the low word initial boundary tone (L-) spreads until the end of the nuclear word which is then followed by a fall. Both claim that IP stress is related to a determined position and not to a prosodic feature. There is no correlation of pitch accent and prominence as typically described for intonation languages. However, non-final word stress is represented on the level of PPh in the form of a pitch accent (H*L) in their approaches and also realized on nuclear constituents.

The representation of the different approaches highlights the need for more studies on Turkish intonation not at least in order to create a reliable and conventionalized phonological annotation system. More studies based on much bigger data sets are necessary to arrange the sometimes unstructured and intro-perspective assumptions about Turkish intonation in general. Of great advantage would also be to dispend the intent to describe Turkish intonation in the framework of so called brother hood languages and have an unbiased look at the data.

II.4.2 PHONOLOGICAL INVENTORY USED IN THE PRESENT STUDY

The phonological analysis model used for the analysis of the intonation contours in the following experiments is based in the classification of Turkish as stress-accent language, basically following Kan (2009) and subsequent observations made by İpek & Jun (2013,2014). This choice is made for two main reasons. First, Kan`s model is based on the so far biggest data analysis conducted for Turkish, whereas the other models are based on crucially smaller data sets and many intro-perspective assumptions, which lack experimental evidence. Second, the classifications of Turkish as a pitch-accent language (Kamali 2011) and/or phrase language (Güneș 2013a,b) cannot be followed, since their observations are contradicting in the way that other acoustic correlates of word stress than *f0* have been identified (cf. Levi 2005) which scrutinize pitch as the only indicator of stress and therefor the classification of Turkish as a pitch accent language in addition to the observation of pitch accents in Turkish which on its side scrutinizes the classification of Turkish as a phrase language.

Kan's model is followed to the point that two levels of phrasing are assumed; namely the PPh and the IP. However, the observation of more than one pitch accent in a PPh by İpek & Jun (2013) refutes the formation of PPh's on the base of one pitch accent only. The observation that syntactic mapping seems not to be a straightforward matter of fact in Turkish will also be confirmed by the results of experiment 1. Prosodic phrases can be modified without changing the syntactical structure. As a further difference to Kan (2009), I do not include pitch accent categories based on phonetic variation, since Kan (2009) states that phonetic variation has no impact on the semantic meaning of the constituent. To this effect two pitch accents are observed in the following data (H*), which is found on pre-nuclear constituents and (H*L) found on the nuclear constituents. The trailing tone indicates the fall of the pitch accent towards the IP-final low boundary tone (L%). With respect to the implementation of IP-final boundary tones two categories are observed: a high final boundary tone (H%) and a low final boundary tone (L%). The set of PPh-final boundary tones is reduced to two categories: (H-) and (L-), excluding meaningless phonetic variation. A high PPh-final boundary tone is used at the end of pre-nuclear phrases, whereas the low PPh-final boundary tone shares the same syllable with the IP-final boundary tone (L%). To this effect only the IP-final boundary tone is indicated. In those cases, where a pitch accent shares the same syllable with a PPh-final boundary tone, only the boundary tone is indicated based on İpek & Jun's (2014) phonetic study, which reveals higher pitch and increased duration on the respective syllables in contrast to words where only pitch accents are realized. Although the higher phonetic values may be based on an adding up of the phonetic values of both categories in the sense of Liu & Xu (2005) and PENTA (Xu 2004), which refer to the simultaneous implementation of pitch on the same syllables with different post-lexical functions, I consider it as sufficient to only indicate the higher leveled category corresponding to the PPh-final boundary tone.

A further boundary tone category by means of a left-aligned nuclear boundary tone as proposed by İpek & Jun (2013) is not assumed a priori due to the lack of experimental evidence. The following experiment furthermore contributes new insights with respect to the introduction of a nuclear boundary tone. Based on acoustic measurements its implementation has to be refuted. A left aligned low tone (L) as used in İpek & Jun's (2013) intonation model based on Kamali's (2011) approach is not assumed in Kan (2009) and neither used in the tonal inventory used in the present dissertation. In (2.15) the tonal inventory used for the following data analyses is summarized.

(2.15): **Tonal inventory of Turkish used in the present study**

Pitch accents:	H*, H*L
PPh final boundary tone:	H-, L-
IP final boundary tones:	H%, L%

II.5 PROSODIC FOCUS MARKING IN TURKISH DECLARATIVES

The AM-models of Turkish intonation outlined in the previous subchapter, are basically established upon default intonation contours in declaratives representing cases of broad focus. However, a crucial research aspect of the present dissertation concerns the intonation contour of IS modified sentences. To this reason, the following subchapter will provide a literature review with respect to the assumption of IS realization in monolingual Turkish with emphasis on its prosodic realization. It will be shown that several assumptions about the role of IS in Turkish declaratives are circulating in the literature. Opinions are controversial concerning the impact of IS on the realization of the intonation contour and assumptions mainly lack empirical evidence. A review of the corresponding literature brings to light that prosodic focus marking in Turkish has mainly been investigated in the framework of prosodic prominence understood in the original sense of Jackendoff (1972) in who´s terms prominence is an equivalent to a pitch accent which experiences emphasis on a focused constituent. In chapter 1 however it has been shown that focus prominence is realized in different ways cross-linguistically. To this effect, the literature review in chapter 2 provides the baseline for experiment 1 in chapter 3. The results there will provide additional evidence for a prosodic correlate of IS in Turkish, amplify the studies on IS in Turkish by an extension to yes/no questions, and furthermore provide a typological classification of IS marking in Turkish.

II.5.1 FOCUS MARKING STRATEGIES

Turkish is claimed to have two distinct strategies to mark focus: in-situ and/or by syntactic movement (e.g. Erguvanlı 1979; Işsever 2003). Early studies mainly concentrate on the role that syntactic movement plays in the realization of focus and are based on the influential surface-syntactic approach by Erguvanlı (1979), which started a long during debate about the existence of a special focus position in the Turkish syntax. She claims that word order variation carries the pragmatic function to bring the focused constituent into a specific position, namely the immediately preverbal position. This position has also been designated as the prosodic head of the IP in the AM-approaches of Turkish intonational phonology outlined in the previous subchapter. Example (2.16) (a) represents an example of an unmodified simple SOV declarative where the object is in the immediately pre-verbal position retaining sentence stress. In (2.16) (b) on the other side, the subject *Melda* is moved into the objects position and becomes the sentence stress bearing constituent representing the focused constituent. An additional focus marking of a further constituent by stress is considered ungrammatically.

(2.16)(a) Melda elmaciyi seviyor.
(Melda apple.trader-ACC love-PRS)
(Melda loves the apple trader.)

(b) Elmaciyi Melda seviyor.

(apple.trader-ACC Melda love-PRS)

(It is Melda who loves the apple trader.)

Based on Ergunvanlı`s (1979) influencing assumption of focus realization, following studies on information structure in Turkish agree on two basic assumptions. First, the preferred structural realization of focus in Turkish is word order. Second, certain syntactical positions are preferably aligned with certain information structural units: topic is sentence initial, focus is immediately preverbal, and background is post-verbal (Özge 2006: 25).

Agreeing with Ergunvanlı (1979), Göksel & Özsoy (2000:3) affirm the importance of the immediately pre-verbal position for focus marking in Turkish. However, they propose that:

> Stress can be assigned to any preverbal constituent even if it is scrambled. This indicates that the surface syntax of Turkish does not have a designated focus position.

To this effect, Göksel & Özsoy (2000) do not account for a syntactically determined position for focus and instead relate the strategy of moving any possible constituent to sentence stress requirements. They claim that focused elements are moved into the immediately preverbal position by the need to move the focused constituent into the prosodically prominent position to receive sentence stress and fulfill prominence requirements.

Despite, they also admit in-situ focus, backing up their approach of a prosodically motivated focus marking in Turkish. Focus marking is possible solely by prosodic means without any change of word order. There are basically no positional restrictions for focus for the pre-verbal area in the claim of Göksel & Özsoy (2000), but the focused constituent is banned from the post-verbal area. In (2.17) the subject *ben* is the focused constituent. It remains in-situ, is marked prosodically, and is not moved into the position adjacent to the verb, which is occupied by the accusative object. Hence, the whole utterance in (2.17) represents perfect default word order: SOOV including a focused subject.

(2.17) BEN Aliye yemeği pişirdim.

(I –DAT food-ACC cook-PAST-1)

(I cooked the food for Ali.)

Still, Göksel & Özsoy’s (2000) claim of a prosodically motivated focus marking in Turkish lacks concrete phonological evidence. It remains unclear by which prosodic means the subject focus sentence in (2.17) is distinguished from an all-new sentence with the same syntactical structure.

II.5.2 THE MARKING OF INFORMATION FOCUS AND CONTRASTIVE FOCUS

A distinction in the realization of different focus types in Turkish is made by Işsever (2003). His proposal for focus is twofold. He claims that syntax and phonology contextualize different types of focus; namely contrastive and information focus. Following Erguvanlı (1979), he assumes syntactic as well as prosodic focus. Syntactically, focus is signaled by scrambling. Prosodic focus however, is realized by pitch accent assignment in-situ.

Crucial to Işsever's (2003) approach of IS in Turkish is his argumentation that focus realization cannot be explained without making a crucial distinction between two different focus types: presentational focus (p-focus) and contrastive focus (c-focus). P-focus is an alternative notion to what has been described as information focus in chapter I with respect to IS. Both are assumed to be different structural manifestations of different pragmatic needs. According to Işsever (2003) they differ with respect to the semantic concept of accessibility from the context. P-focused elements are not accessible while c-focused elements are accessible in the sense that they are members of a set defined by the context. An accessible element cannot receive p-focus, but constitutes a contrastive element and has to be marked prosodically.

Every type of new information, unless contrastive new information is subsumed under the p-focus category, defined by its accessibility. Furthermore, p-focus has clear positional restrictions. It cannot occur in a different sentential position than the immediately preverbal position in the sense of Ergunvalı's (1979) designated focus position for Turkish. All constituents that are not adjacent to the verb have to be constructed as c-focused. However, Işsever characterizes p-focus not only by syntactic movement and un-accesability, but also by the absence of prominence. P-focus is realized in the syntax and only c-focus is implemented by prosodic means. By locating the p-focused element in the immediately preverbal position, it occupies a non-prominent position for Işsever (2003). To this effect, p-focus is represented by the constraints [+NEW] and [-PROM]. This is in contrast to the AM-approaches on Turkish intonational phonology outlined in the preceding subchapter. In contrast to Işsever (2003), they all assume main prosodic prominence on the immediately preverbal constituent though the position might not correlate with pitch accent assignment (cf. Kamali 2011, Güneș (2013b).

A further crucial distinction that Işsever (2003) makes between p-focus and c-focused items is that only p-focused elements can project their focus properties towards the left to the entire clause. That means that an element adjacent to the verb (post-verbal items are excluded) and the verb itself can imply broad focus reading as it is able to set its scope over the whole utterance. C-focused elements can only iterate.

In (2.18) an example for p-focus marking is provided, repeated from Işsever (2003:1034). He assumes that the focused element is replaced by a free variable in the open proposition, which is not accessible from the context. To this effect the subject *Ali* is classified as un-accessible information and moved into the preverbal position.[23] All following glossings and translations in the examples from Işsever (2003) are adopted from Işsever (2003: 1034ssq).

(2.18) Fatma'yı kim arıyor?

(Who is looking for Fatma?)

Fatma'yı [FALI] arıyor. (p-focus)

(Fatma-Acc look-PROG)

In the second focus marking strategy assumed by Işsever (2003), c-focus, focused elements are not moved syntactically, but remain in-situ. In contrast to p-focused elements, c-focused elements are accessible from the context due to their contrastiveness, indicated by [-NEW]. Additionally, they are prosodically marked as prominent [+PROM]. Exhaustive reading as in p-focus is impossible for contrastive elements. They cannot set scope over the whole utterance since their scope is reduced to the phonological domain immediately occupied by the c-focused item.

The example in (2.19), taken from Işsever (2003) demonstrates contrastive in-situ focus. The syntactic structure is represented by perfect default word order SO_AO_DV and the accessibility of the c-focus is guaranteed by the preceding question. To this effect, the subject *Ali* can remain in the default subject position and can be indicated by prosodic means.

(2.19) Kim kitabı Ayşe'ye verdi? (Ali mi Ahmet mi?)

(Who did give the book to Ayşe? (Ali or Ahmet?))

[FALI] kitabı Ayşeye verdi.

(book-ACC Ayşe-DAT give-PST)

(Ali gave the book to Ayşe.)

A further feature of c-focus, according to Işsever (2003) is that c-focus can also be implemented in the immediately pre-verbal position, the designated position for p-focus. C-focus reading of constituents in the p-focus positions is possible due to their prosodic prominence and to the accessibility of the c-focused items from the context. P-focus is always [-PROM] never mind if the constituent is broad or narrow focused. A difference in prominence is only assumed between p and c-focus, but not between broad and narrow focus within p-focus. Broad focus reading however, is

[23] The double marking of focus here by means of hyphens in addition to the application of brackets and the F-feature is confusing since Işsever (2003) denies prosodic prominence for p-focused elements. P-focus elements are marked as [-PROM] in his appraoch.

excluded a priori for c-focus. In contrast to p-focused items in the immediately preverbal position, c-focused items cannot spread their focus leftward so that broad focus interpretation is blocked by the implementation of prosodic prominence. To this effect, Göksel & Özsoy (2003) suggest that different semantic focus concepts are rather based on the presence and absence of focus projection than referring two distinct strategies, as the p-focus position can also host a c-focus.
In (2.20) a further example from Işsever (2003) is provided. The verb-adjacent dative object *Ayşeye* is narrowly c-focused although it occupies the p-focus position. Accessibility from the context is demonstrated by the second sentence, which provides an alternative to the preceding focused item.

(2.20) Ali kitabı [F AYŞE' YE] verdi. Ahmete değil.
(book-ACC Ayşe-DAT give-PST Ahmet-DAT NEG)
(Ali gave the book to Ayşe, not to Ahmet.)

Despite its detailed classification of focus marking in Turkish, which shows similarities to Selkirk's (2007) contrastive focus marking rule (CFMR) explained in chapter 1, Işsever's (2003) approach to information structure does not refer to the correlates of prosodic prominence. To this effect, it remains open how his concept of [+/- PROM]) related to the different focus marking strategies is realized.

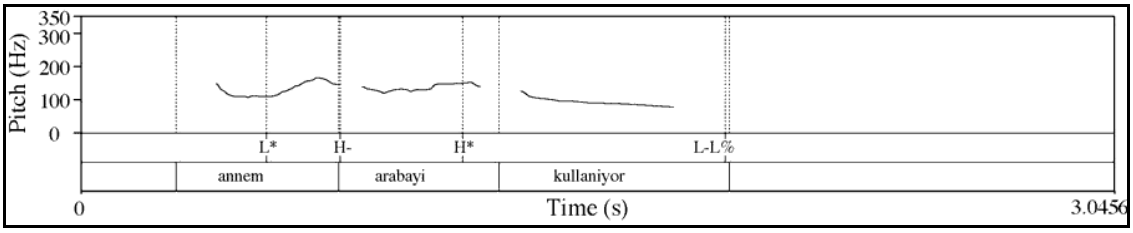
II.5.3 THE RELATION BETWEEN PHONOLOGICAL CATEGORIES AND IS CATEGORIES

In contrast to the preceding semantically based concept of a distinction between prosodic and syntactic marking of IS in Turkish, the claim of Özge & Boşzahin (2010) offers a purely phonological projection of IS. In distinction to Iṣsever (2003) they assume that word order, information structure and intonation structure do not necessarily require different focus marking strategies. They propose that the sematic concepts of information focus and contrastive focus can be included into a phonological approach of Turkish information structure, where the three aspects correlate rather than determine one way or the other.
Based on the assumptions of Göksel & Özsoy (2000), as represented above, Özge (2006) and Özge & Bozşahin (2010) suppose that word order as the structural manifestation of focus is *only a by-product of attaining the information structurally imposed intonationally* (Özge 2006:239) and is not necessarily one out of two focus marking strategies in Turkish. By presenting experimental acoustic data of five native speakers of Turkish they challenge the conventional view that syntactic movement

in Turkish is motivated by surface positions which are identified with grammatically determined discourse functions, such as focus for the immediately preverbal position. Instead, the relation between prosody and IS is characterized as a matter of prosodic prominence by making use of pitch accent placement and phonological phrasing in the encoding of information structure. More precise they claim that IS is represented phonologically by the implementation of determined tones and tunes independent of the corresponding word order.[24]

To this effect they postulate (L*H-) as the theme contour and (H*L-) as the rheme contour. However, IS units do not always coincide with prosodic phrases. In the pitch track in figure (2.7), the supposed given information is split into two parts by the focused element. The part that represents the pre-focal element (L*H-) is called the *theme contrast*, and the part that follows the focal accent (H*L-) and is de-accented, is denominated the *theme background*. All glossings and translation are from Özge & Bozșahin (2010).

Fig. (2.7): Pitch track of IS-tunes from Özge & Bozşahin (2010: 159)



L*H- H* L-L%

(Annem) (ARABAYI kullaniyor).

(Mother-POSS car-ACC drive-PROG) (My mother is driving the car)

(Theme contrast) (Rheme) (Theme background)

The sequence outlined in figure (2.7) represents a typical declarative contour in the framework of Özge & Bozșahin (2010). The binary opposition theme and rheme (roughly corresponding to focus and givenness as outlined in chapter I) is always indicated by the same tunes independent of their syntactic position. The subject *annem* (mother) represents the *theme* and is associated with a low pitch accent on the stressed syllable followed by a high boundary tone (L*H-).[25] The focused object *arabayı* (car) is associated with a high pitch accent (H*), followed by the verb corresponding to the

[24] In their description of Turkish intonation contours they follow Kan's (2009) tonal grammar for Turkish in basic aspects. Reducing Kan's inventory of PPh-final boundary tones to purely phonological categories (H-, L-), leaving beside the phonetic variation proposed in Kan (2009). With respect to pitch accents they also assume a low pitch accent (L*) which remains undocumented in all other AM models of Turkish.

[25] It is not clear to Özge & Bozșahin (2010) if (H-) represents an independent boundary tone or if it is part of the preceding low pitch accent, representing a bitonal pitch accent which than would be represented phonologically as L*+H. Based on Kan (2009) all further AM models assume a high PPh-final boundary tones at the end of every prenuclear PPh.

theme background which is marked by de-accentuation (L-L%)[26]. A noteworthy observation at this point is that post-focal constituents and de-accenting imply each other. Post-focal de-accentuation is also observed in the results of Experiment 1 of the present study which reveals that post-focal constituents are usually de-accented in simple SOV structures in Turkish yes/no questions. Pre-focal given constituents however are aligned with a pitch accent although they might represent contextually given material as well.[27]

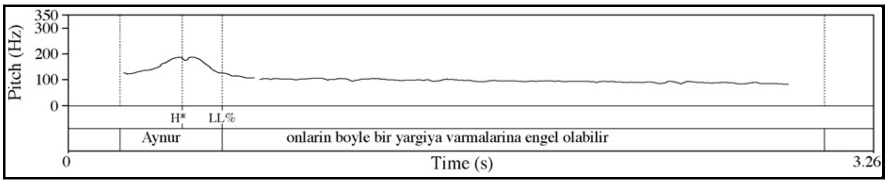
The incidence of post-focal de-accentuation in Turkish can be observed even more clearly in longer utterances, like in (2.21) and its corresponding figure (2.8) taken from Özge & Bozșahin (2010: 144). The glossings and translations are taken over again from Özge & Bozșahin (2010) once again.

(2.21) Aynur onlarin böyle bir yargıya varmalarına engelolabilir.

(Aynur they-GEN such a judgement-DAT arrive-POSS.3.PL-DAT prevent-ABIL-PRES)

(Aynur may prevent them from making such a judgement.)

Fig. (2.8): Pitch track of initial focus in Özge & Bozşahin (2010: 144)



In figure (2.8) the supposed focus contour (H*L-) is also implemented when the focus is at positions other than the immediately preverbal slot. In figure (2.8) the focused item is not adjacent to the verb, but still is the carrier of the same tune as pre-verbal focused items which are adjacent to the verb, as represented in figure (2.7). Focus is indicated by the implementation of the same tune independent of its syntactic position. According to Işsever's (2003) distinction on the other side, focused items which are not verb adjacent have to be constructed as c-focused. With respect to example (2.21), Özge & Bozşahin (2010) on the other side claim that the prosodically marked focused item is not necessarily contrastive. According to the authors, the focused non-verb-adjacent constituent is not contrastive in the sense of accessibility from the immediately previous context, as

[26] Note that Özge & Bozşahin (2010) are unclear here again about the state of the boundary tone. It remains open if (L-) is part of a bi-tonal pitch accent or if it is independently implemented as an intermediate phrase boundary tone. However, for Özge & Bozşahin 2010, (L-) represents an important pragmatic contrast to (H-) in the way that (H-) is implemented to indicate that the utterance is not complete and is implemented to signal that there is more to come (Özge & Bozşahin 2010: 143). (L-) on the other hand is implemented only postfocally on deaccented items which represent the background in information structural terms.

[27] This observation matches the assumptions of contrastive topic (e.g. Krifka 2008, Zimmermann 2007, Tomioka 2009) outlined in chapter 1 who propose that topics can be associated with a G-marker and an F-marker at the same time.

supposed by Işsever (2003). Instead, it represents information focus which would be realized only in the immediately preverbal position in the theory of Işsever (2003).

Furthermore, Özge & Bozsahin (2010) indicate that information structural partitioning can be ambiguous. The sentence in the preceding figure (2.7) is information structurally ambiguous in the way that it can either represent a broad focus or narrow object focus, depending on the context. It may contextualize the answer to an object information question as well as the answer to a broad focus question.[28] The informational ambiguity in figure (2.7) is eliminated in Özge & Bozşahin`s (2010) theory by the assumption of a relative degree of stress. The utterance in figure (2.7) would be realized as emphatic stress with an emphasized high tone labeled as H** when it represents narrow object focus. To this effect, the implementation of the H* on the accented syllable of the object experiences a boost when it represents the answer to an object focus question. A constituent that experiences emphatic stress is more likely to represent a narrowly focused constituent. Prominence is considered as the indicator of focus in which Özge & Bozșahin`s (2010) analyses clearly reflects the analyses of IS in intonation languages such as German and English, where prominence by means of pitch increase and de-accentuation are reported as prosodic correlates of IS (e.g. Féry & Kügler 2008 for German).

However, Özge & Bozșahin`s (2010) concede that they have to be agnostic about the phonetic correlates of the assumed emphatic stress implemented on focused items. To this effect, the assumption of prominence increase on focused constituents is not proved by acoustic measurements on the respective syllables. Their assumption of a relative degree of stress stated as the binary opposition of H* vs. H** realized by a pitch increase on the focused constituent remains a hypothesis.

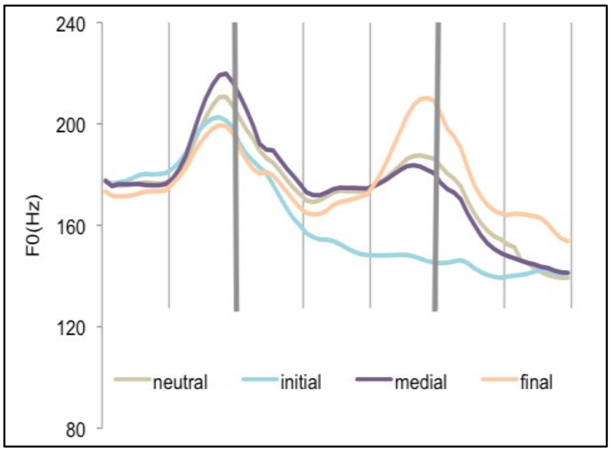
II.5.4 ACOUSTIC CORRELATES OF FOCUS

In the previously presented study of Özge & Bozsahin (2010) and the former studies, which more or less try to integrate prosody into an IS marking theory in Turkish (Işsever 2003, Göksel & Özsoy 2000), all assume that prosodic focus marking is realized by prominence in the sense of pitch accent assignment and modification. However, they remain unclear about the acoustic correlates of

[28] Note that the original example of Özge & Bozşahin (2010) deals with predicate focus compared to object focus (*Ali ne yapti?* What did Ali do?). According to Kan they assume that only one pitch accent is realized in the VP; i.e. on its head, represented by the argument. The verb and the preverbal element are forming one prosodic phrase phonologically represented as (H*L-L%). In predicate focus the object is realized as emphatic stress with an emphasized high tone labeled as H**. A contour which experiences emphatic stress is more likely to represent predicate stress for the whole prosodic phrase including verb and argument.

prominence. İpek (2011) on the other side provides an acoustic study on in-situ focus realization considering *f0*, duration and intensity as possible acoustic correlates of pitch accent prominence. Her observations challenge the role of increased acoustic prominence on focused constituents in Turkish.
Ipek's (2011) acoustic analysis is a replication of Xu (1999) for Mandarine Chinese to elicit focus on different constituents conducted with six Turkish speakers. For the production experiment four different SOV target sentences were presented, each containing three words. To elicit in-situ focus on different constituents, each target sentence was preceded by a question that forces neutral, initial, medial or final focus on the target sentence. Subjects were asked to read out the target sentences with five repetitions. The same Xu (1999) based methodology is slightly modified and used for the elicitation of yes/no questions in experiment 1 and 2 with mono-and bilingual Turkish speakers of the present dissertation.
In the analyses, comparisons between focused words and their neutral counterparts were made for *f0*, duration, and intensity in the on-focus, pre-focus and post-focus regions. With respect to *f0* figure (2.9) shows the time-normalized *f0* contours averaged across all speakers, sentences and repetitions. The time-normalized *f0* contours are averaged across 6 speakers, 4 sentences and 5 repetitions. The vertical lines indicate syllable boundaries. The thicker vertical lines indicate word boundaries in an SOV order. The different in-situ focus conditions are represented by the different coloring of the graphs.

Fig. (2.9): Mean *f0* contour in different in-situ focus conditions in İpek (2011)



Considering the results of figure (2.9), İpek (2011) concludes that focus is acoustically not realized by *f0* increase for initial and medial focus indicated by the blue and the purple graph. Nonetheless, she observes that final words (corresponding to the verb and the red graph) have a higher *f0* when they are focused and additionally the ultimate syllable of the immediately preceding constituent, represented by the object, experiences a pitch range expansion. Ípek (2011) interprets this increase as a phenomenon that she calls *immediately pre-focal pitch range expansion* of final focus. A similar pre-focal pitch range expansion takes place on the initial element (subject) when the medial element (object) is focused. Nonetheless, post-hoc tests for the pitch range expansion in the immediately pre-focus domain show a significant difference for final focus only. For initial focus she states a visible *f0* drop and a significant post-focal lowering or compression (PFC).

As for duration and intensity İpek (2011) shows that focused initial words (subjects) have longer duration, and focused final words (verbs) have an increased intensity. Medial focused words (objects) do not differ from their neutral counterparts in any of the acoustic parameters. To this effect, İpek (2011) cannot find a stable and reliable acoustic cue to focus prominence. The increase or change of the three relevant acoustic parameter of her study, are not straight forward, but depend on the position of the focused item. This results lead İpek to the conclusion that (i) *f0* is not a correlate of focus, as she cannot find a constant on-focus pitch range expansion and (ii) that focused items acoustically rather differ in terms of intensity and duration depending on the focus position. By this means, İpek (2011) assumes that duration and intensity are more relevant acoustic correlates of pitch accents assigned to the focused constituent. This challenges Levi's (2005) and Kamali's (2011) classification of Turkish as a pitch accent language, who assume that *f0* is the only pitch accent parameter on the word and on the sentence level.

Despite the fact, that the results of İpek (2011) do not determine a reliable on-focus pitch range expansion- for which she claims a lack of acoustic correlates tom IS- the graphs in figure (2.9) nonetheless clearly show that the outlined *f0* curves are modified under the impact of focus. For initial focus, İpek (2011) states post-focal compression, since the *f0* contour remains flat after the focused subject. The same can be attested for verb focus in figure (2.9). Whereas in verb focus, *f0* movement on the verb can be seen, this pitch movement is not found in sentences where the verb constitutes a post-focal constituent. Hence, post-focal compression or post-focal de-accentuation seems to be systematic after focus in Turkish, which will be shown by the results of experiment 1.

Furthermore, the observation of a *pre-focal rise* on the medial constituent for final focus also relates to a change in *f0* in a certain focus condition compared to the default contour. From a cross-linguistic perspective of focus typology this might be the prosodic expression of the introduction of a pre-focal boundary tone changing the phrasing structure of an utterance and its respective meaning. In chapter I, it was outlined that the introduction of boundaries is one out of several strategies to mark a constituent as prominent by prosodic means. In the AM-model of İpek & Jun (2013) for Turkish intonational phonology also a left-aligned nuclear boundary tone is assumed, as outlined in the preceding subchapter. Although the results of İpek`s (2011) acoustic measurements do not reveal pitch increase on focused constituents as a prosodic correlate of focus, it still can be assumed that IS motivates a modification of the intonation contour in Turkish declaratives.

The results of experiment 1 will shed more light on this assumption with respect to the modification of the *f0* contours in contrastively in-situ focused SOV yes/no questions.

II.5.5 SUMMARY

In the present section I gave an overview of different approaches on information structure in Turkish. Depending on the framework of description, syntactic, semantic, or phonologic/phonetic features are claimed to be relevant or absent in the realization of focus prominence. Whereas early studies mainly concentrate on the role of syntactic movement and identify the immediately pre-verbal position as the default focus position, more recent studies try to explain syntactic movement by prosodic requirements (Göksel & Özsoy 2000) or differentiate between different focus types which are realized by different linguistic means. To this effect, İşsever (2003) claims that only contrastive focus is marked prosodically. Özge & Bozșhain (2010) on the other side propose that prosodic focus marking in Turkish works independent of the syntactic structure. Phonological categories are related to IS categories and ambiguities in the intonation contour of different focus types are supposed to be disentangled by different degrees of stress making a narrowly focused constituent more prominent than the broad focused counterpart. The phonetic study of İpek (2011) on the other side cannot find such a gradient difference in her experimental study of in-situ focus. Instead, she observes different acoustic correlates for different focus conditions. A pitch increase on the word stressed syllable is only found in final focus. Furthermore the syllable immediately preceding the final focused word experiences a *pre-focal pitch range-expansion*. For initial focus she observes post-focal de-accentuation as previously described for post-focal elements in general by Özge & Bozșahin (2010).
Considering the diverging results of the reviewed approaches of IS in Turkish, the role of *f0* in prosodic focus marking is still unclear. Though none of the studies actually doubts that Turkish realizes IS on the prosodic level a classification of focus typology for Turkish is still lacking. In the experimental section I try to resolve this missing classification by means of *f0* examination departing from a different way of analysis. Instead, of considering prominence increase to indicate focus by means of pitch increase, the role of the prosodic alignment of focused constituents in IS marking will be in the center of attention. A prosodic analysis of monolingual declaratives in Turkish presented in Kühn (2014) already gave hints that focus is aligned to prosodic boundaries. In experiment 1 the claim is fortified by new result for Turkish yes/no questions where prosodic alignment via the deletion of post-focal tones is even more systematic. Furthermore, the same experiment additionally investigates the prosodic realization of sentence type. To this effect, the presentation of experiment 1 will be preceded by a short introduction into the basic features of yes/no questions in Turkish.

II.6 TURKISH YES/NO QUESTION

Turkish disposes of two morpho-syntactic major types of interrogatives (e.g. von Essen 1964, Kornfilt 1979): (i) *wh-* questions and (ii) yes/ no questions. Kawaguchi et al. (2006:364) also mentions a third type of interrogatives: (iii) questions without morpho-syntactic marker *which solely evoke attention without necessarily expecting a subsequent speech act of the interlocutor.* This chapter will concentrate on interrogative type (ii): interrogatives, which are morpho-syntactically classified as yes/no questions.

While, traditionally morpho-syntactic properties are in the center of attention in establishing a classification of Turkish interrogatives, supra-segmentals, especially intonation, have been investigated as well. Von Essen (1964) already distinguishes between six different types of interrogative intonation in Turkish.[29] A classification considering morpho-syntactic, pragmatic and intonational properties at the same time, in order to establish a holistic taxonomy of interrogatives in Turkish has not been realized yet. As supra-segmental features are crucial for the experimental part of the present study, I will concentrate on their description. Special attention will also be payed to the morphological question marker used in Turkish yes/no questions.

II.6.1 THE QUESTION PARTICLE IN TURKISH

The discussion about the morpheme that indicates yes/no questions in Turkish morphologically, takes grant part of the literature on yes/no questions (e.g. Kornfilt 1979, Kabak & Vogel 2001, Göksel & Kerslake 2005, Kamali 2011). Though the marker is primarily a morpho-syntactic phenomenon, it has been reported to have an impact on word stress and sentence level prosody. The syntactic position of the morpheme has been claimed to have an impact on the realization of the intonation contour. To this cause, it is crucial for the present study with respect to prosodic sentence type marking in Turkish. However, the identification of its default placement location remains unsolved, motivating the conduction of an additional Q-particle placement test. The test is conducted in order to justify the stimuli of experiment 1 and 2 with respect to the precise position of the Q-particle in the target sentences and the connected change in the semantic interpretation.

[29] For a general overview concerning different assumptions about types of interrogative intonation consult Kawaguchi et al. (2006).

From a syntactic point of view Turkish yes/no questions do not differ from their declarative counterparts: the default SOV structure of Turkish declaratives is maintained. However, they differ morphologically. Yes/no questions are marked morphologically by the question particle -mI. The Q-particle differs in many aspects from question particles in other languages, as it is restricted to yes/no questions and occurs in different positions in the question.[30]

As shown in (2.22), it can either follow the verb (2.22) (a), the object (2.22) (b) or the subject (2.22) (c) in simple SOV interrogatives.

(2.22)(a) Merve annesini görüyor mu?
Merve mother-POSS-ACC see-PRS-Q
Merve sees her mother?

(b) Merve annesini mi görüyor?
Merve mother-POSS-ACC Q see-PRS
Is it her mother Merve sees?

(c) Merve mi annesini görüyor?
Merve Q mother-POSS-ACC see-PRS
Is it Merve who sees her mother?

As shown in the examples in (2.22) -mI can attach to different constituents in the yes/no question evoking different semantic meanings. In (2.22) (a) the Q-particle is adjacent to the verb and evokes scope setting over the whole utterance. In (2.22) (b) it is attached to the object causing focus reading on *annesini* (her mother)*,* and in (2.22) (c) it causes subject focus reading as it is attached to the subject *Merve*. In other words –mI attaches to the focused constituent and indicates sentence type at the same time, attaching to a *response-seeking-utterance* (Göksel et al. 2009). However, its focus-sensitivity has been refuted by the existence of so called *distant mI questions*. Kamali & Büring (2011) and Kamali (to appear) show that the Q-particle does not necessarily attach to a focused constituent. Focus can be realized on any constituent as long as the particle attaches to the predicate. In figures (2.10) and (2.11), taken from Kamali (to appear), the Q-particle -mI is attached to the verb in both examples. Nonetheless, the intonation contour varies in both examples. In figure (2.10), the question particle -mI is adjacent to the constituent bearing sentence stress. In figure (2.11) -mI is still attached to the verb, but not adjacent to the constituente bearing the main pitch accent. Main pitch in figure (2.11) is aligned with the adverb *dün* instead.

[30] Note that in Japanese and Korean, e.g. the morphological question marker also occurs in *wh*-questions. In Turkish only echo questions consist of a *wh*-word and an additional Q-particle (Göksel et al. 2006: 251).

Fig. (2.10): Pitch track of adjacent -mI question (AMQ) from Kamali (to appear)

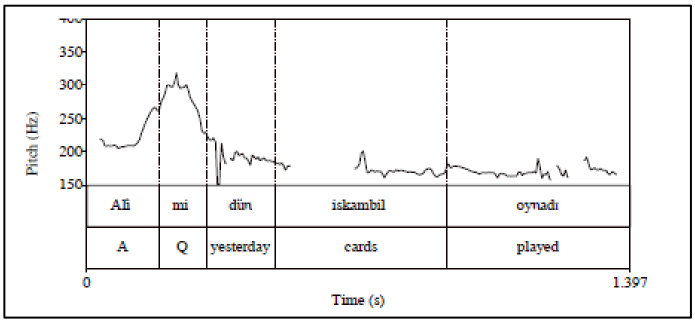
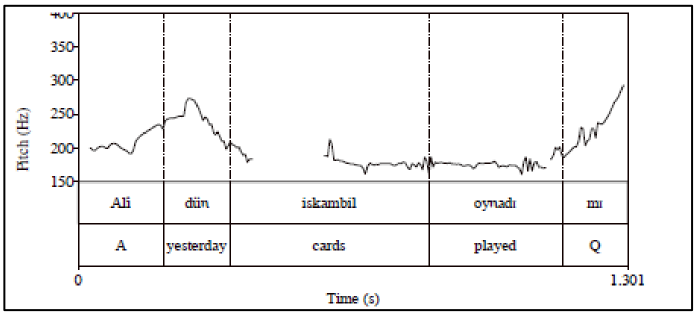


Fig. (2.11): Pitch track of distant -mI question (DMQ) from Kamali (to appear)



To distinguish both yes/no question types, Kamali & Büring (2011) propose the notion adjacent -mI question (AMQ) to the one´s where -mI follows the stressed item and distant -mI question (DMQ) to the one´s where -mI is sentence final and an earlier constituent is stressed. DMQ's are described as marked yes/no questions, restricted to questions, where main stress is associated with a contrastive topic/focus. Kamali & Büring (2011) assume that contrastiveness (topical or focal) is phonologically realized by the implementation of a boosted high tone, as in German or English. However, in the preceding study of İpek (2011) it was shown that in-situ focused constituents in Turkish do not increase *f0.* Still, both studies assume post-focal de-accentuation. To this effect, Kamali & Büring (2011) furthermore assume that in DMQ's a post-topical/ post-focal de-accentuation takes place, up to the sentence final Q-particle which than is aligned with a final rise instead of a low boundary tone in AMQ's.

II.6.1.2DEFAULT PLACEMENT

In the preceding section it was shown that the Q-particle does not have a fixed position in the syntax. However, in AMQ's it basically attaches to the constituent which is focused. In all-new sentences, where each constituent is in the scope of focus, the determination of the position of the Q-particle, is a controversial issue. Different linguistic aspects are considered and basically, two positions have been determined as the default location for Q: (i) -mI is adjacent to the verb (e.g. Kornfilt 1979, Aygen 2007, Ladd 1996), or (ii) it attaches to the phrase immediately preceding the predicate (Kamali 2011a). There are some authors (e.g. Göksel & Kerslake 2005, Yüksek 2012), who take a third position, located in between the two extremes. Their assumption is that (iii) both, verb attaching and VP internal attaching, are possible realizations to set scope over the entire proposition, each depending on specific factors.

In the Turkish literature, representing the traditional view (i), broad focus reading is described to be achieved by attaching the Q-particle at the right edge of the interrogative, i.e. when it is cliticized onto the predicate of the sentence and has the whole sentence in its scope (e.g. Kornfilt 1997, Aygen 2007). This position is also taken by Ladd (1996) who states that the Q-particle attaches to the finite verb in Turkish if no specific word is focused.

In (2.22) (a) above -mI is attached to the verb and a truly broad focus reading is possible as the whole sentence is in its scope. The interrogative is interpreted as an out-of-the-blue-question and can felicitously be answered by yes or no. However, a further reading is possible when the Q-particle attaches to the predicate: narrow focus reading of the predicate. Kornfilt (1997) argues that yes/no questions with focus on the verb are more likely to receive an answer, which includes the verb (as in (2.23) (b), whereas in broad focus answers a short minimal answer is sufficient (2.23)(a).

(2.23)	Merve annesini görüyor mu? (Merve mother-POSS-ACC see-PRS Q)	
(a)	Evet. (yes)	(Answer to broad focus question)
(b)	Evet, görüyor. (Yes see-PRS)	(Answer to predicate focus question)

A different generalization (iii) regarding the default position of the Q-particle for broad focus reading is made by Göksel & Kerslake (2005). They assume that broad focus reading can be generated either by attaching Q to the predicate, or to the phrase immediately preceding it. Accordingly, (2.22) (b) above, where -mI attaches to the object, can obtain a broad focus reading as well. Broad focus questions with the structure of (2.22) (b) are used when the speaker has an assumption about the situation s/he is asking about, usually due to non-linguistic clues. Broad focus questions with the structure of (2.22) (a) instead, are out-of-the-blue questions, or all-new questions, where the speaker has no assumption about the situation. Hence, a pure all-new sentence is only triggered when the Q-particle is aligned to the verb.

Finally, representing (ii), Kamali (2011b) who is in principle supported by Yüksek (2012), assumes that -mI is a second position clitic in the VP domain which attaches to the highest constituent in the spellout domain in Turkish to generate broad focus reading. Following Truckenbrodt's (1995) assumption that focus receives the highest prominence, Kamali (2011b) argues that if Q-particle placement follows the greatest sentential prominence, it is expected to attach to the narrowly focused constituent when there is one, and to the element that receives default sentence stress when there is no narrow focused constituent. To this effect, question (26) (b) of the examples above represents the default Q-particle placement for Kamali (2011b), where the scope of focus needs to spread backwards and forward in order to incorporate the whole sentence into the domain of focus. To confirm her assumptions of object adjacent default placement, Kamali (2011b) provides examples where -mI is not adjacent to the verb, but can only follow a "what happened" question and indicate broad focus reading when it attaches to the preverbal constituent. In (2.24) an example from Kamali (2011b:2) for object adjacent Q-particle assignment in broad focus is provided representing a Turkish idioms.

(2.24) A : Ali'nin bankaya bir sürü borcu varmış.
Ali-GEN bank-DAT a.lot.of debt-POSS exist-EVID
I heard Ali owes a lot of money to the bank.

B: Hâlâ sinek mi avlıyor?
Still mosquito Q catch-PRS
Does (he) still catch mosquitos?

Kamali (2011b) outlines different possibilities to read (2.24): either as (i) literal narrow: *Is it mosquitos that Ali is still catching?* or (ii) literal broad: *Is it catching mosquitos that Ali is still doing?* But the true meaning, which can be concluded from the provided context in A is an idiomatic broad reading which refers to the question if *Ali´s business is still not going well*. Due to the categorical absence of idiomatic narrow focus reading in idioms, Kamali concludes that the only possible reading is related to default attachment of the Q-particle and that narrow focus cannot be responsible for the attachment of -mI on the object.[31]

[31] A further interesting aspect which comes up with the above outlined differentiation of DMQ's and AMQ's within the portfolio of yes/no questions (Kamali 2011a, Kamali & Büring 2011) is its consequence for the default position of the Q-particle. As outlined above in Kamali & Büring (2011) the strategy of distance marking is restricted to yes/no questions with sentence final Q-particle attachment which would usually lead to strict predicate focus interpretation according to Kamali (2011). However, here she argues that as long as -mI is attached to the predicate any other constituent can bear the main pitch accent of the interrogative utterance. Kamali states that distant contrastive prosodic focus marking is only possible if -mİ attaches to the verb, if it attaches to any other constituent the position for narrow focus reading is automatically occupied and a further constituent cannot be marked prosodically. So why can -mI exclusively attach only to the verb, but not to the subject or object when a further constituent is prosodically associated with the main accent and therefore specified as the narrow focused constituent? My interpretation is that Q-particle attachment on the verb generally implies broad focus reading. Only if Q is in its default position, narrow focus reading can be generated on a non-Q-particle adjacent

Yüksek (2012) basically follows Kamali (2011b) in the determination of the Q-particle placement, but makes a less strict generalization about its default placement similar to Göksel & Kerslake (2005). In contrast to other approaches, Yüksek bases her assumptions on empirical evidence. She conducts a study with approx. 20 speakers who evaluate yes/no questions with respect to their broad and narrow focus reading possibilities when the Q-particle is adjacent to the object.[32] The results of her study show that for some speakers the object adjacent attachment of -mI evokes broad focus reading. Here the Q-particle seems to have the entire proposition in its scope when -mI is attached to a direct object in simple SOV yes/no questions. On the other side, her results show that if object adjacent particle placement is possible at all in a broad focus context it is restricted to direct objects. For about half of the speakers, who allow broad focus reading at all in object adjacent Q-particle questions the broad focus reading disappears in configurations where an indirect object is present. The examples below are taken from Yüksek (2012:9) and represent yes/no questions with object adjacent -mI placement. In (2.25) the question contains a direct object where broad and narrow focus reading is possible according to some of her speakers. In (2.26) a further yes/no question with an indirect object is provided, where narrow focus reading is the only possibility for all of her speakers.

(2.25) Ahmet araba mı aldı?

(Ahmet car Q buy-PAST)

(Did Ahmet buy a car?)

Broad focus reading: "Did Ahmet buy a car?"

Narrow focus reading: "Was it a car that Ahmet bought?"

(2.26) Ahmet Ayşe' ye araba mı aldı?

Ahmet Ayşe-DAT car Q buy-PAST

(Did Ahmet buy a car for Ayṣe?)

**Broad focus reading:* "Did Ahmet buy Ayşe a car?"

Narrow focus reading: "Was it a car that Ahmet bought Ayşe?"

constituent. If Q attaches to any other item than the default constituent it automatically contextualizes narrow focus reading on the respective constituent. If Q attaches to the verb however, the position for narrow focus reading is still open and can be marked prosodically by aligning the last pitch with the focused constituent and a following deaccentuation can take place.

[32] Unfortunately, Yüksek gives no further information about the used methodology and speakers of her study. Furthermore, the meaning of an approximate number of speakers remains unclear.

Yüksek relates the syntactical structure of interrogatives to the disappearing of broad focus reading once the indirect object is added, like in (2.26). She argues that the indirect object is introduced by the applicative head, which has the same sectional properties as -mI and therefor is precluded from appearing in the same structure, leaving the narrow focus reading as the only alternative. She also mentions the possibility that whether broad focus reading is available or not, may not only depend on the presence or absence of an indirect object, but also on the tense in which the predicate appears. It seems to her that broad focus reading for interrogatives, where the Q-particle is placed on a VP internal constituent is more likely to arise with the past tense than it is with present tense and future.[33] Thus, what Yüksek's study actually reveals is a very restricted possibility of object adjacent Q-particle placement in relation to an all-new broad focus interpretation of yes/no questions. Due to the observed limits on Q-particle placement, object adjacency does not seem to represent the default case for broad focus contextualization, but an exceptional matter of fact.
Summing up the different approaches on Q-particle placement two distinct syntactic positions are considered relevant for a broad focus elicitation. The particle is claimed to be either adjacent to the verb or to a VP internal constituent, which in SOV sentences constitutes the argument. However, the examples given for both positions are mainly based on intuitions of native speaking authors. In Yüksek's (2012) empirical-based study, it is shown that object adjacent placement is restricted to specific morpho-syntactic events and does not represent the default representation of Q-particle placement, thus contradicting her basic agreement with Kamali's (2011b) assumptions of sentence stress determined Q-particle placement. Following the controversial discussion in the literature, most authors state that yes/no question obtain a broad focus reading when the particle is adjacent to the verb, though some of them include a more or less restricted object adjacent placement for a broad focus interpretation. Solely Kamali (2011b) states that verb attachment exclusively causes narrow predicate focus reading whereas object placement is the only position which can be related to a broad focus reading. In (2.27) the theoretically assumed Q-particle positions are summarized.

(2.27) **Q-particle attachment**

i. -mI attaches either to the verb to generate broad focus reading, or
ii. -mI attaches to a VP-internal constituent preceding the verb.
iii. If the Q-particle occupies any other position, narrow focus reading is implied.

For the purposes of the present study the default placement of the Q-particle is important for several reasons. Experiment 1 concentrates on the interplay of prosody and IS which requires certainty on the elicited focus condition in the experimental set up and design. With respect to the controversy

[33] Note that Kamali's examples are in the past tense.

on the default placement of the Q-particle, a production experiment is conducted concentrating on this issue. In this supplementary trial the target sentences of experiment 1 are tested with respect to broad focus elicitation. The results will be outlined in the following subchapter.

II.6.1.3 THE Q-PARTICLE PLACEMENT TEST

Previous research on Turkish yes/no questions has brought to light a controversial discussion about the location of the Q-particle in broad focus sentences. Whilst it is evident that the placement of the Q-particle causes narrow focus reading on the constituent it attaches to (e.g. Kornfilt 1979, Yüksek 2012), it still remains unclear to which constituent it is attached, to evoke broad focus reading. The literature review so far offers two options: either it is described to be adjacent to the verb (amongst others Kornfilt 1979, Ladd 1996), or to a VP internal constituent (Kamali 2011b). Some authors also take an intermediary stance assuming that both positions can cause a broad focus reading, depending on special morpho-syntactic features (Göksel & Kerslake 2005, Yüksek 2012).

To avoid confusion with respect to the elicitation of broad and narrow focus in experiment 1, the target sentence design has to be based on empirically grounded facts to guaranty the most natural production of broad and narrow focus. To this reason, it is tested if native speakers of Turkish prefer to locate the Q-particle adjacent to the object or adjacent to the verb in the target sentences of experiment 1, which are designed in pragmatic contexts which provide a broad focus reading.

For this production test, the goal is not to provide a definite answer to the default placement of -mI, but to empirically justify the design of the target sentences of the following experiments concerning the placement of the Q-particle in simple SOV broad focus yes/no questions.

II.6.1.3.1 METHODOLOGY

In the following I will give a brief description of the experimental design, the background of the tested participants and the eliciting procedure used in order to search for the default Q-particle position in simple Turkish SOV yes/no questions for the determined corpus of sentences of this study.

II.6.1.3.1.1 STIMULI

Five short contexts were provided to the participants calling for the realization of a yes/no question which would have the character of a broad focus question. The syntactical representation of the contexts was designed in order to evoke the production of a simple SOV yes/no question with an accusative object according to the target sentence design in the following experiment 1. In the presentation the written context was provided on a power point slide, supported by a picture referring to the outlined situation. The pragmatic contexts and intended target sentences are presented in table (2.1) below.

Table (2.1): Q-particle test: tasks and target broad focus questions

Task	Melda'nın elmacıyı sevip sevmediğini sor!	Nilsu'nun eskiciyi üzüp üzmediğini sor!	Merve'nin annesini görüp gör-mediğini sor!	Necla'nın amcasını özleyip özlemediğini sor!	Nazlı'nın eltsini arayıp aramadığını sor!
Glossing	Melda-GEN apple.trader-ACC love-CONV love-NEG-NOM-POSS-ACC ask(IMP)!	Nilsu-GEN second.hand. dealer-ACC make sad-CONV make sad-NEG-NOM—POSS-ACC ask(IMP)!	Merve-GEN mother-POSS-ACC see-CONV see-NEG-NOM-POSS-ACC ask(IMP)!	Necla-GEN uncle-POSS-ACC miss-CONV miss-NEG-NOM-POSS-ACC ask(IMP)!	Nazlı-GEN sister-in-law-POSS-ACC search -CONV search-NEG-NOM-POSS-ACC ask(IMP
Translation	Ask if Melda loves the apple trader!	Ask if Nilsu makes the second hand dealer sad!	Ask if Merve sees her mother!	Ask if Necla misses her uncle!	Ask if Nazli searches her sister-in-law!
Target answer	Melda, elmaciyi seviyor mu?	Nilsu eskiciyi üzüyor mu?	Merve annesini görüyor mu?	Necla amcasini özlüyor mu?	Nazli eltisini ariyor mu?

The contexts as outlined in table 2.1 were presented to each speaker, just one time and no repetitions were made. In total 120 yes/no questions were elicited: 5 sentences x 24 speakers which build the empirical bases for the analysis.

II.6.1.3.1.2 SUBJECTS

24 native speakers of Turkish, seven male and seventeen female, participated in the study. The mean age of the subjects was 28 at elicitation time, with the youngest being 18 and the oldest 50. The subjects were recruited in Turkey and Germany, mainly in Izmir and Berlin, and are either monolingual or bilingual speakers of Turkish. 12 of the speakers are monolingual Turkish speakers living in Turkey, 9 of the speakers are early bilinguals of Turkish and German living in Germany, and 3 of them are late bilinguals of Turkish and German living in Germany. The subjects were not paid for their participation in the experiment.

II.6.1.3.1.3 DATA ELICITATION PROCEDURE

The experimental set up consisted of the five different contexts outlined above, each represented on a different power point slide. Each context was accompanied by a picture representing the context of the desired target sentence. The target sentences were elicited by two different procedures. One group, consisting of ten participants, was seated in front of a computer screen, where they were presented with the different slides. All slides were presented consecutively and after each slide the subject was asked to formulate a corresponding question in Turkish and write it down. The session took about five to ten minutes of time for each speaker. The presenting procedure to the remaining 14 speakers was slightly different. The same presentation slides were sent to them in an email. They were asked in the email to open the presentation, read the text on the first slide and write down a corresponding question. After completing this, they were asked to repeat the same procedure with the following slides. Afterwards, they were asked to send the written questions back by email. The difference between both procedures should not influence the result, since stimuli and presenting method were similar and only the way of indication was different: for one group via my direct instruction and for the other group via written instructions.

II.6.1.3.1.4 ANALYSES AND RESULTS

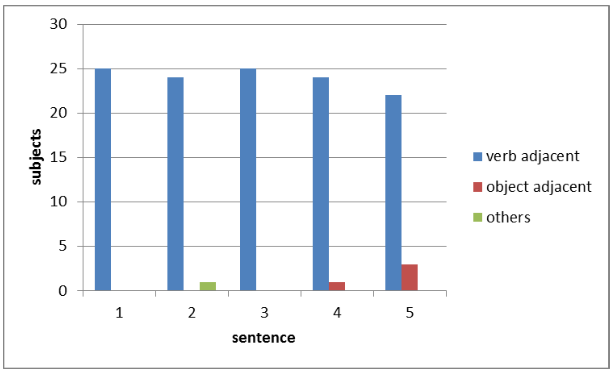
The written yes/no questions of all speakers for all five contexts were documented and analyzed with regard to the position of the Q-particle in the utterance. The core analysis refers to whether the particle was aligned to the verb, to the object or a further constituent.
The participants produced the target broad focus yes/no questions as expected by means of a SOV structure with an accusative object. The results show that the Q-particle in broad focus yes/no

questions is much more often situated adjacent to the verb than to the object. As can be seen in figure (28), 116 of 120 yes/no questions were produced with -mI adjacent to the verb and only three yes/no questions were produced with -mI aligned to the object. The object adjacent realization was exclusively used in sentence (5) *Nazli elstisini mi ariyor?*.

In one occasion one subject produced an utterance different from the intended target sentence (2) and aligned the Q-particle not to the object, nor to the verb, but on a different constituent. The subject introduced an adjective into the target sentence, instead of formulating a simple SOV structure, to which the Q-particle was attached.

Furthermore, the results show some variation concerning the use of tempi. All sentences were either produced in present or past tense.

Fig. (2.12): Default Q-particle placement in the target sentences of experiment 1



II.6.1.3.1.5 DISCUSSION

The analysis of the default Q-particle position in the present experiment clearly shows a strong tendency to align the Q-particle to the verb in the production of the broad focus yes/no questions which will be used in experiment 1. However, the produced broad focus yes/no questions vary to certain extent. Some of the utterances are in present tense, whilst others are in past. The aspect that the yes/no questions of the analyzed data show verb adjacent Q placement throughout different tempi however is an interesting side effect of the study. Yüksek (2012) mentions that tempus might probably be an influencing factor in the Q-particle placement, based on the observation that Kamali (2011a) basically uses examples in the past tense to justify her claim that the broad focus placement of -mI in Turkish yes/no questions is not adjacent to the verb, but a VP internal constituent. The results of the testing of the target sentences for the following Experiment 1 however show that in these particular sentences participants systematically aligned the Q particle to the verb to produce broad focus questions independent of the tempus. Q-particle placement was realized in 96,66 % adjacent to the verb.

Concerning the three questions where participants aligned the Q-particle to the object, it can be retained from figure (2.12) that object alignment was restricted to one and the same target sentence. Since the strategy is implemented by three different speakers the deviation may be an effect related to this concrete sentence, which may have been interpreted differently by these speakers. The remaining 21 speakers interpreted the context the same way they interpreted the contexts of target sentence 1 to 4, which can be concluded from the same Q-particle alignment in sentence 1 to 5. Apart from a stimuli inherent reason for the deviance in Q-particle alignment in target sentence 5, a further reason might be settled in the nature of language acquisition of the deviating speakers. The three speakers, who aligned Q to the object in target sentence 5, are early bilinguals, which acquired both of their languages (German and Turkish) in their early childhood. An influencing factor of their German knowledge cannot be excluded, especially since the default marking (though not morphologically, but prosodically) of broad focus in German yes/no questions is generally realized on the object as the bearer of default sentence stress.[34] Monolinguals did not produce broad focus questions with -mI aligned to the object at all.

II.6.1.3.1.6 CONCLUSION

The presented test concentrates on the placement of the Turkish question particle -mI in broad focus conditions. For the production experiment only Turkish yes/no questions with a simple SOV structure containing an accusative object were considered. The results show a clear effect for the placement of Q adjacent to the verb to implicit broad focus reading for the respective target sentences. The study experimentally confirms the assumptions of Kornfilt (1997) and others and differs from Kamali's (2011b) view, who determines a VP internal constituent as the host of the Q-particle, which corresponds to the object position in SOV yes/no questions. Whether the here found verb adjacent placement can be generalized for each subtype of Turkish yes/no questions requires further investigation, but it legitimates the tested sentences as the stimuli for broad focus yes/no questions for the following experiments of this dissertation. Furthermore it confirms Ladd`s (1996: 170) observation: *If there is no specific focused word, it is attached to the finite verb.*

[34] For further information about sentence stress and focus marking in German consult chapter V

In subchapter II.2.2 it was shown that the Q-particle, which marks yes/no questions morphologically, belongs to the class of morphemes that induces exceptional non-final word stress (e.g. Kornfilt 1997, Inkelas 1999). Phonologically, it is classified as a pre-stressing suffix which correlates with word stress to its left and de-accentuation of any syllable that follows (e.g. Inkelas & Orgun 1998, Inkelas 1999; Kabak & Vogel 2001; Kahnemuyipour & Kornfilt 2007). Kabak & Vogel (2001) describe the morpheme as prosodic word adjoiner.

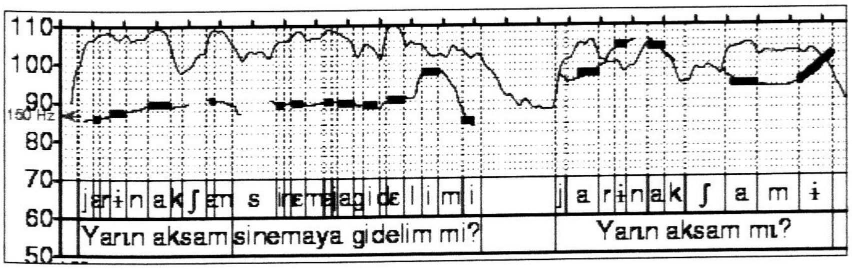
Across languages it has been claimed a matter of universal observations that distinctive intonation patterns between interrogatives and declaratives -when they are present in a certain language- occur rather towards the end of an utterance than at the beginning of it (e.g. Greenberg 1963; Kornfilt 1997; Kawaguchi et al. 2006). In principal, the final intonation pattern in Turkish reflects this assumption: *Wh*-questions are most typically associated with a final rise, declaratives with a final fall. However, yes/no questions are generally not aligned with a final rise, but with a final fall.

Kawaguchi et al. (2006) discuss two varieties of endings and two relevant prosodic positions for the intonation structure of yes/no questions in Turkish. The first relevant position (P1) is the syllable immediately preceding -mI, the second relevant position (P2) is the sentence final syllable. Pitch pattern are supposed to oppose to each other in these two positions. If the syllable immediately preceding the Q-particle is aligned with a high flat pitch or rising glissando, the final *f0* must be opposite to the pitch before the Q-particle, i.e. a terminal low flat pitch or a falling glissando. Accordingly, this should represent the regular intonation contour, considering that Q requires stress on the syllable preceding it. However, if the syllable the Q-particle attaches to is aligned with a low flat pitch or a falling glissando, the sentence final syllable has to be high. The observation of a final high boundary tone (H%) preceded by a flat low (de-accented) intonation contour is also described in the so called DMQ's by Kamli & Büring (2011) as outlined above.[35] In the graph presented in figure (2.13), both possible intonation patterns of the two crucial positions, which phonologically oppose each other, are outlined. In the first question: *Yarın akşamlar sinemaya gidelim mi?* (Shall we go to the cinema tomorrow evening?), (P1) corresponds to the syllable immediately preceding the Q-particle and is realized with a high tone consequently causing a low tone in (P2), which is associated with the last syllable of the utterance. Contrastively, in the second question: *Yarın akşam mı?*

[35] Originally the distinction between AMQ's and DMQ's is made with respect to the position of Q neglecting focus-sensitivity, but it also points out that both subtypes differ in the shape of their final intonation contour. AMQs end with a final fall (L%), whereas DMQs end with a final rise (H%) after the de-accented post-focal constituents. To this effect a final rise is implemented when the syllable immediately preceding -mI is not aligned with a high tone like proposed by Kawaguchi et al. (2006). Though a direct comparison of the marked yes/no questions in both studies is difficult it appears that contrastively focused yes/no questions may bear sentence stress on a non -mI adjacent constituent and if so they end with a final rising boundary tone, representing a marked yes/no question subtype.

(Tomorrow evening?) (P1) realized on the constituent preceding Q, *akşam,* exhibits a low tone and (P2) a rising glissando. Interestingly, the question represents a DMQ as proposed by Kamali & Büring (2011). A contrastively focused constituent which is not adjacent to the Q-particle is followed by a de-accentuation pattern and a high boundary tone.

Fig. (2.13): Yes/no question intonation contours from Kawaguchi et al. (2006:363)



Kawaguchi et al. (2006:366) relate this regular prosodic chiasmus between the pitch immediately preceding -mI and the sentence terminal pitch to different pragmatic meanings.

> (…) the pitch pattern of the first position has a morpho-syntactic function, because with wh-words or -mI, a given interrogative sentence can be distinguished from other types of sentence. On the contrary, the pitch pattern of the second position seems to be connected with the pragmatic meaning of a given discourse.

To this effect, they claim that the IP-final contour is related to different semantic question types of yes/no questions. A final low pitch in their corpus of 42 semi-natural yes/no questions is related to assertions. A falling glissando relates to emotional feelings, such as surprise, satisfaction or dissatisfaction. A rising glissando, which only appears 2 times in their corpus, is related to confirmation questions. In Ímer & Çelebi (2006) it is furthermore mentioned that yes/no questions with a rising intonation are not the primary choice and they propose that the high tone is used to emphasize or express excitement or rejection. Nonetheless, Kawaguchi et al. (2006) admit that their results should be checked especially concerning the given prosodic pattern and its pragmatic meaning since their observations are based on a relatively small corpus of spoken Turkish.[36]

A further observation of Kawaguchi et al. (2006) with respect to the intonation contour of yes/no questions is that the word that carries the Q-particle reveals the highest peak of the contour, akin to the cross-linguistic high peaks on wh-items (e.g. Truckenbrodt 2012 or Göksel et al. 2009 for Turkish),

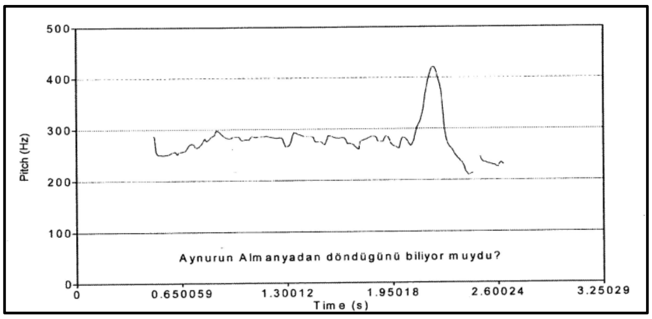
[36] A further drawback of their classification is that they do not account for the structural diversity of the reviewed utterances in their corpus. Each yes/no question is classified solely by its (P1) and (P2). No distinction is drawn with respect to possible interrelation with pragmatics by means of IS. A more detailed look into the pragmatic categories of yes/no questions including different IS structures would be helpful in the description of the possible intonation contours of Turkish yes/no questions as will be outlined in the results of Experiment 1.

as outlined in the first sentence in figure (2.13) above. The word stressed syllable of the constituent where –mi attaches to represented by the verb *gidelim* is realized with the highest pitch of the whole IP. All preceding constituents on the other side are realized with a low almost flat contour. The same claim is made in Ímer & Çelebi (2006: 74):

> In Standard Turkish, the question particle is normally placed at the end of the question, and the verb in front of –mI has the highest tone.

Special emphasis with respect to the flat contour preceding –mI is made in a study by Göksel et al. (2009). Similar to Kawaguchi et al. (2006), they classify the final fall (L%) as the general final intonation pattern of Turkish yes/no questions. However, in contrast to what has been reported as a universal in sentence type marking (cf. Greenberg 1963), Göksel et al. (2009) do not assume the final intonation contour as relevant for sentence type distinction in Turkish, but the initial part of the contour. They state that the distinctive intonation cues in Turkish are primarily located at the beginning of Turkish interrogatives, including wh-questions, and to a lesser extend towards their end. Similar to the preceding studies, Göksel et al. (2009) observe a compressed pitch contour up to the nuclear pitch, which aligns to the word the Q-particle attaches to or to the wh-word in wh-phrases. In figure (2.14) a sample pitch track for a typical yes/no question with a compressed pitch contour from Göksel et al. (2009) is provided. In *Aynurun Almanyadan döndüğünü biliyor muydu?* (Did s/he know that Aynur had returned from Germany?) the intonation contour seems relatively flat until the verb *biliyor* which is immediately preceding the Q-particle *-mu*, which is undergoing vowel harmony and located before the tense marker. The pitch realized on the final syllable of the verb represents the highest pitch of the whole intonation contour. All glossing, annotations, and translation are from Göksel et al. (2009).

Fig. (2.14): Yes/no question intonation contour with final fall from Göksel et al. (2009: 254)



Aynur'un Almanyadan döndüğünü biliyor muydu?

(Aynur-GEN Germany-ABL return-COMP-3.SG.POSS-ACC know-IMPF Q-P.COP)

(Did s/he know that Aynur had returned from Germany?)

Göksel et al. (2009) claim that declarative contours show the same final pattern (L%) as the yes/no question outlined above however, in a declarative contour the same area between onset and nuclear pitch accent exhibits a variety of peaks with higher excursion. Furthermore, they assume a gradient contrast in the final fall between both contours. The fall in the yes/no questions is much steeper due to the excursion of the pitch accent preceding the Q-particle. According to Göksel et al. (2009) the nuclear pitch accent on the syllable preceding -mI undergoes a boast in the interrogative in comparison to a nuclear pitch accent in a declarative. Additionally, the contour preceding the nuclear pitch accent undergoes compression.

To substantiate the observation of compression, Göksel et al. (2009) conduct an additional perception experiment to show that the compressed pitch contour is crucial in speech perception to distinguish between both sentence types. In their second experiment it is shown that hearers are able to map the different contours (compressed vs. uncompressed) at the beginning of the utterance to the corresponding sentence type, right before hearing the morphological marker or the wh-word. Taking these facts, Göksel et al. (2009) hypothesize that the intonation of declaratives and interrogatives contrasts right from the beginning of an utterance. Declaratives exhibit a fluctuating pitch contour, whereas questions exhibit a compressed pitch contour up to the focused constituent which is aligned with the highest pitch.

To sum up the results of the outlined studies on interrogative intonation in Turkish, it seems that intonation is involved in the marking of sentence type in Turkish. In contrast to universal observations the pivot point for the implementation of distinct intonation patterns however, is not assumed to be located at the end of an utterance, but right at the beginning of a sentence by means of a compressed pitch contour instead of the fluctuating pitch contour in declaratives and a salient nuclear pitch accent.[37] The crucial cues of general intonation in Turkish yes/no questions shown by former research can be summarized as follows:

(i) In yes/no questions (and declaratives) generally a final low tone (L%) is implemented, in contrast to the straightforward implementation of a final high tone (H%) in wh-questions.

(ii) The implementation of a high final boundary tone (H%) in yes/no questions is exceptional, structurally determined by the preceding tone, and represents a pragmatic subtype (described as assertion or DMQ).

(iii) Yes/no questions exhibit a compressed pitch contour up to the nuclear-pitch accent, in comparison to their declarative counterparts.

[37] Note that Turkish is described to not exhibit much pitch expansion in general (e.g. Kan 2009, Kamali 2011, Güneş 2013a).

(iv) A salient nuclear pitch accent is realized on the syllable immediately preceding the Q-particle.

II.6.3 SUMMARY

In the previous section I provided an overview of the crucial facts on yes/no questions as outlined in the literature with special attention on the features which are reported to have a prosodic effect on the intonation contour of yes/no questions. The review revealed that two crucial aspects are discussed controversially: the default position of the Q-particle and a sentence type indicating intonation contour.

With respect to the default placement of the question particle, which should imply broad focus reading in Turkish, the traditional morpho-syntactic analysis (e.g. Kornfilt 1997) proposes that Q attaches to the sentence final constituent, generally represented by the verb, to spread scope backwards over the whole utterance. However, in restricted environments the Q-particle can also attach to a different constituent than the final and still spread scope over the whole sentence (e.g. Göksel and Kerslake 2005, Yüksek 2012). A different view on the other side is taken by Kamali (2011b). She states that verb attachment exclusively causes narrow predicate focus reading, whereas object placement is the only position which can felicitously evoke a broad focus interpretation in yes/no questions. Due to the unsolved location determination an additional Q-particle placement test was conducted in order to justify the target sentence design of the following experiments which, includes the elicitation of broad focus as a baseline for comparison with different in-situ foci. To ensure that the results of the present study were not biased by theoretical assumptions, the broad focus target sentences where tested with respect to the preferred position of Q by native Turkish speakers. By means of a production test it was fortified that the Q-particle is most likely adjacent to the verb to contextualize a broad focus meaning in the simple SOV target sentences of this experiment. An object adjacent placement as proposed by Kamali (2011b) was only found in three out of 120 sentences.

With respect to the sentence type distinctive properties of the intonation contour, researchers agree that a low final boundary tone (L%) is systematic in Turkish yes/no questions. To this effect the final contour is not a distinctive cue to general declarative contours. However, Göksel et al. (2009) claim that the most crucial point of differentiation is manifested in the beginning of Turkish interrogatives already, including wh-questions. The interrogative intonation contour is demonstrated as a compressed pitch contour, compared to declaratives, up to the constituent where the Q-particle attaches to. Correspondingly, the Q particle adjacent constituent is supposed to exhibit the highest *f0* value of the sentence independent of its position, which is also assumed by Kawaguchi et al. (2006) and İmer & Çelebi (2006). In general, the Q-particle adjacent constituent pragmatically represents the focused element, which according to Göksel et al. (2009) phonetically, experiences a boost in pitch on its word stressed syllable. To this effect the pre-focal contour and the boost in the nuclear pitch accent are considered as the crucial prosodic correlates of yes/no questions in Turkish. However, these correlates have been reported in other languages as correlates of IS. As will be outlined in chapter V, German compresses pre-focal constituents and raises pitch on the focused constituent by means of a register change. No reference though, is made in the previously outlined studies to the possible impact of IS in their sentences. To this effect, it cannot be excluded that the prosodic features, reported as exclusively indicating sentence type in Turkish, are in fact correlates of IS. What's been missing so far is a study investigating the prosodic correlates of sentence type and IS in order to disentangle the corresponding features. Such a study is provided in the following chapter by means of experiment 1.

CHAPTER III: EXPERIMENT 1
PROSODIC FOCUS AND SENTENCE TYPE MARKING IN MONOLINGUAL TURKISH YES/NO QUESTIONS

III.1 INTRODUCTION

As outlined in the previous section, there is a lack of evidence how prosodic focus and sentence type marking is realized in Turkish yes/no questions. The following experiment will contribute to fill this gap. Moreover, it is motivated by the fact that knowledge of the monolingual realization of focus and sentence type is needed as a baseline for comparison with the bilingual German-Turkish data gathered in experiment 2.

With respect to IS marking, Turkish has been described to have a syntactic and a prosodic strategy to mark focus. Phonological descriptions try to identify pitch accent modification as a prosodic correlate of focus including the increase of pitch height on focused constituents. This is not affirmed though by phonetic analyses, which show that pitch increase on a focused constituent is not systematically implemented in Turkish declaratives (İpek 2011). Nonetheless, different focus conditions cause a modification of the intonation contour.

Considering the results of previous studies in addition to cross-linguistic observations concerning focus typology as outlined in chapter 1, in this section an experiment is described, which investigates focus from a different perspective, in order to classify the modification of *f0* by the influence of focus. In contrast to the previous studies, I do not assume pitch accent modification by means of pitch increase or categorical change as the crucial factor in Turkish prosodic focus marking, but a modification of focus prominence by means of prosodic alignment as described in chapter 1. Germanic languages, which usually assign the most prominent pitch accent to the focused constituent, have been crucial in the development of theories of focus prominence. However, cross-linguistic studies on prominence marking also revealed that prominence is not only obtained via the modification and/or implementation of pitch accents, but also by prosodic alignment (e.g. Truckenbrodt 1995, Büring 2010, Féry 2013a). Prosodic alignment refers to the tendency that focused constituents are realized towards the edges of a prosodic boundary. By aligning focused constituents with edges of prosodic boundaries, they become prominent. To this effect the intonation contour can be modified through the impact of IS by boundary deletion and/or insertion.

For Féry (2013a) moreover, alignment is the most common prosodic realization of focus, since not all languages associate focus with prominence, but all try to align focus prosodically. In the literature on Turkish prominence marking, no attention has been paid so far on the correlation of focus and prominence including the concept of prosodic alignment as proposed by Truckenbrodt (1995) or focus as alignment without the obligatory need of prominence in the sense of Féry (2013a). To clarify if focus prominence is realized by alignment in the sense of the insertion and/or deletion of prosodic boundaries and the deletion of post-focal pitch accents in Turkish rather than by pitch increase, experiment 1 considers contrastive in-situ focus on different constituents. It is similar to İpek's (2011) study, based on the methodology of Xu (1999), but with modified stimuli and yes/no question target sentences. By that means, a further aim of the following experiment is to describe the prosodic reality of yes/no questions in Turkish.

The previously outlined studies on interrogative intonation in Turkish in chapter II brought to light that intonation seems to be somehow involved in the marking of sentence type in Turkish. It was referred to Göksel et al.'s (2009) claim that Turkish is a universal exception on the prosodic level. Göksel et al. (2009) state that in contrast to other languages which indicate sentence type by prosodic means, Turkish does not modify the IP final syllable, but the initial contour by means of pre-focal compression to indicate sentence type. Nonetheless, other studies provide evidence that a final high boundary tone in contrast to a low boundary tone, as typical in declaratives, is also possible in Turkish (e.g. Kawaguchi et al 2006, Kamali & Büring 2011). Its implementation, nonetheless, does not seem to be crucial for sentence type distinction. Instead, it most probably refers to other pragmatic functions of intonation, is purely structural determined (Kawaguchi et al. 2006), or restricted to structurally marked questions (Kamali & Büring 2011).

The following experimental study will verify by a phonological analysis and additional concrete acoustic measurements if Turkish marks sentence type by means of *f0* modification in form of a compressed pre-focal contour and/or by the implementation of a high final boundary tone. Furthermore, the results will indicate if pre-focal compression, if used at all, is a correlate of IS, meeting cross-linguistic observations, or if it indeed constitutes an universal exception by indicating sentence type, as proposed by Göksel et al. (2009).

III.2 METHODOLOGY

The present experiment is designed in order to elicit the prosodic realization of IS and sentence type in contrastive in-situ focused yes/no questions in monolingual Turkish. The same experiment is replicated with bilingual German Turkish speakers in experiment 2 of the present study. Experiment 1 is conducted to serve as a monolingual baseline for comparison with bilingual speech.

III.2.1 EXPERIMENTAL DESIGN AND SET UP

The experimental design and set up represents a modified replication of İpek´s (2011) study based on Xu's (1999) methodology with focus as the manipulated factor. In contrast to Ipek's study some major changes with respect to the segmental design and sentence type are made. The present experiment is conducted with Turkish yes/no questions containing the question particle -mI. Furthermore, all sentences contain the same number of syllables, which was not the case in İpek's (2011) study and data elicitation is not based on repetitions.

III.2.1.1 SET UP AND RECORDING

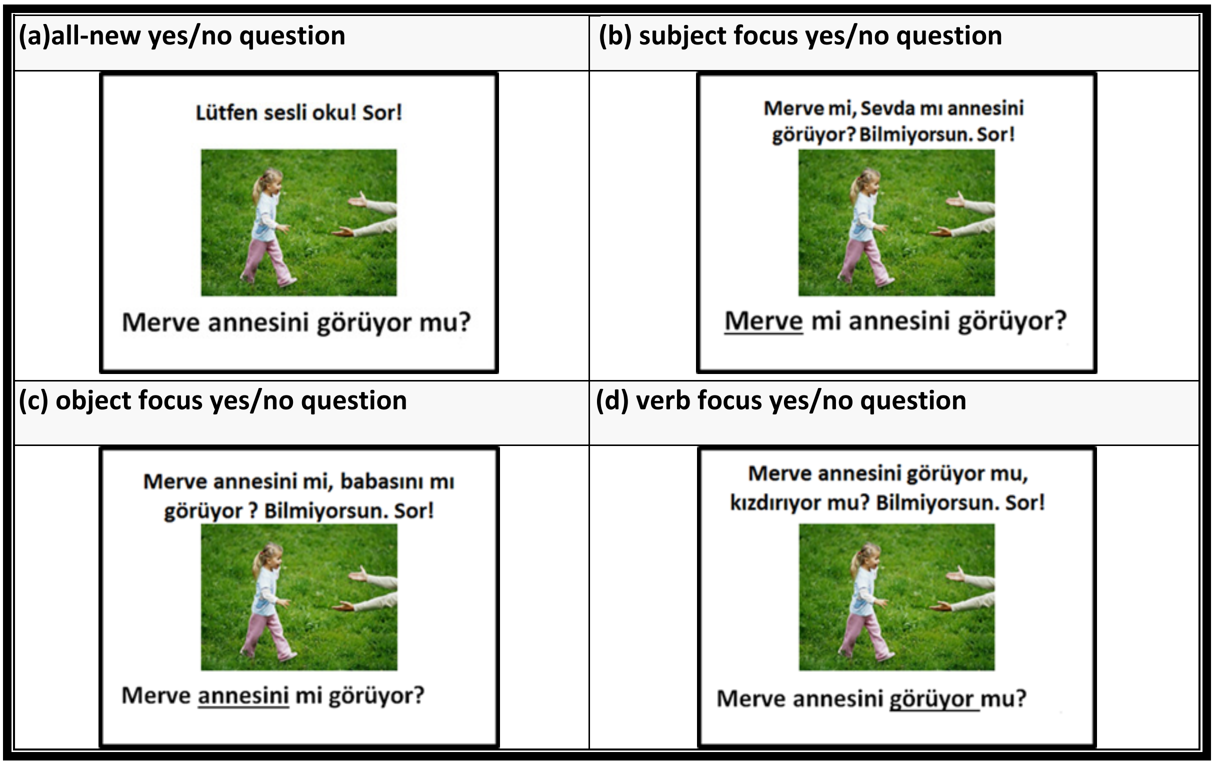
The monolingual experiment was conducted in a translation booth at the Ege University in Izmir. The recordings were conducted by a German-Turkish bilingual speaker who studied at the Ege University in Izmir during the recording time. Speakers wore a headphone microphone which was connected to a digital recorder: Roland vers.3.0/ R-09HR (24bit, 96 kHz). Data were recorded as MP3 files and converted into wav afterwards.

Different target sentences were presented by means of a power point presentation on a laptop. Each slide represented a picture referring to the target event. On the top of the slide a written context was provided which referred to the target yes/no question on the bottom of the picture. The preceding context was designed in a way that different contrastive foci were most naturally uttered in the following target questions. The slides were presented to each speaker successively and always in the same order for the different speakers. In the recording session the subjects were asked to read out aloud both: context and subsequent yes/no questions.

The presentation procedure of the target sentences was the same for each participant. Each target sentence was presented first in the all-new condition, afterwards in the subject condition, then in the object focus condition, and finally in the verb focus condition. Before going over to the next target sentence, all focus conditions of a respective target sentence were presented in the mentioned order.

The focused word was underlined in each sentence in order to reduce errors. The underlining should not have an effect on the prosodic structure of the utterances if Turkish does not mark information structure by prosodic means. No underlining was used for the all-new condition. Figure (3.1) gives an example how the different focus conditions were elicited for one of the target sentences.

Fig. (3.1): The elicitation of different contrastive in-situ foci of target sentence 1



III.2.1.2 STIMULI

Since Turkish does not implement syntactic movement to mark questions, but a morphological marker as outlined in chapter II, the general word order of Turkish declaratives is maintained. All target sentences have a SOV structure containing an accusative object. The only structural difference arises with respect to the position of the Q-particle which changes dependent on the focus conditions. Corresponding to each focus condition the Q-particle was either aligned to the verb, the object, or the subject.

With respect to the prosodic properties of each constituent all subjects and objects have final word stress, to which the Q-particle can attach as a PWA (cf. Kabak & Vogel outlined in chapter II.2.2). The final syllable of subjects and objects is supposed to be the anchor point for the realization of the high phrase boundary tones (H-) as well as for pitch accents (H*).

All verbs have word stress on a non-final syllable due to the morphological marker –Iyor which is used in all target sentences and was described as a lexically stressed suffix in chapter II.2.2. The word stressed syllable of the verb is understood as the anchor point for pitch accents (H*L) whereas the word and IP final syllable is aligned with a final boundary tone (L% or H%). In the cases of an all-new condition and in the verb focus conditions, where the Q-particle attaches to the final constituent, as verified for the target sentences of experiment 1 by the Q-particle placement test outlined in chapter II. 6. 1.3, the final boundary is realized on the morphological question marker since it constitutes the IP final syllable.[38]

With respect to the segmental design of the targets, each sentence consists of a total of 10 syllables including the Q-particle. In İpek´s experiment the number of syllables differs across targets. Here in contrast, all subjects are composed of bi-syllabic words, all objects of four-syllabic words, and all verbs of three-syllabic words. In (3.1) the five basic target sentences are demonstrated in an all-new condition with the Q-particle aligned to the final constituent.

(3.1) **All-new target yes/no questions of experiment 1**

(1) Melda elmacıyı seviyor mu?
(Melda apple.trader-ACC love-PRS Q)
(Does Melda love the apple trader?)

(2) Nilsu eskiciyi üzüyor mu?
(Nilsu second.hand.dealer-ACC sadden-PRS Q)
(Does Nilsu sadden the second-hand dealer?)

(3) Merve annesini görüyor mu?
(Merve mother-POSS-ACC see-PRS Q)
(Does Merve sees her mother?)

(4) Necla amcasini özlüyor mu?
(Necla oncle-POSS-ACC miss-PRS Q)
(Does Necla miss her oncle?)

(5) Nazlı eltisini arıyor mu?
(Nazlı sister.in.law-POSS-ACC search-PRS Q)
(Does Nazlı search her sister-in-law?)

Each target sentence has 4 variations corresponding to the four elicited focus conditions. An all-new, a subject focus, an object focus, and a verb focus version. The position of the Q-particle varies across the focus conditions and each constituent can be aligned with it, indicating the respective focus condition. Table (3.1) outlines the structural differences according to each focus condition for the five target sentences. The vowel of the Q-particle changes according the preceding vowel following Turkish vowel harmony.

[38] Based on the controversial discussion with respect to the default placement of the Q-particle in Turkish literature, which either assumes the verb or the object as the constituent, where the particle attaches to in broad focus (all-new), a pre-experimental test was conducted. The test exclusively included the target sentences of Experiment 1 in order to elicit the default placement of the particle with respect to this concrete target sentences. The results of the test showed that Turkish speakers attach the Q-particle systematically with the verb in order to generate a broad focus question in the targets of experiment 1, where the scope of focus spreads over the whole sentence.

Table (3.1): Target yes/no questions of experiment 1 in different in-situ focus conditions

<u>Sentence 1:</u>

a)	All-new yes/no question:	Melda elmacıyı **seviyor mu?**
		(Melda apple.trader-ACC love-PRS Q)
b)	Subject focus yes/no question:	**Melda mı** elmacıyı seviyor?
		(Melda Q apple.trader-ACC love-PRS)
c)	Object focus yes/no question:	Melda **elmacıyı mı** seviyor?
		(Melda apple.trader-ACC Q love-PRS)
d)	Verb focus yes/ no question	Melda elmacıyı **seviyor mu?**
		(Melda apple.trader-ACC love-PRS Q)

<u>Sentence 2:</u>

a)	All-new yes/no question:	Nilsu eskiciyi **üzüyor mu?**
		(Nilsu second.hand.dealer-ACC sadden-PRS Q)
b)	Subject focus yes/no question:	**Nilsu mu** eskiciyi üzüyor?
		(Nilsu Q second.hand.dealer-ACC sadden-PRS)
c)	Object focus yes/no question:	Nilsu **eskiciyi mi** üzüyor?
		(Nilsu second.hand.dealer-ACC Q sadden-PRS)
d)	Verb focus yes/ no question	Nilsu eskiciyi **üzüyor mu**?
		(Nilsu second.hand.dealer-ACC sadden-PRS Q)

<u>Sentence 3:</u>

a)	All-new yes/no question:	Merve annesini **görüyor mu?**
		(Merve mother-POSS-ACC see-PRS Q)
b)	Subject focus yes/no question:	**Merve mi** annesini görüyor?
		(Merve Q mother-POSS-ACC see-PRS)
c)	Object focus yes/no question:	Merve **annesini mi** görüyor?
		(Merve mother-POSS-ACC Q see-PRS)
d)	Verb focus yes/ no question	Merve annesini **görüyor mu?**
		(Merve mother-POSS-ACC see-PRS Q)

Sentence 4:

(a) All-new yes/no question: Necla amcasını **özlüyor mu**?
(Necla oncle-POSS-ACC miss-PRS Q)

(b) Subject focus yes/no question: **Necla mı** amcasini özlüyor?
(Necla Q oncle-POSS-ACC miss-PRS)

(c) Object focus yes/no question: Necla **amcasını mı** özlüyor?
(Necla oncle-POSS-ACC Q miss-PRS)

(d) Verb focus yes/ no question Necla amcasını **özlüyor mu?**
(Necla oncle-POSS-ACC miss-PRS Q)

Sentence 5:

a) All-new yes/no question: Nazlı eltisini **arıyor mu**?
(Nazlı sister-in-law-POSS-ACC search-PRS Q)

b) Subject focus yes/no question: **Nazlı mı** eltisini arıyor?
(Nazlı Q sister-in-law-POSS-ACC search-PRS)

c) Object focus yes/no question: Nazlı **eltisini mi** arıyor?
(Nazlı sister-in-law-POSS-ACC Q search-PRS)

d) Verb focus yes/ no question Nazlı eltisini **arıyor mu**?
(Nazlı sister-in-law-POSS-ACC search-PRS Q)

As demonstrated in table (3.1) in subject focus the subject is adjacent to the additional syllable consisting of the Q-particle, in object-focus the object is adjacent to Q, and in all-new and verb focus the verb is adjacent to the question particle. However, the total number of syllables always remains the same. The ambiguous alignment of the Q-particle in all-new and verb focus is justified by the results of the Q-particle placement test.

III.2.1.3 SPEAKERS

11 native monolingual speakers (7 male/ 4 female) of Turkish were recorded at the Ege University in Izmir in April 2013. All speakers were aged between 22 and 26 at recording time. All were university students of non-linguistic subjects and born in the Egais area. Most of them had some basic knowledge of English as a foreign language. None of them is an early second language speaker.

III.3 EXPECTATIONS

The following expectations concern the realization of prosodic in-situ focus and sentence type marking in simple SOV yes/no questions in monolingual Turkish as outlined in the previous subchapter. Expectations are based on cross-linguistic assumptions of focus typology and sentence type marking in addition to the observations of previous studies on prosodic focus marking in declaratives and prosodic sentence type marking in Turkish yes/no questions outlined in the previous chapters. The present study exclusively focuses on the analysis of *f0*. Other prominence markers on the supra-segmental level like duration and intensity are not considered in the following. There relevance however, cannot be excluded (cf. Levi 2005, İpek 2011).

In most languages focus finds its representation in prosodic prominence and/or alignment by either moving the focused constituent into a prosodically prominent position, by the implementation or increase of pitch accents, or by the introduction or deletion of phrase boundaries which make a focused constituent more prominent than its unfocused counterpart. Since İpek (2011) cannot find stable acoustic correlates of in-situ focus by means of pitch increase in Turkish but describes constant de-accentuation after a focused subject and an immediately pre-focal rise before a focused verb, I expect within the framework of focus typology, that focus in Turkish is aligned to prosodic boundaries by tonal deletion and the insertion of prosodic boundaries as described for other languages in e.g. Truckenbrodt (1995) and Büring (2010).

Departing from İpek`s observation of an immediately pre-focal rise before a verb focus in SOV declaratives, I expect that a prosodic boundary is introduced before a focused constituent in order to align a focused constituent to a prosodic boundary with the purpose to fulfill focus prominence. Truckenbrodt (1995) proposes that if an element is not by default the head of the next higher prosodic constituent, then focus prominence wants the prosodic structure to change to make the element the head of the next higher prosodic constituent. By the introduction of a boundary the verb which usually shares a VP with its argument in Turkish SOV sentences becomes the head of its own phrase assuming that Turkish is a left headed language (e.g. Kan 2009 and Kamali 2011). The introduction of a left-aligned nuclear boundary tone is also assumed in İpek & Jun's (2013, 2014) AM-model of Turkish intonational phonology outlined in chapter II. However, their observation still lacks empirical evidence, which will be provided by means of the following experiment 1.

Ípek's (2011) observation of pitch increase on the syllable preceding a focused verb is interpreted here as the introduction of a pre-focal boundary tone phonetically realized by tonal values which add up.[39] Similar to what has been proposed in Xu's (2004) PENTA model, which explains *f0* surface variation by means of a parallel encoding and implementation of different linguistic functions, I assume that the tonal values of the pitch accent (H*) implemented on this syllable and the additional IS generated pre-focal boundary tone (H-) add up, resulting in a higher pitch value on the constituent preceding a focused constituent which in default phrasing would not be aligned with an (H-) boundary tone. A similar effect was observed by Ípek & Jun (2014) with respect to the *f0* values on PPh-final syllables with final word stress as outlined in chapter II.

Furthermore, I expect that de-accentuation plays a crucial role in the alignment of focus to prosodic boundaries in Turkish.[40] The observation of de-accentuation in different studies on Turkish prosodic IS marking (e.g. Özge & Bozșhain 2010, İpek 2011), motivates my expectation that the prosodic realization of IS in Turkish is crucially determined by a change of the intonation structure by means of tonal deletion as proposed for boundary languages in Büring (2010). If a focused constituent is the most prominent in its domain, no further pitch accents or boundary tones are allowed to maintain the prominence status of the focused constituent. To this effect de-accentuation of all post-focal material is required.

In other words, I expect that by means of de-accentuation and additional pre-focal boundary tone introduction a focused constituent is aligned to a prosodic boundary with the consequence of becoming more prominent independent of the syntactic position it occupies. In the sense of focus alignment, I expect for yes/no questions containing a simple SOV structure and contrastive focus on different in-situ focused constituents, namely subject, object and verb focus, the following alignment strategies to arise: In subject focus of simple SOV declaratives the deletion of all following acoustic material after the focus is expected, realized by de-accentuation. To this effect the number of prosodic phrases is reduced to one prosodic phrase, contrasting with the original syntax- based derivation of two prosodic phrases. For object focus, I also expect that further tones on verbs are deleted corresponding to post-focal de-accentuation. However, a change in the original phrasing structure is not necessary since the object is supposed to bear the nuclear pitch accent in Turkish SOV's (e.g Kan 2009, Kamali 2011).To this effect it is already the head of the focused phrase and ambiguous with the default intonation contour as represented by all-new sentences. For verb focus

39 Note that Ípek & Jun (2013) assume lower *f0* values for a supposed prenuclear boundary tone. However, their results are not based on phonetic measurements but introperspective perception. Ípek's (2011) observation of prefocal pitch increase on the other side is statistically significant for verb focus.

40 Note that in the Turkish literature the prosodic phenomena of de-accentuation and PFC are used arbitrarily. Özge & Bozșahin (2010) use the term most probably in the sense of Xu (2011) who denies the existence of de-accentuation, but assumes that lexical related pitch accents are always present, but might be realized compressed. This phenomenon is probably best described in Abolhasanizadeh, Bijanhan & Gussenhoven (2012) who do not assume de-accentuation for Persian, but PFC. They conclude that Persian word prominence is realized by pitch accents and that words are not de-accented after focus though the acoustic correlates are reduced. For German on the other side a complete deletion of tones is assumed in the post-focal position (e.g. Féry 1993).

on the other side, I expect that all possible pitch accents and boundary tones are implemented. Furthermore, I expect the introduction of a pre-focal boundary tone in order to make the verb the head of its own prosodic phrase. To this effect it becomes the constituent bearing the nuclear pitch accent as it represents the rightmost pitch accent of the whole IP and no further pitch accents are possible.

Below, the expected changes in the intonation contour for the different types of in-situ focus in simple SOV yes/no questions are summarized.

All-new/ object focus	$(S)^{H-}$	$(O^{H*L}$	$V)_{L\%}$
Subject focus	$(S^{H*L}$	O	$V)_{L\%}$
Verb focus	$(S)^{H-}$	$(O)^{H-}$	$(V^{H*L})_{L\%}$

As outlined above, I assume that all-new sentences are phonologically ambiguous with object focus sentences according to the assumptions of Kan (2009) and Kamali (2011). Both contain two phonological phrases coinciding with syntactic phrases. A simple NP consisting of the subject and a VP consisting of a verb and its argument. The subject is aligned with a PPh-final phrase boundary tone (H-), the object constitutes the head of its PPh and also of the IP and is realized with a high pitch accent on the word stressed syllable (H*L) followed by de-accentuation of all following tones.

In subject focus on the other side, the subject needs to be maximal prominent for which the following tones are deleted. By means of post-focal de-accentuation the subject becomes the most prominent constituent of the whole IP. The pre-nuclear boundary tone (H-) of the all-new and object focus condition is not implemented anymore since the whole IP is reduced to one PPh. However the pitch accent on the word stressed syllable is implemented similar to the marking of the object as the nuclear item in the all-new and object focus condition.

In verb focus the reverse phrasing process is supposed to happen. Instead of boundary deletion an additional boundary (H-) is introduced right before the verb to phrase the verb separately in order to make it the rightmost prominent constituent receiving the main pitch accent of its own PPh and the whole IP[41]. However, boundary insertion is not enough to become the head of its own phrase and a further analysis will be conducted with respect to the value of the pitch accent of the verb, since the results of Ípek (2011) also indicate pitch increase on a focused verb. In the all-new condition post-focal de-accentuation is expected after the object, representing the prosodic head of the VP. In order to represent the head of its own phrase, realized by the pre-focal boundary introduction, the verb also needs to be assigned a pitch accent, which will result in different *f0* values between the verb in

[41] Remember that Kan (2009) proposes that the head of the rightmost PPh recives the main pitch accent of an IP in Turkish.

the all-new and the verb focus condition. Since, all-new yes/no questions and verb focus questions are ambiguous with respect to their morpho-syntactic structure, phonetic means may be used in order to disentangle the ambiguity. This is not necessary in the remaining focus conditions, since they are not ambiguous to any other condition.

As a consequence of prosodic focus alignment, I assume that Turkish realizes focus prominence prosodically by de-accentuation and boundary tone introduction and not by pitch accent modification via pitch increase as assumed in previous studies, based on the observations of the prosodic expression of focus in most Germanic languages. The only expected pitch increase concerns verb focus resulting from pitch accent assignment, in contrast to the de-accentuation of verbs in the remaining conditions.

Additionally, the experiment also elicits sentence type. According to the literature high and low final boundary tones are possible in Turkish yes/no questions, whereby a high boundary tone represents a structurally marked case.

According to the observation of Kawaguchi et al. (2006), as outlined in chapter II.6, high final boundary tones (H%) are expected when the syllable preceding the question particle -mI is realized with a low tone as shown for DMQs by Kamali & Büring (2011). A low final boundary tone (L%) is proposed by Kawaguchi et al. (2006), when the syllable preceding the question particle -mI is associated with a high tone corresponding to the general intonation contour of yes/no questions, where -mI is claimed to evoke stress on its immediately preceding syllable.

All sentences of the following experiment consist of a simple SOV structure where the Q-particle is adjacent to the focused constituent. However, they show structural differences with respect to word stress motivating the implementation of both final boundary tones depending on the focus condition. All subject and object focused yes/no questions should exhibit general boundary tone implementation of yes/no questions by means of a low final boundary tone (L%) since the Q-particle preceding syllable is word stressed and aligned with a high pitch accent. In verb focus and the all-new condition on the other side, the syllable preceding the Q-particle is not high since all verbs in the experiment contain the progressive marker –Iyor which causes stress on the penultimate syllable of the verbs. Hence the high tone of the bi-tonal pitch accent (H*L) is realized on the penultimate syllable and not on the syllable preceding Q. The syllable preceding Q is realized with the low trailing tone of the pitch accent. According to Kawaguchi et al. (2006), those sentences should be realized with a high final boundary tone (H%) according to the supposed chiasm.

With respect to sentence type intonation, Göksel et al. (2009) furthermore propose a compressed pitch contour up to the focused constituent. Additionally, they assume that a focused constituent exhibits the highest *f0* value of each yes/no question independent of its position within the sentence.

Based on cross-linguistic observations of question marking, which show that sentence type is usually realized by a final rise in languages, which use prosodic cues at all to mark sentence type, I expect that pre-focal compression is not a correlate of sentence type in Turkish yes/no questions. In contrast, I suppose that pre-focal compression, if realized at all, reflects universal tendencies and is related to IS marking as shown for other languages such as German as outlined in the following chapter V.5 of the present dissertation.

To summarize my expectations with respect to prosodic focus and question marking in monolingual Turkish yes/no questions I propose that:

(i) Post-focal constituents are de-accented. By that means prosodic constituents are aligned to right most prosodic phrases in Turkish and receive main prominence since following constituents are de-accentuation.

(ii) Prosodic phrase boundaries are introduced in order to phrase focused constituents separately for the sake of focus prominence. By that means a focused constituent can become the head of its own phrase.

(iii) Simple SOV yes/no questions are realized with a final low or high boundary tone boundary tone (L%, H%) depending on the syllable preceding –mI,

(iv) Pre-focal compression is supposed to be a prosodic correlate of IS and not of sentence type.

(v) Pitch increase is only expected in verb focus, indicating pitch accent assignment on the verb, which remains de-accented in all further conditions.

III.4 ANALYSES AND RESULTS

The analyses of the IS modified yes/no questions of monolingual Turkish include a phonologic analyses of all target sentences of all speakers and an additional phonetic analyses. For the phonologic and phonetic analysis in a first step all target sentences of all speakers were cut from the mp3 audio file containing the whole recording session and saved separately being converted into wav-files.

Afterwards, each file was generated in Praat using ProsodyPro. Prosody Pro is a tool for the systematic analyses of prosody provided and developed by Xu (2013). The program allows users to perform systematic analysis of large amount data and generates a rich set of output including continuous data such as time normalized *f0* contours which are suitable for graphical analyses and discrete measurements suitable for statistical analyses. ProsodyPro automatically generates a waveform together with vocal cycle marks were missing marks can be added manually and redundant ones can be deleted. The process also smooths out random variations and individual differences leaving only consistent variations due to contextual variation. With respect to the large output which is automatically generated by the script only time-normalized *f0* values and maximum *f0* values were used in this study. Time-normalization allows averaging across different but segmentally equal targets and different speakers. This elicitation method is favored over repetitions, since repetitions may train speakers to produce utterances in a certain way.

A further advantage of ProsodyPro with respect to the time-normalized *f0* which is computed by automatically taking ten measure points per syllable is that it clearly indicates the locations and manners of the maximum differences between experimental conditions by plotting the contours in overlaid graphs. However, the time-normalized data are exclusively used for graphical comparisons. For the analyses of maximum *f0* values only discrete measurements were used.

As discrete measurements and time-normalization require the definition of temporal domains, each target sentence was segmented on the syllable level by inserting interval boundaries in the TextGrid in Praat. Syllable segmentation for all sentences and the following phonological annotation was done manually.

The phonological annotation of the pitch contour of the whole IP was done in a fourth step also for all targets across focus conditions and speakers. Since Turkish lacks a conventionalized tonal annotation system, all targets are labeled according to the annotation guideline presented in chapter II.4.2. The inventory is primarily based on the tonal events observed in the present data set in addition to observations of previous studies, basically Kan 2009 and İpek & Jun (2013, 2014) as presented in chapter II. Both use general AM-labeling advices, though Ípek & Jun's inventory is somehow unconventional. However, both analyses use an inventory of pitch accents, PPh-final boundary tones and two IP final boundary tones, which is adapted here, leaving phonetic variation of tonal categories apart. To this effect, two different pitch accents are analyzed (H*, H*L) in the present data set, a non-final phrase boundary tone (H-), implemented on the final syllable of non-final NP's, as proposed by Ípek & Jun, and two IP-final boundary tones (L%, H%). The tonal inventory is probably not exhaustive since only simple SOV structured yes/no questions are analyzed.

A nuclear boundary tone (H*n) is not anticipated as in Ípek & Jun's study, since one of the goals of experiment 1 is to find the prosodic correlates of IS in Turkish by means of *f0*.

In order to proof the preceding expectations concerning prosodic boundary alignment of focused constituents by means of boundary tone insertion and deletion, in addition to the verification of prosodic correlates to indicate sentence type in Turkish, the following phonological and phonetic analyzes are carried out:

(i) The distribution of IP-final boundary tones for all speakers across all sentences as a sentence type distinguishing cue.

(ii) The distribution of pitch accents and PPh-final boundary tones across different constituents and focus conditions, namely subject focus, object focus and verb focus. The all-new condition serves as a baseline for comparison with the remaining focus conditions to test differences in the implementation of pitch accents and changes in the phrasing structure according to each focus condition.

(iii) Pre-and post-focal constituents are analyzed with respect to de-accentuation as a correlate to IS and/or sentence type as proposed by Göksel et al. (2009). All constituents of all sentences are subject to visual and auditive analyses of the *f0* pitch tracks and additional phonetic measurements of the maximum *f0* values.

(iv) Pre-focal boundary tone insertion as a correlate of IS is analyzed by means of maximum *f0* measurements on the final syllable of pre-focal constituents.

(v) The disambiguation of verb focus and the all-new condition, which both share the same morpho-syntactic structure, is analyzed by means of pitch increase on the word stressed syllable of a focused verb; i.e. maximum *f0* values on the verb in verb focus are compared to maximum *f0* values on the verb in the all-new condition.

All phonologic and phonetic analyzes are conducted for each speaker individually and additionally for all speakers as a group. For a visual understanding of the corresponding changes in the *f0* contours, time-normalized graphs are additionally provided. However, the phonologic as well as the phonetic analyses and their results are exclusively based on the detailed analyses of each pitch track and concrete max*f0* values computed by ProsodyPro for each target sentence and constituent and calculated mean values for each speaker.

Further mean maximum f0 measurements were conducted with respect to pre-focal boundary tone introduction. The maximum f0 values of pre-focal constituents were compared to the mean maximum f0 values of the same constituents in an all-new condition where they not occur pre-focally. For verb focus, the mean maximum f0 of the preceding object is compared to the mean maximum f0 of the object in an all-new condition. For object focus the mean maximum f0 of the immediately preceding subject is compared to the mean maximum f0 on the subject in the all-new condition. A higher pitch value in the focus conditions should indicate the implementation of a pre-focal boundary tone as stated in the expectations.

For the phonetic analyses the maximum *f0* on the three constituents in pre-focal, focal and post-focal condition were extracted with the script for each speaker. On the base of the 5 target sentences per focus condition the mean maximum *f0* for each constituent in each focus condition was calculated and compared for each speaker and all speakers as a group.

For the phonetic and phonologic analyses 220 sentences were elicited and analyzed: 5 target sentences x 4 focus conditions x 11 speakers. No data were excluded from the analyses due to bad quality or failures or alike.

In a further step statistical tests are run for the maximum *f0* values on the word stressed syllables of the crucial constituents in each focus condition. The statistical analyzes are done in order to reliably show whether maximum *f0* values significantly differ when comparing focused, post-focal and pre-focal constituents to the baseline of all-new sentences. Based on a similar study by Zerbian (2015) who also uses the methodology of Xu (1999) to measure post-focal de-accentuation and pitch increase on focused and post-focal constituents, linear mixed models were fit with the maximum *f0* of the stressed syllable as the dependent variable, the focus condition as a fixed factor, and speaker as a random factor. In order to account for gender-related differences in pitch among speakers, the *f0* values obtained for each speaker are converted to their logarithms using the log() function in R. Afterwards the log values (semi tones) were calculated back to Hertz.

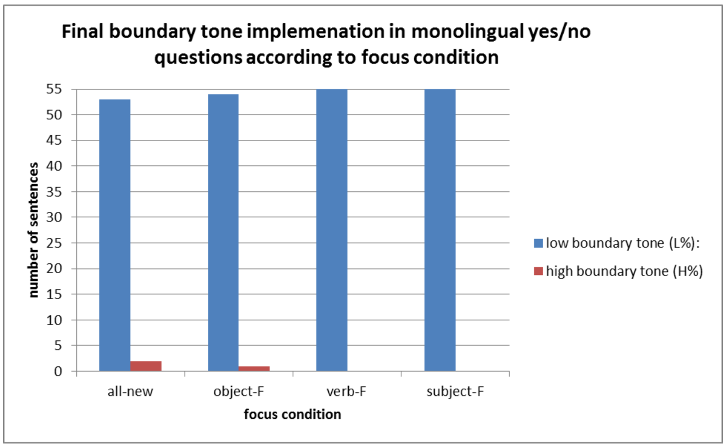
For the statistical analyses of the present study each measure point of each stressed syllable is included. The statistic is not based on mean values as input data, but includes all measured max*f0* of all crucial syllables of the whole data set including all speakers and target sentences.

III.4.1 FINAL BOUNDARY TONE DISTRIBUTION

With respect to the implementation of the IP-final boundary tone (FBT), 217 of the 220 contrastively in-situ focused yes/no questions of experiment 1 are realized with a low FBT (L%). The implementation of (L%) on the final syllable occurs across all sentences independent of the position of the question particle in the utterance and independent of the tonal quality of the preceding syllable.

A high boundary tone is used in three utterances only, whereby (H%) is exclusively used by speaker 1. He uses (H%) twice in an all-new sentence, where the Q-particle is aligned to the sentence final constituent, and one time in an object focus sentence where the Q-particle is adjacent to the focused object. The table in (3.2) provides a graphic overview summarizing the distribution of FBT's across the different focus condition for all speakers. Each focus condition was elicited 55 times in total and 5 times by each speaker corresponding to the number of varying target sentences per focus condition.

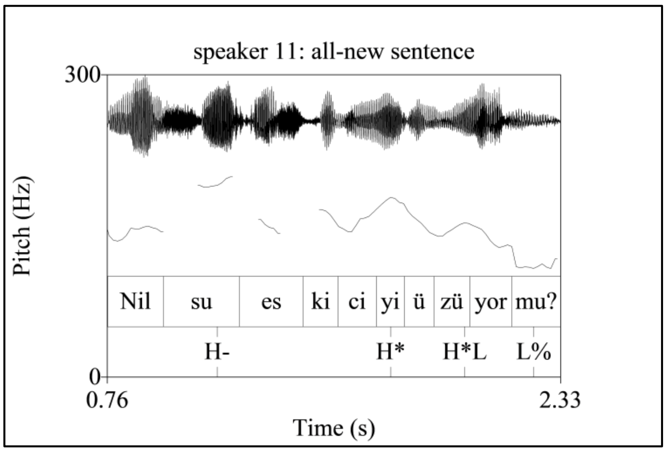
Table (3.2): Final boundary tones in monolingual Turkish yes/no questions with modified foci



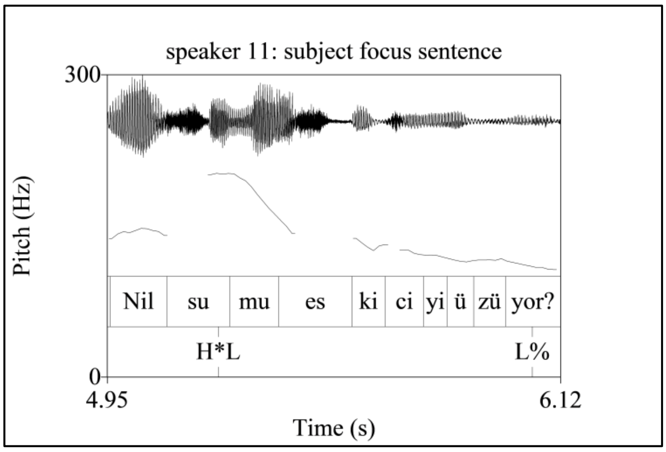
In addition to the analyses of the implementation of the boundary tones for the whole speaker group, the graphs in the following Praat pitch tracks in figure (3.2) exemplarily outline the implementation of the (L%) of target sentence (2) by male speaker 11 in the all-new baseline (a) and all focus conditions; i.e. subject focus (b), object focus (c) and verb focus (d) realized

Fig. (3.2): Low final boundary tone implementation across different focus conditions

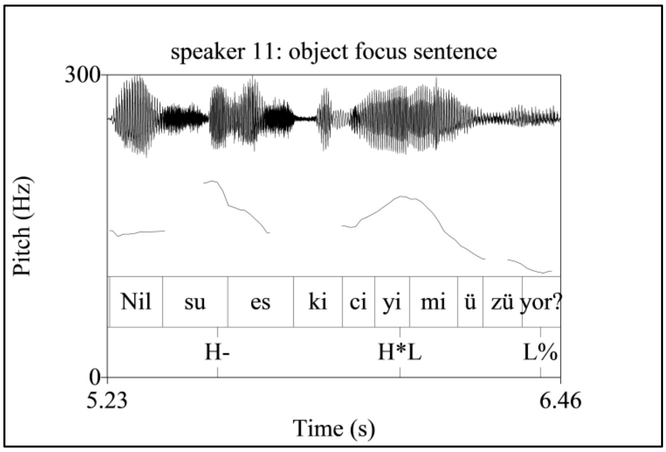
(a) low final boundary tone in an all-new sentence



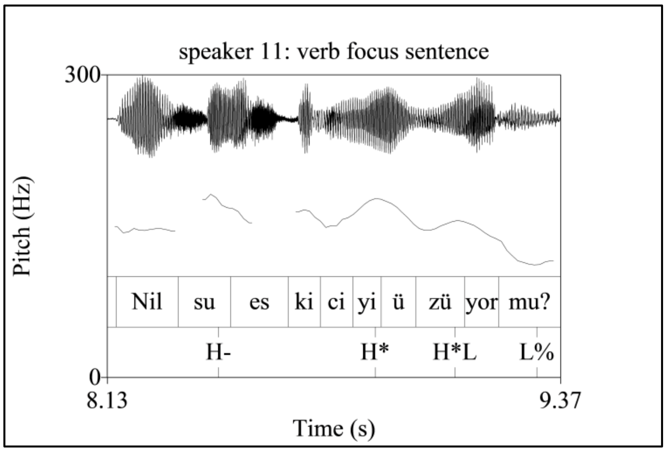
(b) low final boundary tone in an subject focus sentence



(c) low final boundary tone in an object focus sentence



(d) low final boundary tone in an verb focus sentence



The position of the Q-particle varies in all pitch tracks in figure (1), whereby (a) and (d) are ambiguous with respect to the morpho-syntactic structure. In both sentences the Q-particle is sentence-final and follows a low trailing tone resulting from a high-falling pitch accent realized on a non-finally word stressed syllable. In (b) and (c) the low trailing tone of the nuclear pitch accent (H*L) is realized on the Q-particle itself and the syllables preceding the Q-particle are realized with the high tone of the nuclear pitch accent. Although (a) and (d) differ in the tonal quality preceding the Q-particle (low tone) from the tonal quality preceding the Q-particle in (b) and (c), all sentence final syllables are realized with a low FBT (L%) in contrast to the chiasm proposed by Kawaguchi et al (2006).

III.4.2 THE DISTRIBUTION OF PITCH ACCENTS AND PPH-FINAL BOUNDARY TONES

In the following, the results of the phonological analyses of the 220 yes/no questions with modified foci are presented with respect to the implementation of pitch accents and phrase boundary tones on each constituent; i.e. subject, object, and verb. In a first step, general aspects of the analyses are schematized. Subsequently, the results of the analyses are provided for each focus condition and the all-new baseline. The phonological analyses and annotation was done for each speaker and target sentence and is exemplified by means of pitch tracks of several speakers in addition to the presentation of time-normalized *f0* graphs for a simplified visual understanding of variation across focus conditions.

III.4.2.1 GENERAL TONAL DISTRIBUTION ON DIFFERENT CONSTITUENTS

In table (3.3) below, the general tonal distribution, exclusively based on analyses of pitch on each constituent of the SOV yes/no questions, is first provided for each speaker. The analyses include all target sentences independent of the respective focus condition. Modification of the tonal distribution with respect to a change in IS is analyzed in the next subsection. The table shows that speakers use pitch accents and PPh-final boundary tones on different constituents in addition to the (FBT) realized on the sentence final syllable.

In table (3.3), columns indicate the different constituents; i.e. subject, object, and verb which maintain the same order in all sentences and focus conditions. The rows indicate the number and type of pitch realized on each constituent for each speaker. The type of pitch is categorized by means of the previously discussed AM-models of Turkish intonation, which distinguish between positional-bounded PPh-final boundary tones, IP-final boundary tones, and pitch accents on word stressed syllables. In cases where PPh-boundary tones and pitch accents share the same syllable, only (H-) is indicated in the annotation.

Each speaker realized a total of 20 sentences. By that means, the maximum number of realizations for a pitch on a respective constituent is 20 per speaker. In cases were realizations are less than 20, no pitch at all was found on the respective constituent and only pitch realizations were counted. In cases of FBT a number of realizations less than 20 indicate that instead of a low boundary tone, a high boundary tone was implemented.

Table (3.3): Tonal distribution for each speaker for each constituent in SOV yes/no questions

constituent **speaker**	**subject** **H*/ H*L**	**object** **H*/ H*L**	**verb** **H*L**	**FBT** **L%**
1	20	15	10	17
2	20	15	10	20
3	14	10	10	20
4	20	20	15	20
5	20	18	10	20
6	20	16	10	20
7	20	20	6	20
8	20	15	9	20
9	20	15	9	20
10	13	12	8	20
11	20	15	10	20
total	207	171	107	207

Table (3.3) above demonstrates that for the subject, the analysis of the tonal distribution reveals that in 207 of a total of 220 yes/no questions containing a subject, the subjects are aligned either with a high PPh-final phrase tone or with a rising-falling pitch accent (H-, H*L). In 195 of the 207 sentences which are realized with a high tone, the peak of the high tone is aligned to the word stressed syllable of the subject; i.e. the final syllable. In 12 of those 207 sentences the peak of the high tone is only reached at the following syllable. In all of these late alignment cases the following syllable is constituted by the attached question particle. By that means this alignment strategy is only found in subject focus sentences where the Q-particle attaches to the subject. 55 subject focus questions have been recorded in total. Speakers 4 and 7 use late alignment in 4 of the 5 subject focus conditions. Furthermore 6 yes/no questions show no pitch realization on the subject at all. These sentences are exclusively realized by speaker 3 and 10. Speaker 3 de-accents the subject in 6 yes/no questions whereof 5 questions are in a final focus condition. Speaker 10 de-accents the subject in 3 sentences: once in all-new, once in object focus and once in verb focus, but not in subject focus. Furthermore, speaker 10 uses four times an (H*) pitch accent on the first syllable of the subject and no further tones on the word stressed syllables are implemented. There is no relation for that to a certain focus condition.

For the object, the analysis of the tonal distribution as shown in table (3.3) reveals that in 171 of the 220 yes/no questions containing an object, also the object is aligned with a high tone in the form of a pitch accent, either (H*) or (H*L). On the remaining objects no pitch implementation on the object is realized. In 165 of the 171 sentences which are realized with a (H*) or (H*L) on the object, the pitch accent is realized on the word stressed syllable of the object. In the remaining 6 sentences the peak of the high tone is only reached at the attached question particle. Again this alignment strategy is reduced to the object focus condition where the Q-particle attaches to the object. Five of the sentences with late alignment are realized by speaker 3. He uses late alignment in all of his 5 object focus sentences.

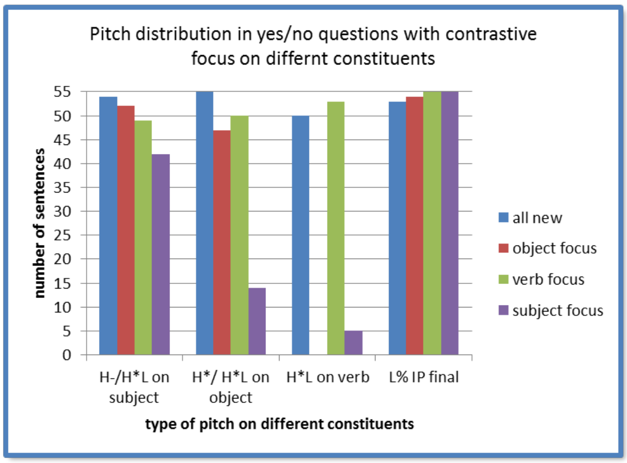
For the tonal distribution on the verb, the results of the distribution analysis as demonstrated in table (3.3) shows that verbs show less pitch implementation than the other constituents. The verb constitutes the final word in all of the yes/no questions and is aligned with a low final boundary tone (L%) on its final syllable in 217 of the 220 sentences as mentioned above. However, due to the segmental design of the target sentences all verbs have word stress on a non-final syllable. They all contain the morphological progressive marker –Iyor, which is a lexically stressed morpheme which attracts word stress on itself. However, only 107 of the 220 verbs in the 220 yes/no questions are additionally aligned with a pitch accent on their word stressed syllable. The pitch accent is basically implemented when the verb has an additional syllable in form of the Q-particle, i.e. in the all-new condition as well as in the verb focus condition. In these cases, a rising-falling pitch accent (H*L) is aligned with the antepenultimate and penultimate syllable of the verb, including the prosodic word adjoiner, with main emphasis on the first syllable of the morphological progressive marker -Iyor. The last syllable is occupied by the Q-particle where the low final boundary tone is implemented.

The results in table (3.3) above in sum indicate that subjects are generally realized with a high non-final phrase boundary tone (H-) or an (H*L) pitch accent. Objects are generally realized with a further high pitch accent (H*) or (H*L), though the distribution of pitch is less than on subjects. If verbs are realized with tonal movement at all, then by means of an (H*L) pitch accent. The varying number of distribution of pitch accents and PPh-final boundary tones on each of the three constituents is correlated with the three focus conditions and the all-new baseline, which will be analyzed in the next subchapter.

In the following, the tonal distribution of PPh-final boundary tones and pitch accents in the all-new condition are analyzed followed by an analyzes of the modification of the distribution according to the different focus conditions causing changes in the intonation contour of the yes/no questions. The distribution of tones in the focus conditions is compared to the distribution of tones in the all-new condition, which serves as a baseline condition for comparison.

In figure (3.3) the results of the tonal distribution of pitch accents, PPh-final boundary tones and IP-final boundary tones in correlation with the different focus conditions and the all-new baseline are previously summarized. Each focus condition was realized 55 times, hence the maximum realizations of a pitch corresponds to a number of 55 on each constituent.

Fig. (3.3): Distribution of pitch accents and phrase boundary tones in different focus conditions



In figure (3.3) the vertical scale indicates the number of sentences and the horizontal scale indicates the type of tonal accent realized on one of the three constituents and the sentence final syllable in each focus condition. The different focus conditions are indicated by different coloring. All-new is represented by the blue line and always the first bar for each outlined constituent. Object focus is represented by the red line and constitutes the second bar of each constituent. Verb focus is indicated by the green bar for each constituent and subject focus is indicated by the purple bar which always occupies the fourth bar for each sentence constituent. Additionally, the final boundary tone is demonstrated for each focus condition following the same color scheme.

As analyzed in the preceding subchapter, the figure in (3.3) shows that subjects are generally realized with a high non-final phrase boundary tone (H-) or an (H*L) pitch accent. Objects are generally realized with a further high pitch accent (H*) or (H*L). However, much less objects are realized with a pitch accent in the subject focus condition, where generally no pitch accent is realized at all after the preceding nuclear pitch accent on the preceding subject. Verbs are realized with a pitch accent (H*L) only in the all-new condition and the verb focus condition. In subject focus and object focus in general no pitch accent is realized on the verb.

To this effect, the figure in (3.3) gives a first impression about the variation in the tonal distribution of Turkish yes/no questions, in dependency of the respective focus condition. The results of the concrete realization of pitch accents and PPh-final boundary tones in correlation with IS are outlined for all focus conditions and the all-new baseline separately in the following.

III.4.2.2.1 ALL-NEW

As for the results of the phonologic analyses of the tonal distribution of pitch accents and PPh-final phrase boundary tones in all-new yes/no questions, the table in (3.4) provides a schematic overview for all speakers. The vertical rows of the table indicate the type of pitch that is implemented on different syllables (H-, H*, H*L) on the different constituents (S, O, V) of the all new sentences. The horizontal rows indicate the number of realizations of the respective pitch for each speaker on each constituent. For each speaker five all-new sentences were analyzed. Hence the number of realizations per constituent cannot exceed five for each speaker.

Table (3.4): All-new yes/no questions: pitch accent and PPh-final boundary tone implementation

all new	**subject**		**object**		**verb**
speaker	(H-) on final syllable	(H*L) on initial syllable	(H*L) on final syllable	(H*L) on 1st syllable	(H*L) on penultimate syllable
1	5		5		5
2	5		5		5
3	5		5		5
4	5		5		5
5	5		5	1	5
6	5		5		5
7	5		5		3
8	5		5		4
9	5		5		4
10	3	1	5		4
11	5		5		5
total	53	1	55	1	50

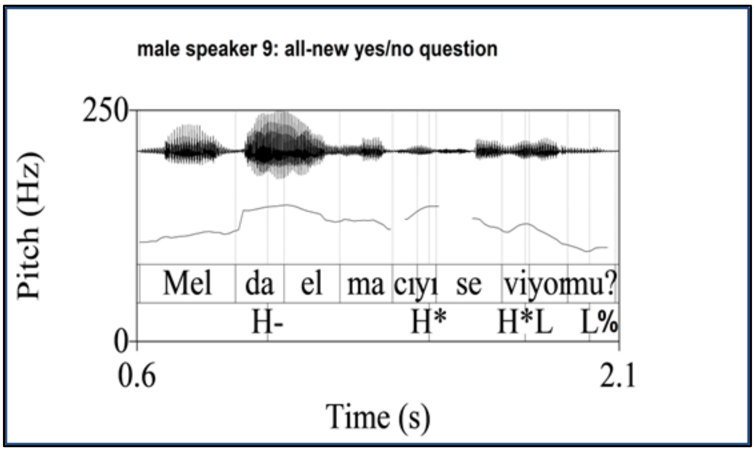
The table in (3.4) shows that in the 55 all-new sentences that were elicited for the monolingual experiment, 53 subjects are aligned with a high non-final phrase boundary tone (H-). Speaker 10 however, implements a further pitch accent on the first syllable of the subject in one all-new yes/no question and no further non-final phrase boundary tone. In a further all-new question the same speaker uses de-accentuation on the subject; i.e. the subject shows no pitch movement at all, but remains flat.

The objects of all 55 all-new questions are aligned with a high tone on the word stressed syllable in the form of a rising pitch accent (H*). Speaker 5 realizes a further pitch accent on the first syllable of the object in one sentence.

The verbs in the all-new condition are aligned with a rising-falling pitch accent (H*L) in 50 of the 55 all-new sentences. Speakers 8, 9, and 10 each realizes one all-new sentence without pitch movement on the word stressed syllable of the verb. Instead, de-accentuation after the pitch accent on the preceding object was observed.

In figure (3.4) an all-new pitch track as typically observed in the analysis of the all-new yes/no questions of the monolingual speakers is exemplarily outlined. It provides the pitch track of the all-new yes/no question *Melda elmacıyı seviyor mu?* (Does Melda love the apple trader?), realized by male speaker 9. As outlined previously for all speakers, speaker 9 also realizes the subject *Melda* with a high PPh-final boundary tone (H-), followed by a high pitch accent (H*) on the final syllable of the accusative object *elmacıyı*, and an (H*L) pitch accent on the penultimate syllable of the verb *seviyor*. The final boundary tone (L%) is realized on the sentence final syllable representing the Q-particle -mu.

Fig. (3.4): Sample pitch track for all-new intonation in Turkish monolingual yes/no questions



As outlined in table (3.4) and the pitch track in figure (3.4) the data show a general pitch pattern for the simple all-new SOV yes/no questions of the present experiment, which can be summarized in the following structure:

(3.2) **All-new intonation contour in simple SOV yes/no questions**

$((H\text{-})_{PPh}$	$(H^*$	$H^*L)_{PPh}$	$L\%)_{IP}$
S	O	V	FBT

III.4.2.2.2 SUBJECT FOCUS

The default pitch pattern outlined for all-new yes/no questions in (3.2) above changes in yes/no questions with subject focus. The results of the analysis of the tonal distribution in subject focus are outlined for each speaker below in table (3.5) below. The categorization of rows and columns as well as the tonal distribution on each constituent follows the realization of the all-new condition outlined in table (3.4) above for the all-new condition for reasons of direct comparability. The maximum number of realizations again cannot concede five per speaker and constituent due to the number of elicited sentences.

Table (3.5): Subject focus yes/no questions: pitch accent and PPh-final boundary tone implementation

subject focus	**subject**		**object**	**Verb**
speaker	(H*L) on final syllable	(H*L) on initial syllable	(H*) on final syllable	(H*L) on penultimate syllable
1	5		0	0
2	5		0	0
3	5		0	0
4	5		5	5
5	5		3	0
6	5		1	0
7	5		5	0
8	5		0	0
9	5		0	0
10	3	2	0	0
11	5		0	0
total	53	2	14	5

In table (3.5) all observed tonal movements in the yes/no questions with subject focus are summarized and show that in the 55 elicited subject focus sentences in the experiment, 53 subjects are aligned with a rising-falling pitch accent (H*L). The word stressed final syllable of the subject is usually aligned with the nuclear tone of the bi-tonal pitch accent (H*) followed by a falling trailing tone (+L) realized on the subject adjacent monosyllabic Q-particle. In rare cases (as outlined above), speakers reach the high peak of the pitch accent solely in the following Q-particle. In contrast to the all-new condition, the high tone on the subject is not analyzed as a high PPh-final boundary tone anymore, but as a pitch accent. High PPh-final boundary tones are only assumed on pre-focal constituents in Turkish (cf. Kan 2009, İpek & Jun 2013). Since the subject in the subject focus condition does not constitute a pre-focal constituent as in the all-new condition, but the focused constituent, no pre-focal boundary tone is implemented, but a nuclear pitch accent, constituting the last pitch accent of the whole IP.

Irrespective of the change in pitch type, speaker 10 implements the pitch accent on the first syllable of the subject in two subject focus yes/no questions and no further pitch movement towards the end of the subject, instead of the general distribution of the pitch accent on the word final syllable .

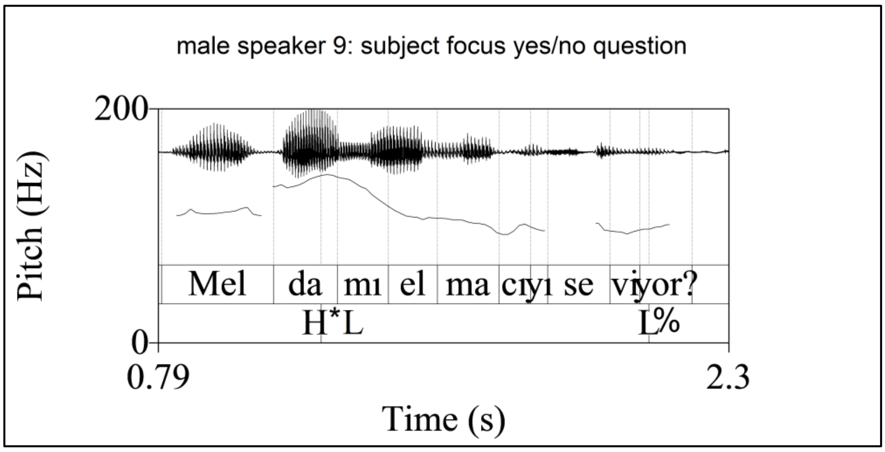
In contrast to the previously outlined all-new questions, the objects in subject focus questions are only aligned with a high pitch accent (H*) or (H*L) in 14 sentences of a total of 55 subject focus sentences. In 41 yes/no questions the objects show no notable *f0* movement, but the contours remain flat after the preceding nuclear pitch accent on the subject.

However, speakers 4 and 7 do align the object of four of their subject focus yes/no questions with a high pitch accent (H*) or (H*L) just like in the all-new condition and do not de-accent the objects.

As for the verb, the same modification of the pitch contour is observed like observed on the object in subject focus in comparison to the all-new condition. In contrast to the all-new condition, verbs are not realized with the (H*L) pitch accent on the word stressed syllable, but the contour remains flat until the realization of the final boundary tone on the verb-final syllable. Verbs in the subject focus condition are de-accented in 50 of the 55 yes/no questions. Only speaker 4 uses a pitch accent on the verb in the subject focus condition.

In figure (3.5) a subject focus pitch track is exemplarily outlined as typically observed in the analyses of the yes/no questions of the monolingual speakers. It provides the subject focus realization of the same sentence *Melda mı elmacıyı seviyor?* (Is it Melda who love the apple trader?) as outlined previously for the all-new condition for the same speaker in the pitch track in figure (3.4). However, the position of the Q-particle has changed from the sentence final position to the subject adjacent position in subject focus. As outlined previously for all speakers, speaker 9 also realizes the subject (*Melda*) with a rising-falling pitch accent (H*L) in contrast to the high PPh-final boundary tone (H-), implemented on the final syllable of the subject in the all-new condition. After the tonal movement on the subject, the contour remains flat on all following constituents in contrast to the all-new condition, where both the object and the verb are realized with further pitch accents. The final boundary tone (L%) corresponds to the final boundary tone implemented in the all-new condition.

Fig. (3.5): Sample pitch track for subject focus intonation in Turkish monolingual yes/no questions



The data outlined in table (3.5) and the pitch track outlined in figure (3.5) can be summarized under the following general intonation pattern of Turkish yes/no questions with contrastive subject in-situ focus for this study:

(3.3) **Subject focus intonation in simple SOV yes/no questions**

((H*L			$)_{PPh}$	$L\%)_{IP}$
S	O	V		FBT

III.4.2.2.3 OBJECT FOCUS

As for the object focus condition, a modification of the pitch contour in comparison to the all-new pitch contour is also observed. In table (3.6) the distribution of pitch accents and PPh-final boundary tones on each constituent is summarized for each speaker.

Table (3.6): Object focus yes/no questions: pitch accent and PPh-final boundary tone implementation

object focus	subject		object		verb
speaker	(H-) on final syllable	(H*L) on initial syllable	(H*L) on final syllable	(H*L) on initial syllable	(H*L) on penultimate syllable
1	5		5		0
2	5		5		0
3	4		5		0
4	5		5		0
5	5	2	4	2	0
6	5		5		0
7	5		5		0
8	5		5		0
9	5		5		0
10	4	1	3	1	0
11	5		5		0
total	53	3	52	3	0

The results of the phonologic analyzes of pitch distribution in yes/no questions with object focus reveal that in the 55 elicited object focus yes/no questions 53 questions are aligned with a high PPh-final boundary tone (H-) on the subject. The same distribution of a high PPh-final boundary tone on the subjects was observed in the analyses of the all-new yes/no questions. Here again, speaker 10 does not implement a pitch on the subject in one sentence, but de-accents the constituent meaning that the *f0* contour remains flat and the final syllable is not realized with a high pitch as used by the remaining speakers. Additionally, speaker 3 de-accents the subject in one object focus sentence.

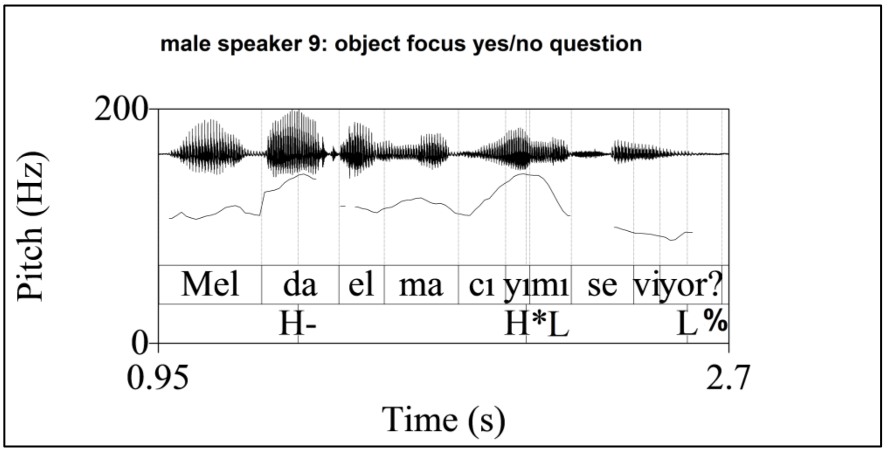
With respect to the tonal distribution on the objects of the 55 object focus questions, 52 target sentences are aligned with a rising-falling pitch accent (H*L) on the word stressed syllable of the constituent. This is also similar to the all-new questions, where all 55 sentences were realized with a high pitch accent (H*) on the final syllable. In object focus however, the final syllable of the object is aligned with the nucleus of a bi-tonal pitch accent (H*L), whereby the following falling trailing tone (+L) is basically aligned to the adjacent Q-particle and the contour remains flat afterwards. In the all-new condition in contrast, the particle is not adjacent to the object but to the sentence final constituent and the contour remains not flat after the pitch accent on the object, but is aligned with a further pitch accent on the following verb.

However, speaker 5 contrasts from the remaining speakers. He uses an additional pitch accent on the first syllable of the object in sentence 4. In sentence 3 he only uses a pitch accent on the first syllable of the object and no further tonal movement on the last syllable of the object. Speaker 10 also implements a pitch accent on the first syllable of the object in sentence 4, but no additional tonal movement on the final syllable of the object. In sentence 1, the same speaker de-accents the object.

In contrast to the all-new condition, none of the 55 verbs in the object focus condition is aligned with a pitch accent on the word stressed syllable, corresponding to the stressed syllable of the progressive marker -Iyor. The *f0* contour of all verbs remains flat for all speakers up to the FBT (L%) implemented on the verb final syllable. By that means, speakers systematically de-accent verbs in object focus, whereas verbs in the all-new condition are systematically realized with a high pitch accent (H*L) on the word stressed syllable in addition to the FBT on the sentence final syllable.

In figure (3.6) an object focus pitch track, as typically observed in the analyses of the yes/no questions of the monolingual speakers, is demonstrated. It provides the object focus realization of the same sentence *Melda elmacıyı mı seviyor?* (Is it the apple trader who loves Melda?) as outlined previously for the all-new condition and the subject focus condition for the same speaker in the pitch tracks in figure (3.4) and (3.5). However, the position of the Q-particle is different again. In object focus it is adjacent to the object, whereas in all-new it is adjacent to the verb and in subject focus to the subject. As outlined previously for all speakers, speaker 9 also realizes the subject (*Melda*) with a high PPh-final boundary tone (H-) on the final syllable, corresponding to the realization of the subject in the all-new condition. The phrase boundary tone on the subject is followed by a rising-falling pitch accent (H*L) on the final syllable of the subsequent object. Afterwards, the tonal movement on the verb remains flat. In contrast to the all-new condition, the verb is realized with no additional pitch. The final boundary tone is low as in all other focus conditions.

Fig. (3.6): Sample pitch track for object focus intonation in Turkish monolingual yes/no questions



The data outlined in table (3.6) and the pitch track in figure (3.6) can be summarized under the following general intonation pattern of Turkish yes/no questions with object focus for this study:

(3.4): **Object focus intonation in simple SOV yes/no questions**

$((H-)_{PPh}$	$(H*L$	$)_{PPh}$	$L\%)_{IP}$
S	O	V	FTB

III.4.2.2.4 VERB FOCUS

The analysis of the tonal distribution of pitch accents and phrase boundary tones in verb focus reveals the same pitch pattern as the analyses for the all-new condition. Both conditions are ambiguous with respect to their morpho-syntactic structure as well as with respect to the implementation of pitch along the *f0* track. In the verb focus condition, subjects are aligned with a high PPh-final boundary tone, objects with a high pitch accent (H*), and verbs with a rising-falling pitch accent (H*L) on the word stressed syllable in addition to the IP-final low boundary tone (L%) on the verb adjacent Q-particle. In table (3.7) the tonal realization on word stressed syllables on the different constituents of the 55 verb focused yes/no questions is summarized for each speaker.

Table (3.7): Verb focus yes/no questions: pitch accent and PPh-final boundary tone implementation

verb focus	**subject**		**object**		**verb**
speaker	(H-) on final syllable	(H*L) on initial syllable	(H*) on final syllable	(H*L) on initial syllable	(H*L) on penultimate syllable
1	5		5		5
2	5		5		5
3	0		0		5
4	5		5		5
5	5		5	1	5
6	5		5		5
7	5		5		3
8	5		5		5
9	5		5		5
10	4	1	5		5
11	5		5		5
total	49	1	50	1	53

The results of the analysis of the tonal distribution in verb focus in table (3.7) reveals that in the 55 of the elicited verb focus yes/no questions, 49 are aligned with a high PPh-final boundary tone (H-) on the word stressed syllable of the subject. In all-new, subject, and object focus, 53 of the corresponding subjects were realized with the high PPh-final boundary tone. In verb focus however, some speakers de-accent the subject. Speaker 3 is a speaker, who systematically de-accents subjects in verb focus, which results in a flat *f0* contour up to the -mI-adjacent constituent. He does neither implement a high phrase boundary tone on the subjects of verb focus questions, nor a pitch accent on the objects of verb focus question. Speaker 10 also deviates in pitch implementation from the remaining speakers. He uses a pitch accent on the subject´s first syllable in sentence 2 and does not use a further high phrase boundary tone on the final syllable, which would be designated for the implementation of the (H-) PPh-final boundary tone.

The objects of the 55 verb focus yes/no questions are aligned with a high pitch accent (H*) in 50 sentences. In the all-new condition and the object focus condition a similar pitch accent distribution was observed. In all-new, 55 objects are realized with a high pitch accent (H*), and in object focus 52 objects are realized with a rising-falling pitch accent (H*L).

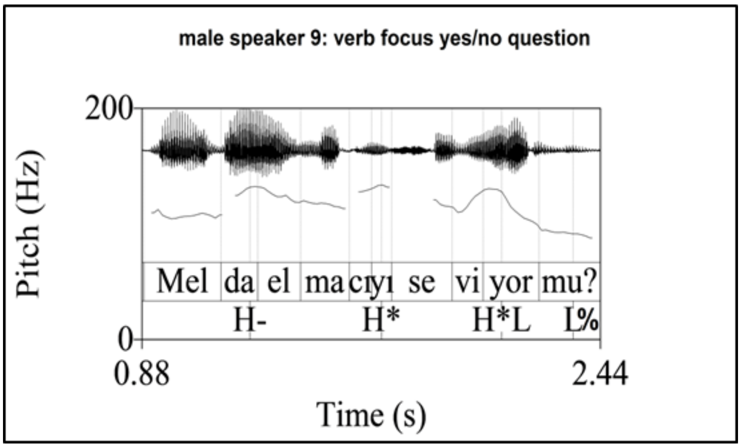
However, not all speakers follow the observed verb focus pattern on the object. As mentioned with respect to the de-accentuation pattern used by speaker 3 on the subject in verb focus, he also systematically de-accents all objects in verb focus and does not show any *f0* movement before the verb. Speaker 5 furthermore uses a further pitch accent on the first syllable of the object in sentence 4 in addition to a high tone on the last syllable.

With respect to the implementation of pitch on the verb in verb focus, the pitch accent implementation on the verb constitutes the ambiguity between all-new and verb focus questions. Whereas verbs in subject and object focus remain without tonal movement, the verbs in all-new and verb focus sentences are realized with a pitch accent on the non-final word stressed syllable.

The rising-falling pitch accent (H*L) is used in 53 of the 55 verb focus yes/no questions. In the all-new condition 50 verbs are aligned with a pitch accent. The nuclear tone of the bi-tonal pitch accent (H*L) is aligned to the antepenultimate syllable of the verb (including the adjacent Q-particle). The following trailing tone (+L) is realized on the verb final syllable. The subsequent IP-final boundary tone is low (L%) as in all other focus conditions and realized on the Q-particle.

In figure (3.7) the verb focus pitch track, as typically observed in the analysis of the yes/no questions of the monolingual speakers of the present data set, is exemplarily outlined for speaker 9. It provides the pitch track of the verb focus yes/no question *Melda elmacıyı seviyor mu?* (Does Melda love the apple trader?) as outlined previously for the all-new condition, the subject focus condition, and the object focus condition for the same speaker in the pitch tracks in figures (3.4), (3.5), and (3.6). As described previously for all speakers, speaker 9 also realizes the subject *Melda* with a high PPh-final phrase boundary tone (H-), followed by a high pitch accent (H*) on the final syllable of the accusative object *elmacıyı*, and an (H*L) pitch accent on the penultimate syllable of the verb *seviyor*. The final boundary tone (L%) is realized on the sentence final syllable representing the Q-particle *-mu.*

Fig. (3.7): Sample pitch track for verb focus intonation in Turkish monolingual yes/no questions



As outlined in table (3.7) and in the pitch track in figure (3.7) the data show a general phrasing for verb focus in the simple SOV yes/no questions of the present experiment which can be summarized in the following pattern (3.5), which is the same pattern as outlined for the all-new condition in (3.2).

(3.5) **Verb focus intonation in simple SOV yes/no questions**

((H-)$_{PPh}$	(H*	H*L)$_{PPh}$	L%)$_{IP}$
S	O	V	FBT

For a visual understanding of the differences in the *f0* contour between the three focus conditions and the all-new baseline, the graph in figure (3.8) below, demonstrates the pitch contour of the all-new sentences and the modification of this default pitch contour in the different focus conditions. The time-normalized *f0* graphs represent the averaged contours for all speakers across all sentences of the respective focus condition. In the chart, the thin lines indicate syllable boundaries and the thick lines word boundaries.

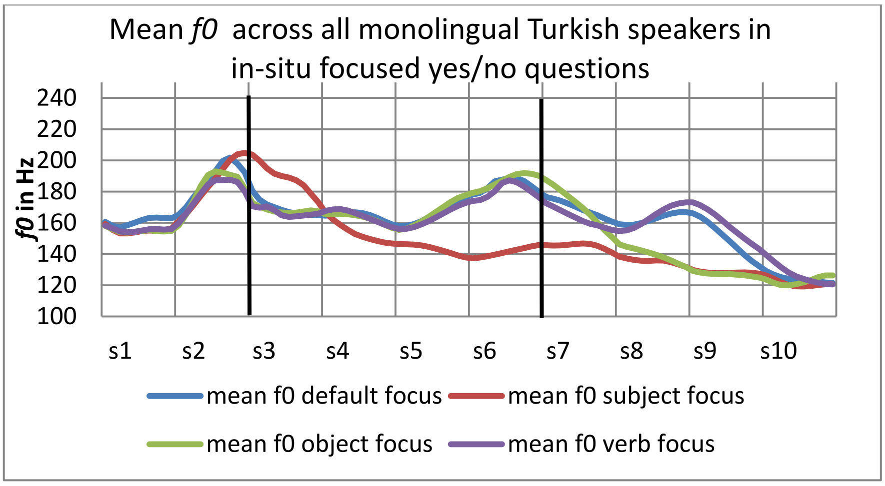
As previously outlined, the all-new condition is realized with pitch movements on the word stressed syllables of all three constituents, namely the subject, the object and the verb. A high PPh-final boundary tone can be seen on the subject's final syllable and pitch accents on the word stressed syllables of the following objects and verbs. The all-new condition is represented by the blue graph.

In the subject focus condition, represented by the red graph, the syllables are also indicated by the thin vertical lines. The word boundaries however swap one syllable ahead since the Q-particle is aligned adjacent to the third syllable since it is adjacent to the subject. In contrast to the all-new condition only the subject is associated with pitch on its final word stressed syllable. This time the pitch corresponds to a rising-falling pitch accent (H*L). The peak of the high tone is realized on the second syllable of the subject and the low trailing tone on the additional third syllable corresponding to the Q-particle.

In the object focus condition, only the subject and the object are realized with considerable tonal movement. The word boundary of the object is realized after the seventh syllable, since the Q-particle is adjacent to the object in this focus condition, constituting the PWA. Similar as in the realization of the all-new condition, the subject is realized with a high PPh-final boundary tone (H-) followed by a pitch accent (H*L) on the object. The pitch accent on the object is realized by an H*L pitch accent which continuously falls until the low FBT on the IP final syllable. The object focus contour is represented by the green graph in the chart.

The verb focus condition represents an ambiguous pitch contour to the pitch track in the all-new condition. The verb focus condition is represented by the purple graph and basically resembles the blue graph, which represents the all-new *f0* contour. As in the all-new condition this time again the thick vertical lines indicate word boundaries and the Q-particle is represented by the last syllable of the IP. The subject is realized with a high pitch on its final syllable as in all remaining conditions. The pitch corresponds to a high PPh-final boundary tone (H-), as in the all-new and object focus condition and is followed by a high pitch accent (H*) on the object and a further pitch accent (H*L) on the verb aligned to the word stressed syllable. The peak of the bi-tonal pitch is reached in the antepenultimate syllable corresponding to the stressed syllable of the progressive marker –Iyor. The low trailing tone is aligned with the following syllable. The IP final syllable is aligned with the obligatory low final boundary tone (L%).

Fig. (3.8): Time-normalized *f0* graphs across all speakers, sentences and focus conditions



III.4.3 DE-ACCENTUATION AND COMPRESSION

As a third step of the comprehensive phonetic and phonologic analyses of the *f0* contours of yes/no questions with modified foci, pre-and post-focal constituents are analyzed with respect to de-accentuation or compression respectively. De-accentuation of post-focal constituents is expected as strategy to mark IS prosodically as shown for several languages that use prosodic cues to mark focus (cf. Büring 2010). The compression of pre-focal constituents is claimed as a prosodic correlate of sentence type marking in Turkish by Göksel et all (2009). However, cross-linguistically pre-focal de-accentuation is actually observed as a correlate to IS as observed in German (e.g. Féry & Kügler 2008).

All constituents of all sentences are subject to visual and auditive analyses of the *f0* pitch tracks and additional phonetic measurements of the maximum *f0* values on pre-and post-focal constituents which are compared to their counterparts in the all-new condition.

The analyses start with phonologic and phonetic analyses of post-focal de-accentuation which is completed by a statistical analysis. Subsequently, the same analyses are conducted for pre-focal compression.

III.4.3.1 POST-FOCAL DE-ACCENTUATION

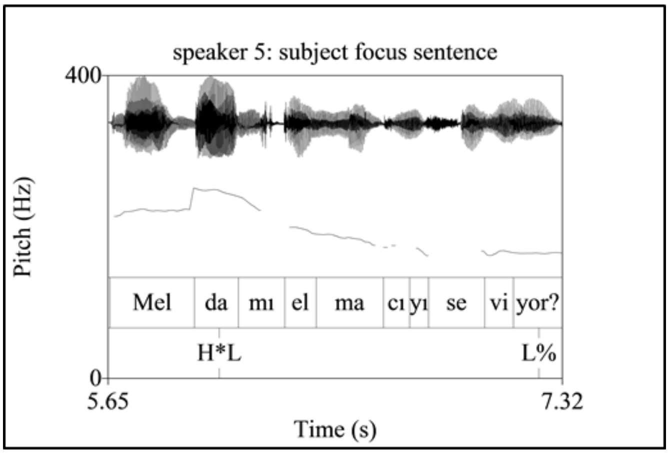
In the preceding phonological analysis of the general tonal distribution in yes/no questions and the tonal distribution across different focus conditions, a modification of the *f0* contour by means of tonal deletion after focus was observed. What sticks out in the analyses of the *f0* contours is that they differ in the tonal implementation according to the focus condition. The change in the *f0* contours is systematic since post-focal constituents lack pitch in all focus conditions. To this effect, the three different focus conditions and the all-new baseline systematically differ with respect to the constituents that bear pitch and those which are de-accented.

In the all-new sentences and in the ambiguous contours of the verb focus sentences all constituents (subject, object, and verb) are systematically realized with pitch movement by all speakers. Either the constituents are realized with high PPh-final boundary tones on PPh-final syllables or they are realized with pitch accents (H*, H*L) on their word stressed syllables.

In contrast, in subject- and object focus sentences, not all constituents are systematically aligned with tonal movement. Pitch movement is only observed on pre-focal and focal constituents. In subject and object focus the graphs show de-accentuation in the form of a low de-accenting pattern which starts right after the focused constituent which is aligned with a high-falling pitch accent (H*L) and continues until the final low boundary tone (L%). No considerable *f0* movement is observed after the focused constituents. In subject focus 53 of 55 subjects are realized with an (H*L) on their word stressed syllable followed by de-accentuation on following objects and verbs. Whereby in 14 sentences the object is not de-accented. In object focus, 53 subjects are realized with a PPh-final boundary tone followed by an (H*L) pitch accent on the word stressed syllable of the following object in 52 of the 55 objects. The following verb is de-accented in all 55 object focus questions. In figures (3.9) and (3.10) the de-accenting pattern is exemplarily outlined by means of an *f0* pitch track for subject and object focus of sentence 1 realized by speaker 5.

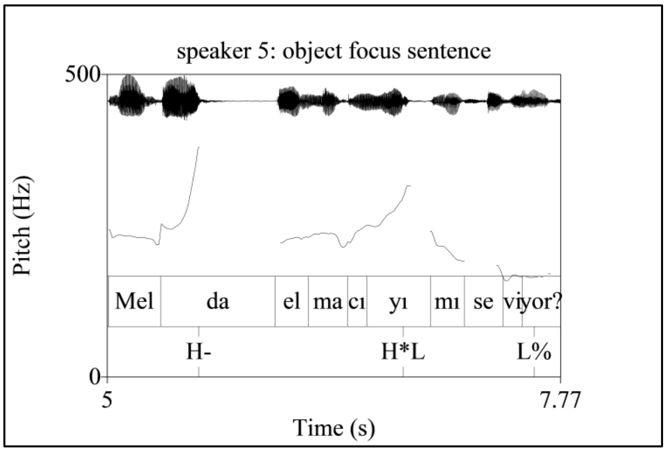
In figure (3.9) the pitch track of *Melda mi elmaciyi seviyor?* (Is it Melda who loves the apple trader?) shows de-accentuation of all constituents following the focused subject which is realized with an (H*L) pitch accent on its word stressed syllable.

Fig. (3.9): Post-focal de-accentuation in subject focus by speaker 5



In figure (3.10) the object focus pitch track of the same sentence, also realized by speaker 5, is exemplarily outlined indicating post-focal de-accentuation on the verb.

Fig. (3.10): Post-focal de-accentuation in object focus by speaker 5



However, there are some speaker dependent deviations with respect to the general observation of post-focal de-accentuation. Speaker 4 and 7 systematically realize a high pitch accent on the object in subject focus conditions although the objects constitute a post-focal constituent which is additionally morphologically indicated by the Q-particle which is attached on the preceding subject. The verb as a further post-focal constituent however, is de-accented as for the remaining speakers. Furthermore, speaker 6 only de-accents four objects in a post-focal position and speaker 5 de-accents only two objects in a post-focal position in subject focus as demonstrated above in table (3.4). However, all verbs of the present data are always de-accented by all speakers when they occur in a post-focal position.

In addition to the visual and auditive inspection of all intonation contours of all speakers in Praat, the calculation of time-normalized *f0* graphs also reveal a systematic de-accentuation pattern of objects and verbs in subject focus and of verbs in object focus. For an easier visual understanding, figure (3.8) above shows the time-normalized *f0* contours of all speakers across all sentences and focus conditions. The time-normalized graphs represent the averaged contours for all speakers across all sentences of the respective focus condition. The all-new condition and the verb focus condition are ambiguous and show pitch movements on each of the three constituents. In subject focus and object focus in contrast, the post-focal constituents, object or object and verb respectively, are de-accented. Similar as in the realization of the all-new condition and the verb focus condition, the subject is realized with pitch movement in subject focus and object focus. In object focus also the object shows an *f0* rise on its word stressed syllable as in all-new and verb focus.

The de-accenting pattern observed in the visual and auditive analyses of post-focal constituents for subject and object focus is also observed in the concrete maximum *f0* measurements. For the phonetic analysis of post-focal de-accentuation, the maximum *f0* of the word stressed syllable was extracted for each constituent of each sentence in each focus condition for each speaker.

Afterwards, for each speaker a mean max*f0* value was calculated on the base of the five sentences per focus condition. Comparisons of the mean max*f0* values are made upon the values on post-focal constituents and the all-new baseline for all speakers and the speakers as a group. In table (3.8) the mean max*f0* values on each constituent in each focus condition and the all-new baseline is demonstrated for each speaker. A difference in *f0* is reported when the difference is lower or higher than zero. Perceptual relevance is not considered as the indicator of difference in the present analyses, since the experimental design does not target the perception of maximum *f0* differences. This evaluation is applied in all following analyses of the present dissertation.

Table (3.8): Mean max*f0* on subjects, verbs, and objects in different focus conditions

focus condition	all-new (mean max pitch in Hz)			subjectF (mean max pitch in Hz)			objectF (mean max pitch in Hz)			verbF (mean max pitch in Hz)		
speaker	subject	object	verb	subject	object	verb	subject	object	verb	subject	object	verb
1	192	187	159	185	151	133	190	181	135	191	184	167
2	195	196	177	221	123	101	201	202	109	194	222	178
3	154	151	178	234	123	107	154	222	119	148	142	220
4	356	358	250	315	264	233	337	286	219	333	337	233
5	336	320	222	283	212	194	352	268	182	306	342	230
6	151	142	113	145	100	89	148	129	89	142	143	114
7	119	110	99	110	106	95	187	105	96	126	109	98
8	224	145	123	149	110	102	154	138	101	222	148	130
9	288	269	250	366	211	180	240	343	185	247	235	336
10	131	128	115	126	105	98	194	123	89	127	127	112
11	193	179	155	194	132	119	188	178	122	176	178	154
overall mean *f0*	**213**	**199**	**167**	**212**	**149**	**132**	**213**	**198**	**131**	**201**	**197**	**179**

The data in table (3.8) show that the overall mean max*f0* values on the word stressed syllables of objects and verbs in subject focus are lower than the overall mean max*f0* on the word stressed syllables of objects and verbs in the all-new condition. On average speakers produce 199 Hz on the word stressed syllable of objects in the all-new condition and only 149 Hz on objects in subject focus. For verbs the table indicates an overall mean max*f0* across all speakers of 167 Hz in the all-new condition and of only 132 Hz in the subject focus condition. For object focus the data analyses shows that all speakers also use a lower mean max*f0* on the post-focal verb in comparison to the maxf0 on the verb in the all-new condition. The overall mean max*f0* value across all speakers on verbs in the all-new condition is 167 Hz whereas the mean max*f0* value on post-focal verbs in the object focus condition is only 131 Hz.

A speaker dependent analyses shows that all 11 speakers use a lower *f0* on the object in subject focus. Also the verb is realized with a lower *f0* in the subject focus condition when compared to the all-new condition by all 11 speakers. The post-focal verb in object focus is also lower for all speakers whereby speaker 7's lowering is only marginally since the difference does not exceed 4 Hz.

The observed lowering on post-focal constituents is of statistical relevance. In addition to the mean max*f0* analyses, a statistical analyzes including all measure points of the max*f0* values of the word stressed syllables of the respective constituents of all sentences and all speakers is conducted by means of linear mixed model analyses (LMMA) for objects and verbs in post-focal conditions. The linear mixed models are fitted to compare the maximum *f0* values of the post-focal constituents with the values of the same constituents in the all-new baseline. Within the model the max*f0* of the stressed syllable is the dependent variable, the focus condition is the fixed factor and speaker is the random factor. To account for gender-related differences in pitch across speakers, the *f0* values obtained for each speaker were converted to their logarithms and afterwards calculated back to Hertz. All following statistical analyses are conducted in the same way. For the analysis of object de-accentuation in subject focus the reading advices for the following tables is provided in detail and the results are explained explicitly. Since the following tables follow the same scheme a detailed explanation would only be repetitive and is resigned. In table (3.9) the results are first summarized for the object in the subject focus condition.

Table (3.9): LMMA-results for post-focal de-accentuation of objects in subject focus

object	T	P	max*f0* (Hz/st)	confidence intervals
default log			199.006 5.221 **185.104**	155.06 - 242.952 5.003 - 5.439 148.821 - 230.232
subject log	**-10.171**	**<0.001**	153.289 **4.953 141.606**	97.130 - 209.448 4.683 - 5.223 108.122 - 185.459

In table (3.9) the max*f0* of the word stressed syllable of the object is calculated in R for the all-new condition as the intercept. It is 199,006 in the Hertz scale corresponding to 5,221 semi tones on the logarithmic scale. The semi tone value calculated back into Hertz corresponds to 185,104 Hz. The confidence interval for the all-new condition is 155,06 Hz to 242,952 Hz which corresponds to 5,003 to 5,439 semitones. The semi tone values calculated back to Hertz correspond to 148,821 Hz to 230,232 Hz. Furthermore the max*f0* of the word stressed syllable of the object is calculated in R for the subject focus condition in order to test if there is a significant difference to the value on the object in the all-new condition. The max*f0* on the object in the subject focus condition, outlined in the third column of the second row, is 153,289 Hz. This corresponds to 4,953 semitones. The confidence interval for the subject focus condition is 97,130 Hz to 209,448 Hz which corresponds to 4,683 to 5,223 semitones. The semi tone values calculated back to Hertz correspond to a confidence interval of 108,122 Hz to 185,459 Hz. The difference between the max*f0* on the object in subject focus and the all-new condition is significant for the present data set. The difference corresponds to an absolute t-value of 10,171 for the semi tone analysis and a p-value of <0,001.

From this data set analyses a highly significant difference with respect to the *f0* implementation on objects in the all-new condition and the *f0* implementation on objects in the subject focus condition is found confirming the results of the phonological analyses of post-focal de-accentuation of objects in subject focus.

The same statistical analysis is conducted for the max*f0* values on post-focal verbs in subject and object focus. The results are summarized in table (3.10).

Table (3.10): LMMA-results for post-focal de-accentuation on the verb in subject and object focus

verb	t	P	max*f0* (Hz/st)	confidence intervals (Hz/st)
default log			171.778 5.094 → **163.099**	140.169 - 203.386 4.9 - 5.289 → 134.306 - 198.065
subject log	 **-12.605**	 **<0.001**	134.942 **4.849 → 127.573**	95.919 - 173.928 4.616 - 5.081 → 101.114 - 160.955
object log	 **-13.747**	 **<0.001**	131.222 **4.828 → 124.943**	92.257 - 170.186 4.596 - 5.06 → 99.051 - 157.605

In table (3.10) the maximum *f0* of the word stressed syllable of the verb is calculated in R for the all-new condition as the intercept and the verbs in the subject and the object focus condition. The values are indicated in Hertz and semi tones. Furthermore the confidence intervals for the all-new condition, the subject focus condition and the object focus condition are indicated. The p- and the t-values indicated in the first and the second row reveal that also the difference in the max*f0* on verbs in the all-new and the subject focus condition is statistically significant for the present data set. The difference in the subject focus condition corresponds to an absolute t-value of 12,605 and a p-value of <0,001 for the semi tone analyses. The difference for the object focus condition corresponds to an absolute t-value of 13,747 and a p-value of <0,001 for the semi tone analyses.

From this data set analyses a highly significant difference with respect to the *f0* implementation on verbs in the all-new condition and the *f0* implementation on verbs in the subject focus condition and the object focus condition by means of post-focal de-accentuation is found.

Summarizing the results of the preceding phonological and phonetic analyses of post-focal de-accentuation a statistical significant difference on post-focal constituents is found. Post-focal objects and verbs are de-accented in contrastive in-situ focused simple SOV yes/no questions in the sample of Turkish speakers of the present dissertation.

III.4.3.2 PRE-FOCAL COMPRESSION

Based on Göksel et al's (2009) study who observe a systematic compression of pre-focal constituents in the analyses of several yes/no question pitch tracks from three different speakers, pre-focal compression is also analyzed in the present data set. In Göksel et al.'s (2009) study, the observation of pre-focal compression refers to the observation of absence of pitch movement corresponding to an almost flat *f0* contour on pre-focal constituents. In a first step, the phonologic analysis is provided which actually constitutes an analysis of de-accentuation by means of absence or presence of pitch accents. The subsequent phonetic analysis focuses on actual pitch height measurements and can draw conclusions about the status of compression or complete de-accentuation when necessary.

The previously outlined analyses of pitch distribution reveal that 53 subjects in 55 all-new sentences are realized with a high PPh-final boundary tone (H-) (cf. table 3.3). A high PPh-final boundary tone (H-) is also implemented on the subjects when they are in a pre-focal position in object focus or in verb focus. In the 55 object focus sentences 53 subjects are realized with (H-) as outlined in table (3.5) above. Only speakers 3 and 10 do not use pitch on the word stressed syllables of the object in one of their five object focus sentences. In the 55 verb focus sentences 49 subjects are realized with (H-) as outlined in table (3.7). Only speaker 3 and 10 again de-accent the subject in verb focus. However, there is a striking difference between both speakers. Whereas speaker 3 only de-accents the subject of one object focus question, speaker 10 systematically does not implement pitch in all of the five object focus yes/no questions.

With respect to the object in verb focus where it also occupies a pre-focal position a similar picture is observed. In the all-new condition the 55 objects of the 55 yes/no questions are all realized with a (H*) pitch accent. In the 55 verb focus yes/no questions containing a pre-focal object, 50 objects are realized with a high pitch accent (H*) on their word stressed syllable. Again speaker 3 differs from the remaining speakers. He de-accents all objects in the verb focused questions.

Göksel et al's (2009) observation of pre-focal compression is only repeated for speaker 3 in the phonological analysis by means of de-accentuation in the present data set and only for verb focus. In object focus, no systematic compression or de-accentuation of the pre-focal subject is observed. The phonological analysis of the sentences of all remaining speakers does not reveal a systematic compression or de-accentuation of pre-focal constituents.

The visual inspection of the time-normalized *f0* contours repeats the previous observation. All subjects and objects are realized with notable pitch movement when they are in a pre-focal position.

An *f0* drop in contrast to the all-new condition is not observed for object focus. However, the graph for the verb focus condition gives hints for an *f0* drop since the pitch height of the subject in verb focus seems smaller than the pitch height of the subject in the all-new graph. The time-normalized *f0* contours computed by the averaged contours of all sentences and all speakers for each focus condition was outlined previously in figure (3.8). Although the graphs in figure (3.8) indicate a difference in the pitch height of pre-focal subjects in verb focus when compared to all-new, the visual analyses of time-normalized contours does not constitute a reliable result and is therefore amplified by concrete phonetic measurements of the maximum *f0* on the word stressed syllables. Since the phonologic analyses for the remaining pre-focal constituents does not repeat the observation of pre-focal compression made by Göksel et al. (2009) neither, one of the goals of the supplementary phonetic analysis is to test if pre-focal compression can be identified by concrete measurements of the pitch height on unfocused versus pre-focused constituents.

In the following, I will outline the results of the phonetic analyzes of max*f0* values. The max*f0* values are automatically computed by the script for each syllable. The max*f0* values of the word stressed syllables of the different constituent were extracted for each speaker for each focus condition and the all-new baseline. As for post-focal de-accentuation, the mean max*f0* values on the respective syllables were calculated across the different sentences for each focus condition for each speaker and compared with each other. In a first step, the mean maximum *f0* values of pre-focal constituents are compared with the mean maximum *f0* values of the same constituents in the all-new baseline. According to Göksel at al. (2009) and Ímer & Çelebi (2006) the focused constituent is realized with the highest *f0* of the utterance independent of its position. To this effect, in a second step, the mean max*f0* values of the focused constituents are compared to the mean max*f0* values of the preceding pre-focal constituent for each focus condition. For object focus the mean maximum *f0* of the focused object of each speaker is compared to the mean maximum *f0* value of the preceding subject. For verb focus the maximum *f0* of the focused verb is compared with the mean maximum *f0* values of the preceding object and subject. Subject focus sentences are not included into the measurement since no pre-focal constituents are available in SOV yes/no questions.

In table (3.11) the mean max*f0* values on the subjects and objects in the all-new condition, the mean max*f0* values of the subject in object focus, and the subject and the object in verb focus are provided.

Table (3.11): Mean max *f0* comparison on subjects and objects in the all-new condition and in the pre-focal condition in object- and verb focus

focus condition	**all-new** (max pitch in Hz)		**objectF** (max pitch in Hz)	**verbF** (max pitch in Hz)	
Speaker	subject	object	subject	subject	object
1	192	187	190	191	184
2	195	196	201	194	222
3	154	151	154	148	142
4	356	358	337	333	337
5	336	320	352	306	342
6	151	142	148	142	143
7	119	110	187	126	109
8	224	145	154	222	148
9	288	269	240	247	235
10	131	128	194	127	127
11	193	179	188	176	178
mean *f0*	213	199	213	201	197

The data in table (3.11) repeat the results of the phonological analyses with respect to pre-focal de-accentuation by means of concrete phonetic measurements. Subjects and objects are not lower in their mean *f0* values in a pre-focal condition, than they are in the all-new condition. As for the object focus sentences, the data in table (3.11) however, indicate speaker dependent variation with respect to pre-focal compression of the subject in object focus. Whereas speaker 1, 4, 6, 8, 9 and 11 implement a lower max*f0* on the subject in the object focus condition than in the all-new condition, speaker 2, 3, 5, 7 and 10 use a higher or equal *f0* on the subject in the object focus condition. Within both groups furthermore huge variation is observed with respect to the actual *f0* difference on subjects in both conditions. In the crucial group with lower mean max*f0* implementation on a pre-focal subject, speaker 1 produces a mean difference of only 2 Hz on the subjects of both focus conditions, whereas speaker 8 produces a difference of 70 Hz. However, there is no difference with respect to the mean max*f0* value averaged across the mean values of all speakers for the subjects in both focus conditions. The mean max*f0* on the subjects in the all-new condition and the object focus condition is 213 Hz.

With respect to the max*f0* on the pre-focal constituents in the verb focus condition a different picture arises. For pre-focal subjects the observations are repeating the results of the visual analyses of the time-normalized *f0* contours outlined in figure (3.8). The mean max*f0* on pre-focal subjects in verb focus is indeed lower for ten of the eleven speakers. However, the mean difference between the pitch height on objects in the all-new condition and objects in the pre-focal condition calculated across all speakers in verb focus is only 12 Hz. On average the speakers of the data set produce a mean pitch value of 213 Hz on the subject in the all-new condition and a mean pitch value of only 201 Hz on the subject in the verb focus condition where the subject occurs pre-focally.

Furthermore, the range of the difference between the lower *f0* values varies for each speaker. For speakers 1, 2, 8, and 10 the max*f0* on the subject is not even lower than 5 Hz than in the realization of the max*f0* on the subject in the all-new condition and most probably outside acoustic perceptibility. Speaker 7 is the only speaker who uses a higher *f0* on the subject in verb focus when compared to the value of the same constituent in the all-new condition. The difference counts 7 Hz. For pre-focal objects in verb focus the mean values in table (3.11) also show speaker dependent variation with respect to the max*f0* values on pre-focal objects compared to the objects in the all-new condition. In total seven speakers use a lower *f0* on the pre-focal object than in the all-new condition (speakers 1,3,4,7,9,10,11). The actual pitch range does not exceed 5 Hz for speakers 1, 7, 10, and 11 and should be outside perceptability. The remaining speakers (2,5,6,8) even use a higher *f0* on pre-focal objects in the verb focus condition, than on the same constituent in the all-new condition. The *f0* on pre-focal objects in the verb focus conditions are on average only marginally lower than the *f0* values of the objects in the all-new conditions for the speakers as a group. Whereas speakers produce an overall mean max*f0* of 199 Hz on objects in the all-new conditions they produce a mean max*f0* value of 197 Hz in the verb focus conditions.

As a further phonetic indicator of pre-focal compression, Göksel et al. (2009) as well as Ímer & Çelebi (2006) propose that the Q-particle adjacent constituent is realized with the highest pitch in the sentence independent of its position for which pre-focal constituents might seem compressed as well. To verify this previous observations on a basis of phonetic measurements the max*f0* of the word stressed syllable of each constituent of each sentence in both conditions with pre-focal constituents (object focus and verb focus) was also extracted for each speaker. The mean max*f0* values are outlined in table (3.12) for each speaker.

Table (3.12): Mean max*f0* values on all constituents in object and verb focus for all speakers

focus condition	**objectF** (max pitch in Hz)			**verbF** (max pitch in Hz)		
speaker	subject	object	verb	subject	object	verb
1	190	181	135	191	184	167
2	201	202	109	194	222	178
3	154	222	119	148	142	220
4	337	286	219	333	337	233
5	352	268	182	306	342	230
6	148	129	89	142	143	114
7	187	105	96	126	109	98
8	154	138	101	222	148	130
9	240	343	185	247	235	336
10	194	123	89	127	127	112
11	188	178	122	176	178	154
mean *f0*	213	198	131	201	197	179

In table (3.12) the mean *f0* values for object focus and verb focus are demonstrated. The light blue boxes indicate the constituents which are expected to be associated with the highest *f0* according to Göksel et al's (2009) observations, namely the constituent adjacent to the Q-particle. The dark blue boxes indicate the constituents which are actually associated with the highest *f0* of the utterances by the speakers of the present data set.

The measurements of the maximum *f0* reveal that speaker 1, 4, 5, 6, 7, 8, 10, and 11 on average use the highest frequency on the subject in object focus yes/no questions and not on the Q-particle adjacent object. Speakers 2, 3 and 9 on the other side indeed use the highest pitch of the sentence on the object in object focus as predicted by the previous studies. For these 3 speakers a neutral declination pattern where the *f0* values decrease from one constituent to the next, as observed for the remaining speakers is not visible. Instead, for the three speakers, the mean max*f0* values show an upstep on the focused constituent of the three speakers in object focus.

In verb focus yes/no questions speakers show the biggest variation with respect to the constituent with the highest pitch value. In contrast to the all-new condition as outlined in table (3.11), subjects are not realized with the highest pitch by the majority of the speakers. Whereas speakers show tendencies of a neutral declination in all-new sentences corresponding to a continuous *f0* lowering from one constituent to the following constituent this pattern is repeated only by a few speakers in verb focus sentences which have the same morpho-syntactic structure by means of Q-particle attachment. Six speakers produce the highest mean maximum pitch value in verb focus on the object. Two speakers produce the highest pitch in verb focus on the verb and only 3 speakers produce it on the subject. The measurements of the maximum *f0* in verb focus reveal that speakers 1, 7, and 8 on average use the highest frequency on the subject and furthermore show a neutral declination pattern on the following constituents. Speakers 2, 4, 5, 6, 10, and 11 implement the highest *f0* on the object in verb focus yes/no questions. Only speakers 3 and 9 show the highest *f0* value on the focused constituent as predicted by Göksel at al`s (2009) study. However, the mean max*f0* calculated across all speakers indicates that on average the highest *f0* value corresponding to 201 Hz is realized on the subject as in the all-new and object focus conditions in the data set when compared to the mean max*f0* values of the subsequent constituents. The mean max*f0* value calculated across all speakers is not realized on the focused constituent (the verb) as assumed by the previous studies. However, the analysis of all individual speakers shows that more speakers show a higher mean max*f0* on objects than on preceding subjects in verb focus. Furthermore, the data show that in the object focus condition the subject is aligned with the highest pitch value although it is not adjacent to the question particle in this condition. In the verb focus condition more speakers align the object with the highest pitch value of the sentence although it is neither adjacent to the Q-particle. Hence, more speakers realize the constituent preceding the focused constituent with the highest pitch of the utterance and not the Q-particle adjacent constituent. This aspect will be of interest for the analyses of the introduction of pre-focal boundary tones in the next subsection.

The outlined results with respect to the phonetic measurement of pre-focal compression in object and verb focus are furthermore confirmed by the complementary statistical analyzes. In contrast to the phonetic analyses based on mean values, the linear mixed model analyses include all measure points of the maximum *f0* of all sentences and all speakers. As for the compression on subjects in a pre-focal position, the linear mixed model is fit to compare the maximum *f0* values of the pre-focal subjects with the same constituent in the all-new baseline. Within the model the maximum *f0* of the stressed syllable of the subject is the dependent variable, the focus condition is the fixed factor and speaker is the random factor. As previously realized in the analyses of post-focal de-accentuation the *f0* values obtained for each speaker were converted to their logarithms (using the log() function in R) and afterwards calculated back to Hertz in order to account for gender-related differences in pitch among speakers. In table (3.13) the results of the linear mixed model analyses for pre-focal compression is first summarized for the subject in object focus.

Table (3.13): LMMA-results for pre-focal compression on the subject in object focus

subject	t	p	max*f0* (Hz/st)	confidence intervals (Hz/st)
default log			212.646 5.285 **197.302**	169.59 - 255.702 5.086 - 5.484 161.671 - 240.785
object log	0.106	0.916	213.08 5.289 **198.110**	151.276 - 274.884 5.014 - 5.564 150.467 - 260.855

In table (3.13) the max*f0* of the word stressed syllable of the subject is calculated in R for the all-new condition as the intercept and the subject in object focus. Calculations are indicated in Hz and semi-tones. The semi-tones are calculated back to Hz. Furthermore, the confidence intervals for both conditions are provided. The max*f0* on the subject in the all-new condition is 197,302 Hz. In the object focus condition the max*f0* on the subject is 198,110 Hz. Resulting in a t-value of 0,106 and a p-value of 0,916 for the semi-tone analyses.

From the present sample analysis no significant difference with respect to the *f0* implementation on a subject in the all-new condition and the *f0* implementation on a subject in an object focus condition can be found.

The linear mixed model analysis also includes pre-focal compression of the subject in verb focus. As in the analysis of object focus, the max*f0* of the stressed syllable of the subjects is the dependent variable, the focus condition is the fixed factor and speaker is the random factor. In table (3.14) the results of the linear mixed model analysis for pre-focal compression on the subject in verb focus is summarized.

Table (3.14): LMMA-results for pre-focal compression on the subject in verb focus

subject	t	p	max*f0* (Hz/st)	confidence intervals (Hz/st)
default log			212.646 5.285 **197.302**	169.59 - 255.702 5.086 - 5.484 161.671 - 240.785
verb log	-1.243	0.216	201.132 5.237 **188.031**	139.328 - 262.937 4.962 - 5.512 142.812 - 247.543

In table (3.14) the max*f0* of the word stressed syllable of the subject is calculated in R for the all-new condition as the intercept and the verb focus condition. It is indicated in Hertz and semi-tones. Semi-tones are calculated back to Hz. Furthermore, the confidence interval for the all-new condition and the verb focus condition is indicated. In the verb focus c

ondition the max*f0* on the subject is lower than in the all-new condition. However, this difference is not significant for the present data set. The difference corresponds to an absolute t-value of 1,243 and a p-value of 0,216 for the semi-tone analyses. From this data set analysis no significant difference with respect to the *f0* implementation on a subject in the all-new condition and the *f0* implementation on a subject in the verb focus condition can be found repeating the results of the phonological and the phonetic analyses of pre-focal compression on the subject in the verb focus condition when compared to the results of the all-new baseline.

The linear mixed model analysis also includes pre-focal objects in the verb focus condition. As in the preceding analyses the max*f0,* the stressed syllable of the pre-focal constituent is the dependent variable, the focus condition is the fixed factor and speaker is the random factor. In table (3.15) the results of the linear mixed model analyses for pre-focal compression on the object in verb focus are summarized.

Table (3.15): LMMA-results for pre-focal compression on the object in verb focus

object	t	p	maxf0 (Hz/st)	confidence intervals (Hz/st)
default log			199.006 5.221 **185.104**	155.06 - 242.952 5.003 - 5.439 148.821 - 230.232
verb log	-0.223	0.824	198.126 5.215 **184.025**	142.033 - 254.22 4.946 - 5.485 140.55 240.948

In table (3.15) the max*f0* of the word stressed syllable of the subject is calculated in R for the all-new condition as the intercept and the verb focus condition and indicated in Hz and semi-tones. Furthermore, the confidence intervals for both conditions are provided. The difference between both realizations is not significant for the present data set. The difference corresponds to an absolute t-value of 0,223 and a p-value of 0,824 for the semi-tone analyses. From this data set no significant difference with respect to the *f0* implementation on objects in the all-new condition and the *f0* implementation on objects in the verb focus condition can be found confirming the results of the phonologic and phonetic analyses of pre-focal compression of the subject in object and verb focus.

Summarizing the results of the analyses of pre-focal compression, the phonetic analyzes of mean max*f0* values calculated across the sentences of each focus condition for each speaker and the speaker as a group show no clear compression on pre-focal constituents. Furthermore, the statistical analyzes based on the max*f0* values of each sentence of each speaker reveals no significant difference in the realization of pre-focal constituents compared to the realization of the same constituent in the all-new conditions. Pre-focal constituents in the data set are not lower in *f0* than the Q-particle adjacent focused constituents. Speaker individual analyses contrastingly show that some speakers use a higher *f0* on the constituent preceding the focused constituent. This observation will be outlined in more detail in the next analyses step with respect to pre-focal boundary tone introduction.

As an additional observation of the pitch height analyses, the values outlined in table (3.11) partly repeat the results of İpek (2011) with respect to pitch increase on focused constituents. The monolingual speakers of the present experiment on Turkish yes/no questions do not increase pitch on focused constituents in subject and object focus. The mean maximum pitch value of a focused constituent, i.e. either the subject in subject focus or the object in object focus, does not increase in the focus condition in comparison to the all-new baseline. For verb focus on the other side a slight increase of the mean max*f0* across all speakers is observed. The mean max*f0* value increases from 167 Hz on verbs in the all-new condition to 179 Hz on the same constituent in the focus condition. This observation is outlined in more detail in the second subsequent subchapter concerning the ambiguity of verb focus and all-new.

III.4.3.3 PRE-FOCAL BOUNDARY TONE INSERTION

With respect to the analysis of pre-focal boundary tone introduction in order to align a focused constituent to a prosodic boundary, the mean max*f0* of the word stressed syllables of the constituents immediately preceding the focused constituent are compared to the mean max*f0* values on the same constituents in the all-new baseline condition. An increase of the max*f0* would indicate the introduction of a prosodic boundary as similarly observed in İpek (2011). The introduction of a post lexical boundary tone in addition to the pitch accent or phrase boundary tone on the same syllable would correspond to a simultaneous implementation of several functional properties of *f0* as assumed by Xu (2005) and would be indicated by a rise in pitch. The max*f0* of each respective syllable of each sentence was extracted by the help of the script *ProsodyPro*.

The max*f0* values are extracted for the subject in object focus, the object in verb focus, and the subject and the object the all-new condition. Since in subject focus no focus preceding syllable is present in the data due to the consistent SVO design, no measurements can be taken for a pre-focal boundary insertion in subject focus. Afterwards the mean values are calculated for each speaker for each focus condition based on the five target sentences of each condition.

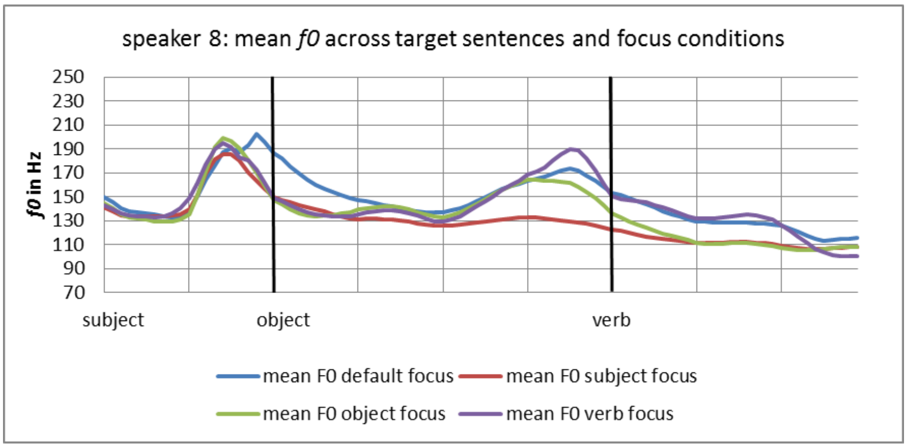
First, the results of the analysis of pitch increase on the word stressed syllable of the object in verb focus are presented. Table (3.16), which partly repeats the results demonstrated in table (3.11) above, shows the results of the mean max*f0* values for each speaker for objects in verb focus. In the first data row the mean max*f0* on the objects in the all-new condition is presented for each speaker. The second data row shows the corresponding max*f0* values for the object in the verb focus condition where it represents the immediately pre-focal constituent. The third row indicates the pitch difference between both conditions.

Table (3.16): Mean *f0* difference in Hz on the object in all-new yes/no questions and verb focus

speaker	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**all**
object mean max *f0* all-new	187	196	151	358	320	142	110	145	269	128	179	**199**
object mean max *f0* verbF	184	222	142	337	342	143	109	148	235	127	178	**197**
difference	**-3**	**26**	**-11**	**-21**	**22**	**1**	**-1**	**3**	**-34**	**-1**	**-1**	**-2**

As in the preceding analysis of pre-focal compression the results outlined in table (3.16) show speaker dependent realization and variation of the pitch values with respect to an increase of pitch. Speakers 1, 3, 4, 7, 9, 10 and 11 implement a lower mean max*f0* on the object in the verb focus condition than in the all-new condition. Speakers 2, 5, 6 and 8 on the other side show a higher *f0* on the object in the focus condition in comparison to the pitch value of the object in the all-new question. The data of those 4 speakers indeed indicate a pitch increases on the object when the verb is focused repeating the results of İpek's observation of the immediately pre-focal rise in comparison to the mean *f0*max value in the all-new condition. However, the actual pitch increase ranges from 1 Hz to 26 Hz depending on the speaker although a difference of 1 Hz is not in the range of perceptability. A sample mean graph for the increase of pitch in verb focus on the immediately preceding constituent is outlined in figure (3.11) for speaker 8. The mean graphs are based on the time-normalized *f0* values generated by the script which enables the comparison across the five different target sentences of each focus condition and a simultaneous layering of all focus conditions.

Fig. (3.11): Time-normalized *f0* graphs across all sentences and focus conditions for speaker 8



In figure (3.11) thin lines indicate syllable boundaries and thick lines indicate word boundaries whereby word boundaries change according to the focus condition due to the position of the Q-particle as explained above for figure (3.8). The mean *f0* contour of the all-new condition is represented by the blue graph, the red graph represents subject focus, the green graph object focus and the purple graph verb focus. Compared to the all-new contour the purple contour shows a boost in pitch on the final syllable of the object as observed in the analyses of the mean max*f0* values for speakers 2,5,6,8.

The remaining 7 speakers do not increase pitch on the immediately pre-focal constituent in verb focus, but a slight decrease can be observed when compared to the *f0* of all-new. On average those speakers use a lower pitch value of 2 Hz on the object in verb focus in comparison to the pitch value of the same constituent in all-new.

By means of statistical analyses based on all measure points and not only the mean values, the difference with respect to pitch height on the object in the all-new condition and the object in the immediately pre-focal position is not significant. As for the analyses of de-accentuation on post-focal constituents and pre-focal compression, also for the analyses of pre-focal boundary insertion a linear mixed model is fit to compare the max*f0* values of the immediately pre-focal constituents of all verb focus sentences of the data set with the values of the same constituent in the all-new baseline. The model is fit with the max*f0* of the stressed syllable of the object as the dependent variable, the focus condition as the fixed factor and speaker as the random factor. In table (3.17) the results of the linear mixed model analyses for pre-focal compression on the subject in verb focus are demonstrated.

Table (3.17): LMMA-results for pre-focal boundary insertion on the object in verb focus

object	t	p	maxf0 (Hz/st)	confidence intervals (Hz/st)
default log			199.006 5.221 → **185.104**	155.06 - 242.952 5.003 - 5.439 → 148.821 - 230.232
verb log	 -0.223	 0.824	198.126 5.215 → **184.025**	142.033 - 254.22 4.946 - 5.485 → 140.55 → 240.948

In table (3.17) the max*f0* of the word stressed syllable of the object is calculated in R for the all-new condition as the intercept and the verb focus condition. Both are indicated in Hz and semi-tones. Semi-tones are calculated back to Hz. Furthermore the table shows the confidence intervals for both conditions. The max*f0* on the object in the verb focus condition outlined in the third column of the second row is 184,025 Hz whereas the mean *f0* in the all-new condition is 185,104 Hz.

The difference between both realizations is not significant for the present data set since it corresponds to an absolute t-value of 0,223 and a p-value of 0,824 for the semi-tone analyses. From this data set analyses no significant difference with respect to the *f0* implementation on objects in the all-new condition and the *f0* implementation on objects in the verb focus condition can be found repeating the results of the analyses of pre-focal compression of the object in verb focus where no *f0* lowering was found neither on the respective syllable.

As for the analysis of pre-focal boundary tone introduction in verb focus, the same phonetic analysis is conducted for the subject in object focus in order to test pitch increase on the immediately pre-focal constituent. Max*f0* values are measured for the final syllables of the subject in the object focus condition and the all-new condition. The mean values based on the five sentences of each condition are calculated for each speaker and compared with each other. In table (3.18) the mean max*f0* values for the subject in the all-new condition and in the object focus condition are outlined for each individual speaker and the speakers as group.

Table (3.18): Mean *f0* difference in Hz on the subject in all-new yes/no questions and object focus:

speaker	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**all**
subject mean max *f0* all-new	192	195	154	366	336	151	119	224	288	131	193	214
subject mean max *f0* objectF	190	201	154	337	352	148	187	154	240	194	188	213
difference	**-2**	**6**	**0**	**-19**	**16**	**-3**	**68**	**-70**	**-48**	**63**	**-5**	**1**

For object focus the mean *f0*max value on the immediately pre-focal constituent (subject) increases for speakers 2, 5, 7, and 10 when compared to the all-new baseline. Increase ranges from 6 Hz to 63 Hz depending on the speaker. Furthermore, six speakers show a lower or equal *f0* on the subject when it is followed by a focused object in comparison to the all-new baseline. Speakers 1, 3, and 6 show a difference between both max*f0* values of 0 Hz to 3 Hz which is outside perceptability. The remaining speakers use a lower pitch which ranges in between 5 Hz and 70 Hz.

The mean max*f0* difference across all speakers is less than 1 Hz. The results of the mean max*f0* analysis for each speaker and all speakers as a group is amplified by an additional statistical analysis including all measure points of the maximum *f0* of all sentences and all speakers. The linear mixed model is fitted to compare the maximum *f0* values of the immediately pre-focal constituent; i.e. the subject, with the same constituent in the all-new baseline. With that it corresponds to the calculation of pre-focal compression in object focus as outlined above although the reverse effect was tested. Within the model the max*f0* of the stressed syllable of the subject again is the dependent variable, the focus condition is the fixed factor and speaker is the random factor. In table (3.19) the results of the linear mixed model analyses for pre-focal pitch increase on the subject in object focus is summarized.

Table (3.19): LMMA-results for pre-focal boundary insertion on the subject in object focus

subject	t	p	max*f0* (Hz/st)	confidence intervals (Hz/st)
default log			212.646 5.285 **197.302**	169.59 - 255.702 5.086 - 5.484 161.671 - 240.785
object log	 0.106	 0.916	213.08 5.289 **198.110**	151.276 - 274.884 5.014 - 5.564 150.467 - 260.855

In table (3.19) the max*f0* of the word stressed syllable of the subject is calculated in R for the all-new condition as the intercept and the object focus condition. Both are indicated in Hz and semi-tones as in all preceding statistical analyses. Furthermore, confidence intervals are outlined. In the object focus condition the max*f0* on the subject is not even 1 Hz higher than in the all-new condition, corresponding to the mean value calculation in the phonetic analyses above. This corresponds to a t-value of 0,106 and a p-value of 0,916 for the semi-tone analyses.

From this data set analysis no significant difference with respect to the *f0* implementation on a subject in the all-new condition and the *f0* implementation by means of pitch increase on a subject in an object focus condition can be found.

To summarize the analyses of pre-focal boundary insertion, the measurements of the max*f0* values on the pre-focal constituents in comparison to the same constituents in the all-new condition show no significant difference in the data set. The difference in pitch height is statistically not significant for the object in verb focus and neither for the subject in object focus for the speakers of the present study. The results of Ipek's analysis are not repeated in that aspect. Speakers of the experiment do not use a higher mean max*f0* on immediately pre-focal constituents. However, with respect to that the mean values of the phonetic analyses outlined in tables in (3.16) and (3.18) show no uniformity across speaker. Variation is observed across speakers and also across the focus conditions with respect to the *f0* events corresponding to boundary indication.

III.4.3.4 PHONETIC DISAMBIGUATION OF VERB FOCUS AND ALL-NEW YES/NO QUESTIONS

A further phonetic analysis is conducted with respect to the disambiguation of verb focus and the all-new condition. The phonological analyses of all-new yes/no questions and verb focused questions reveal the same phonological pattern. Pitch accents are assigned to the verb in both conditions. To this reason both conditions are tested with respect to a possible difference in their phonetic realization on the respective constituent. It was stated in the expectation section that a higher pitch value on the verb in verb focus then in the all-new condition, would be analyzed as an indicator of different phonological phrasing. When focused the verb would be phrased separately from the preceding argument and disovle the ambiguity.

The mean max*f0* on word stressed syllables of verbs in a focused condition are compared to the mean max*f0* on verbs in the all-new condition. All values of the corresponding constituents are extracted for each speaker and afterwards the mean max*f0* values for each constituent are calculated on the base of the five different target sentences for each condition for each speaker. The results with respect to pitch increase on the verb as a possible phonetic contrast for the phonologic ambiguity of all-new and verb focus are outlined in table (3.20) for each speaker.

Table (3.20): Mean max *f0* values on the word stressed syllable of the verb in all-new and verb focus

speaker	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**all**
verb mean max *f0* in Hz all-new	159	177	178	250	222	113	99	123	250	115	155	**167**
verb mean max *f0* in Hz verbF	167	178	220	233	230	114	98	130	336	112	154	**179**
difference	**8**	**1**	**42**	**-17**	**8**	**1**	**1**	**7**	**86**	**-3**	**-1**	**12**

As in the preceding tables, the first data row indicates the mean max*f0* values on the verb for all speakers in the all-new condition, the second data row indicates the mean max*f0* values on the same constituent in verb focus, and the third row indicates the difference between the both conditions. In table (3.20) again speaker dependent variation is observed in the realization of the actual pitch value on the word stressed syllable of the verb in all-new and verb focus. Whereas speakers 1, 2, 3, 5, 6, 7, 8, and 9 on average use a higher *f0* in the verb focus condition, speakers 4, 10 and 11 use a lower pitch value. Speakers 2, 6, 7 10, and 11 use a difference in max*f0* in both conditions which ranges from 1 Hz to -3 Hz which is out of the range of perceptibility. For the speakers which use a higher *f0* in the verb focus condition the values range from 7 Hz to 86 Hz. Speaker 4 uses a lower *f0* of 17 Hz in the verb focus condition. The mean *f0* values across all speakers reveal that speakers on average use a higher pitch of 12 Hz on the verb in the focus condition. Nonetheless, the speaker dependent variation shows no clear picture with respect to pitch increase in verb focus for the monolingual speakers. The additional statistical analysis furthermore confirms that the difference in pitch is not significant for the monolingual speakers of the data set.

As for the previous analyses of pre-focal compression, post-focal de-accentuation, and pre-focal boundary insertion a statistical analysis including all measure points of the max*f0* of all sentences and all speakers is conducted by means of a linear mixed model analysis. The linear mixed model is fit to compare the max*f0* values of the verb in the verb focus condition with the values of the same constituent in the all-new baseline. The max*f0* of the stressed syllable is the dependent variable, the focus condition is the fixed factor and speaker is the random factor. In table (3.21) the results of the linear mixed model analysis for pitch increase on the verb in verb focus is summarized.

Table (3.21): LMMA-results for pitch increase on the verb in verb focus

verb	t	p	maxf0 (Hz/st)	confidence intervals (Hz/st)
default log			171.778 5.094 → **163.099**	140.169 - 203.386 4.9 - 5.289 → 134.306 - 198.065
verb log	 1.394	 0.165	178.385 5.121 → **167.567**	139.420 - 217.35 4.889 - 5.354 → 132.841 - 211.37

In table (3.21) the max*f0* of the word stressed syllable of the verb is calculated in R for the all-new condition as the intercept and the verb focus condition. It is 163,099 Hz in the all-new baseline and 167,567 Hz in verb focus resulting in a t-value of 1,394 and a p-value of 0,168 for the semi-tone analysis. From this data set analysis no significant difference with respect to the *f0* implementation on verbs in the all-new condition and the *f0* implementation on verbs in a verb focus condition can be found.

For the sake of congruency the statistical analysis for the differences in the max*f0* on subjects and objects in the all-new and focus conditions is also conducted. Since the calculations are not relevant for the core part of expectations of the analysis in this study, they are only summarized with respect to the statistical results. The results of the phonetic analyses of mean max*f0* values as outlined for the preceding calculations on verb focus are not indicated here.

Corresponding to a visual analyses of the time-normalized *f0* graphs included in the preceding phonological analyses outlined in figure (3.8), no pitch increase is observed on focused constituents in subject and object focus in the phonetic analyses based on max*f0* mean values. This observation is confirmed by the statistical analyses for the data set including all max*f0* measure points on the focused constituents in both focus conditions and the all-new baseline. As for the preceding analyses, linear mixed model analyses are fit with the max*f0* of the stressed syllable as the dependent variable, the focus condition as the fixed factor and speaker as the random factor. In table (3.22) the results of the linear mixed model analyses for pitch increase on the subject in subject focus is summarized.

Table (3.22): LMMA-results for pitch increase on the subject in subject focus

subject	t	p	max*f0* (Hz/st)	confidence intervals (Hz/st)
default log			212.6458 5.285 → **197.302**	169.59 - 255.702 5.086 - 5.484 → 161.671 - 240.785
subject log	 -0.089	 0.929	209.899 5.281 → **196.619**	147.992 - 271.803 5.006 - 5.557 → 149.274- 258.982

In table (3.22) the max*f0* of the word stressed syllable of the subject is calculated in R for the all-new condition as the intercept and the subject focus condition. Confidence intervals are also indicated for both conditions. The max*f0* on the subject in the object focus condition is 197,302 Hz. In the object focus condition the max*f0* on the subject is 1 Hz lower than in the all-new condition. This corresponds to an absolute t-value of 0,089 and a p-value of 0,929 for the semi tone analyses. From this data set analyses no significant difference with respect to the *f0* implementation on a subject in the all-new condition and the *f0* implementation on a subject in the subject focus condition can be found.

The same analysis is conducted for the object focus condition. In table (3.23) the results of the linear mixed model analyses for pitch increase on the object in object focus is summarized.

Table (3.23): LMMA-results for pitch increase on the object in object focus

object	t	p	maxf0 (Hz/st)	confidence intervals (Hz/st)
default log			199.006 5.221 → **185.104**	155.06 - 242.952 5.003 - 5.439 → 148.821 - 230.232
object log	-0.132	0.895	196.938 5.217 → **184.467**	140.844 - 253.031 4.948 - 5.487 → 140.888 - 241.527

In table (3.23) the max*f0* of the word stressed syllable of the object is calculated in R for the all-new condition as the intercept and the object focus condition. Also the confidence intervals are indicated for both conditions. The max*f0* on the object in the focus condition outlined in the third column of the second data row is 184,467 Hz. The max*f0* on the object in the all-new condition is 185,104 Hz. The difference between both realizations is not significant for the present data set. The difference corresponds to an absolute t-value of 0,132 and a p-value of 0,895 for the semi-tone analysis.

From this data set analysis no significant difference with respect to the *f0* implementation on objects in the all-new condition and the *f0* implementation on objects in the object focus condition can be found.

To summarize the results of the max*f0* analyses on focused constituents, they show no significant pitch increase in comparison to the max*f0* in the all-new baseline. To this effect, pitch increase is neither observed in the phonological ambiguous contour of all-new sentences and verb focus sentences, nor on subjects in subject focus and objects in object focus.

III.5 DISCUSSION

In the preceding section a complex analysis of different phonological and phonetic features of monolingual Turkish yes/no questions with modified foci was conducted and amplified by statistical analyses. The purpose of the analyses was primarily to provide a monolingual baseline for the subsequent analyses of bilingual Turkish data, and secondly to provide a sound experimental study on the prosodic correlates of IS and sentence type marking in Turkish.

The 220 target sentences were analyzed with respect to their tonal distribution; i.e. the distribution of pitch accents, PPh-final phrase tones and IP final phrase tones. The tonal distribution was compared for all-new sentences and three different focus conditions; subject, object, and verb focus in order to test modifications with respect to IS. The character of the IP-final boundary tone was tested as a potential correlate of sentence type in Turkish yes/no questions. Furthermore, all sentences were analyzed with respect to the max*f0* values on word stressed syllables on different constituents in order to test if (i) Turkish uses de-accentuation of post-focal constituents for the sake of focus prominence, (ii) if it inserts pre-focal boundary tones to align focused constituents to prosodic boundaries, (iii) if it uses higher pitch accents on focused constituents in order to disambiguate between two focus conditions, and (iv) if it uses pre-focal compression to mark sentence type as claimed by previous studies. Due to the complex analyses each feature is discussed separately.

III. 5.1 GENERAL TONAL DISTRIBUTION AND DISTRIBUTION ACCORDING TO FOCUS

The results of the general analysis of tonal distribution in Turkish yes/no questions reveals that speakers use two pitch accents, a rising pitch accent (H*) on pre-nuclear constituents and a rising-falling pitch accent (H*L) on nuclear constituents. Moreover, a PPh-final phrase boundary tone (H-) is used at the end of a pre-focal NP, corresponding to the observations of Kan (2009) and İpek & Jun (2013, 2014). A low IP-final boundary tone (L%) is systematically implemented on the final syllable of yes/no questions, independent of the position of the Q-particle and independent of the character of the preceding syllable, opposing the observations made in Kawaguchi et al (2006).
As for the all-new condition, the analyses of the distribution of pitch accents and non-final phrase boundary tones revealed that Turkish yes/no questions are generally realized with the following tonal pattern: In yes/no questions with a simple SOV structure, subjects are realized with a high PPh-final phrase boundary tone (H-) on the final word stressed syllable. The following object is realized with a high pitch accent on the word stressed syllable which is final in the data set (H*). The verb is realized with a high-falling pitch accent on the word stressed syllable (H*L). The nuclear tone of the bi-tonal pitch accent is realized on the penultimate syllable of the word followed by the falling trailing tone on the final syllable spreading until the adjacent Q-particle which is realized with a low final boundary tone (L%). By this means the prosodic phrasing pattern in Turkish all-new yes/no questions corresponds to the observations made in Turkish declaratives. Two prosodic phrases are formed upon two syntactic phrases. However, the observation of pitch accents on verbs in all-new sentences is not documented in descriptions of default intonation contours for declaratives. As outlined in chapter II, Kamali (2011) and also Kan (2009) mention that sentence stress in Turkish declaratives is realized on the immediately pre-verbal constituent, which corresponds to the object in sentences with a SOV structure. All following constituents constitute the post-focal area and are de-accented including the verb in default sentence intonation. However, some exceptions to this

observation are documented for declaratives as well, such as negation, where the negation particle is aligned to the verb, just like the question particle in default yes/no questions.

In (3.6) the general tonal pattern observed for Turkish yes/no questions in the present data set is summarized. Pitch accents are realized on word stressed syllables. PPh- and IP-final boundary tones are positional bound and realized on PPh-final syllables.

(3.6): **Tonal pattern of all-new yes/no questions**

S	O	V	FBT
$((H-)_{PPh}$	(H*	$H^{*}L)_{PPh}$	$L\%)_{IP}$

A modification of the default tonal pattern demonstrated in (3.6) was observed with subject and object focus. The tonal structure is modified by tonal deletion. In verb focus on the other side, the tonal pattern remains the same as in the default question.

In subject focus yes/no questions only the high tone on the final syllable of the subject is implemented. All following tones are deleted until the final boundary indicated by (L%). In contrast to the all-new condition, the high tone on the subject does not correspond to a high PPh-final phrase boundary tone, but a high-falling pitch accent (H*L). In subject focus, the subject does not form a pre-focal phrase, but the focused and final phonological phrase of the sentence. Hence the high tone on the final word stressed syllable of the subject does not represent a tonal unit indicating the post-lexical meaning of a PPh-final boundary. Prosodic phrasing changes the way that only one PPh is realized corresponding to the IP. To this effect the pitch accent on the subject becomes the head of the rightmost prosodic phrase. The tonal contour observed for the subject focused yes/no questions in the analyzed data set is summarized in (3.7).

(3.7) **Tonal contour of subject focus yes/no question:**

S	O	V	FBT
(H*L			$L\%)_{IP}$

In object focus also a modification of the tonal distribution in contrast to the all-new condition was observed in the phonological analysis. As in the all-new condition a high phrase boundary tone (H-) on the subject is implemented representing a PPh-final boundary tone. The (H-) on the subject is followed by a rising-falling pitch accent (H*L) on the word stressed syllables of the objects. In contrast to the all-new condition, the pitch accent on the word stressed syllable of the verb is not implemented in the object focus condition. After the last pitch accent on the object, the tonal contour remains falling until the final low boundary tone (L%). In contrast to the subject focus condition the same phrasing structure is maintained, however the verb is de-accented in contrast to the all-new condition. The tonal contour observed for object focused yes/no questions in the present data set of monolingual Turkish yes/no questions is summarized in (3.8).

(3.8) **Tonal contour of object focus yes/no questions:**

S	**O**	**V**		**FBT**
((H-)$_{PPh}$	(H*L		)$_{PPh}$	L%)$_{IP}$

The analyses of the 55 sentences in the verb focus condition reveals that the same tonal pattern is implemented as in the all-new condition. Subjects are realized with a high PPh-final phrase boundary tone (H-) on the final word stressed syllable. Objects are realized with a high pitch accent on the word stressed syllable (H*). The verb is realized with a rising-falling pitch accent on the word stressed syllable (H*L) whereby the nuclear tone is realized on the penultimate syllable of the word followed by the falling trailing tone on the final syllable and the adjacent Q-particle until the final low boundary tone (L%). With that, verb focus represents an ambiguous tonal structure to the all-new condition. In (3.9) the tonal pattern observed for Turkish yes/no questions in the verb focus condition of the present data set is summarized.

(3.9) **Tonal contour in verb focus yes/no questions**

S	**O**	**V**	**FBT**
((H-)$_{PPh}$	(H*	H*L)$_{PPh}$	L%)$_{IP}$

The tonal patterns outlined in (3.6) to (3.9) reveal a clear contrast between different contrastive in-situ focus conditions. What stands out in the phonological analyses is the deletion of post-focal tones. In subject and object focus all post-focal constituents are systematically de-accented; i.e. objects and verbs in subject focus and verbs in object focus. Only speaker 4 does not de-accent at all in subject focus and speaker 7 does not de-accent objects in subject focus but de-accents the verbs. It is possible that those speakers were confused about the focus condition represented on the screen and did not understand the task well. However, this was not the impression of the interviewer. The unsystematic and differing modification of subject focus yes/no questions by speakers 4 and 7 can also be interpreted as a consequence of the optionality of prosodic features in IS marking in Turkish as stated out in Kühn (2013, 2014) for declaratives.

In Kühn (2013, 2014) no changes in the intonation contour under modified focus conditions was observed at all for 7 monolingual Turkish speakers in a similar experimental set up as in the present study. Two speakers on the other side used a systematic modification of the *f0* contour according to the modification of focus basically by means of post-focal de-accentuation. This preceding study has helped to evolve the basis for a classification of the prosodic expression of IS in Turkish, however it was based on a typological classification of the Turkish intonation system as a phrase language, following Güneș (2013a,b) approach. At this point of research I argued for a classification of Turkish as a phrase language considering all implemented tones exclusively as phrase tones, assuming that each PW was aligned with a high phrase tone. However, the existence of pitch accents in Turkish cannot be ignored and is also documented in the results of the present experiment 1. Turkish cannot be classified as a phrase language in the sense of Féry's (2010) classification criteria for this language type, since Turkish uses pitch accents which are aligned to word stressed syllables in addition to phrase boundary tones which are aligned to phrase-final syllables independent of the word stress status of the syllable. Given the different theoretical background, I assumed for the studies with declaratives that by means of phrase boundary deletion, adjacent given elements were phrased together and separated from the focused phrase. While phrasing still seems to be crucially involved into prosodic IS marking, the deletion of post-focal pitch accents is also important and has to be included into a description of prosodic focus marking in Turkish.

III.5.2POST-FOCAL DE-ACCENTUATION

The observations with respect to *f0* modifications according to focus revealed in the analyses of tonal distribution in different in-situ focused yes/no questions, showed that tonal deletion by means of post-focal de-accentuation is systematic for subject and object focus among all speakers of experiment 1. The results of the phonological analyses of post-focal de-accentuation were also confirmed by phonetic measurements. The maximum *f0* on post-focal constituents were measured and compared to the maximum *f0* of their counterparts in the all-new condition. The results showed that the maximum *f0* on post-focal objects and verbs in subject focus is significantly lower than in the all-new condition in the present data set. Objects in subject focus are significantly lower in pitch than objects in the all-new condition: $t= -10.171/\ p<0.001$. Verbs in subject focus are also significantly lower in pitch than in the all-new condition: $t= -12.605/\ p<0.001$. Also the maximum *f0* on post-focal verbs in object focus is significantly lower than the maximum *f0* on verbs in an all-new condition: t= -13.747/ p<0.001).

To this effect, the results of the analyses show a significant correlation between post-focal de-accentuation and focus condition. Post-focal constituents are systematically de-accented in the sentences of the present experiment with monolingual speakers. The focused constituent is the last constituent which is indicated by a pitch in an IP. To this effect, the focused constituent is always the rightmost syntactic constituent with prosodic correlates by means of pitch movement on the sentence level. Due to post-focal de-accentuation, the focused constituent becomes the most prominent constituent within its own PPh and the whole IP causing a restructuring of prosodic phrasing.

In subject focus the last constituent where a pitch accent is realized is represented by the subject. It represents the rightmost constituent of the whole IP with prosodic prominence since all further pitches, including pitch accents and PPh-final boundary tones, are deleted. The subject becomes the head of one prosodic phrase containing all remaining de-accented constituents in contrast to the all-new condition where the subject is aligned with a PPh-final boundary tone followed by a second PPh including the object and the verb which are both realized with pitch accents on their words stressed syllables.

In object focus the last constituent where a pitch accent is realized is the object. In contrast to what was expected, based on previous studies, no pre-focal boundary tone is inserted to mark the object as focused nor pitch increases on the constituent when it is focused. However, a difference to all-new contours is found. In contrast to all-new sentences and verb focus sentences the verb is de-accented in object focus. Hence, also in object focus the last constituent of a phrase (PPh and IP) where *f0* movement was observed, corresponds to the focused constituent, in this case the object.

In verb focus and all-new sentences the tonal structure is ambiguous and the prosodic phrasing structure repeats the syntactic structure. In both conditions the subject is aligned with a high PPh-final boundary tone (H-), the object with a high pitch accent (H*) and the verb with a pitch accent (H*L) and a final boundary tone (L%) due to a lack of post-focal constituents no pitches are deleted in the verb focus condition.

The observations for the different focus constituents reveal that the focused constituent becomes the most prominent constituent of the whole IP by means of post-focal deletion. Post-focal deletion furthermore causes a restructuring of prosodic phrasing in subject focus and aligns the head of the IP to the rightmost prosodic boundary in all conditions.

On the base of observations on previous acoustic studies on focus marking in Turkish and general focus typology it was also expected that focus in Turkish is not only marked by the deletion of post-focal tonal material but also by the insertion of pre-focal boundary tones in order to align focused constituents to prosodic boundaries.

İpek & Jun (2013) assume that focused items are indicated by a nuclear tone (H*n, LHn) to the left of a focused word; i.e. on the last syllable of the immediately pre-focal constituent. İpek (2011) also already observes a significant immediately pre-focal rise on objects preceding a focused verb in declaratives with a simple SOV structure. This structure is comparable to the structure of the yes/no questions of the present data set containing an additional question marker. The analysis was not only conducted for objects in the immediately pre-focal position, but also for subjects in object focus which also occupy an immediately pre-focal position in the present data set.

Based on Xu (2004) and Liu & Xu (2005) who claim that the parallel encoding of different functional related prosodic cues is reflected in a change in *f0*, it was expected that in cases of pre-focal boundary tone insertion the maximum *f0* values on the stressed syllables should be higher than in the non-focused case. The argumentation was fortified by the acoustic analysis of İpek & Jun (2014) who examine that pitch on subjects in the NP final position indicating a phrase boundary in Turkish are higher than pitch accents on subjects in a non-IP-final position.

The results of the complex phonological and phonetic analyses of Turkish yes/no questions however show no significant increase in pitch on the syllable immediately preceding a focused constituent. A visual inspection of the time-normalized *f0* contours averaged across all speakers for all focus conditions does not reveal a boost in pitch on the object when the verb is focused and no boost in pitch on the subject when the object is focused. The observation of pitch increase on pre-nuclear syllables found in İpek's (2011) study with Turkish declarative sentences is not repeated here for yes/no questions. Additionally, the assumption of nuclear boundary tones in the AM-model of İpek & Jun (2013) does not provide phonetic evidence for a nuclear boundary tone insertion by means of *f0* increase.

Nonetheless, the results of experiment 1 also revealed some speaker dependent variation with respect to pitch increase on the immediately pre-focal syllable. For verb focus the mean maximum *f0* values on the immediately preceding constituent (object) are indeed higher than in the all-new condition for four speakers (2, 5, 6, 8). All other speakers do not increase pitch on the immediately pre-focal constituent in verb focus. Additionally, six speakers produce the highest pitch of the utterance on the object when the verb is focused (2, 4, 5, 6, 10, 11).

For object focus, pitch increases also on the subject for four speakers (2, 5, 7, 10) when compared to the all-new baseline. The remaining speakers do not increase pitch on the constituent immediately preceding the focused constituent.

However, the *f0* values in both focus conditions do not indicate a constant increase as expected for the simultaneous implementation of several pitch related functions that are associated with the same syllable. The results of the measurements show that only for speakers 2 and 5 a constant higher *f0* on the constituent preceding the focus is observed for both focus conditions. The constant pitch increase of the two speakers however, cannot be interpreted as a prosodic expression of the insertion of a pre-focal boundary tone in order to align the focused word to a prosodic boundary. The variation in the pitch values of the remaining speakers instead, gives rise to the assumption that the height of the pitch preceding the focused constituent has no functional meaning on the IS level. This corresponds to Kan's (2009) observation that downstep in Turkish may be present or may not be present. However, it remains without a semantic impact.

According to the literature it was initially expected that the ambiguity in prosodic phrasing between verb focus and the object focus condition is resolved by the insertion of a pre-focal boundary tone causing a restructuring of prosodic phrasing. This strategy was explicitly expected in order to separate the verb from its argument by means of prosodic phrasing. It was expected that in verb focus, the prosodic phrasing does not correspond to the general syntactic mapping which phrases the argument and the verb together in a VP. The results of the phonologic analyses revealed that the ambiguity is resolved by post-focal de-accentuation in object focus. Whereas the verb in verb focus receives a pitch accent it is de-accented in object focus. However, ambiguity was observed for verb focus and the all-new condition by means of the phonologic analyses. Both conditions share the same phonological structure by means of pitch accent assignment and prosodic phrasing in the SOV yes/no questions of experiment 1. However, the insertion of a pre-focal boundary tone in verb focus which would align the focused constituent to a left phrase boundary realized on the final syllable of the preceding object was not observed neither. No phrasing difference by means of pre-focal boundary tone insertion where found in the data. To this effect, a change in meaning is not indicated by a change in the prosodic structure as in the other focus conditions. A modification is only obvious on the semantic level by a change in the scope of focus which consequently requires indication by the preceding context. In contrast to verb focus where the verb is in the scope of focus indicated by the adjacent question particle, the scope of all-new sentences includes the whole IP. In verb focus, the focused constituent is right aligned, since it is the last constituent where accents are realized corresponding to the previously described focus conditions. In all-new the focus sensitive question particle is structurally also adjacent to the verb, but semantically it does not align to a specific constituent and sets scope over the whole utterance.

The results of the visual and the mean maximum *f0* analysis of the immediately pre-focal syllables were also confirmed by additional statistical analyses based on all max*f0* measure points. Thus, no significant difference was found in the present sample for the maximum *f0* values on the word stressed syllables of subjects in the object focus condition when compared to the all-new condition (t= 0.106/ p=0.916). Furthermore no significant difference between the maximum *f0* values on objects in the immediately pre-focal position and objects in the all-new condition were found in the sample (t= -0.223/ p=0.824).

Accordingly, focus marking by means of pre-focal boundary insertion as demonstrated for other languages is not used in Turkish as a prosodic strategy of focus marking. There is no solid evidence that boundaries increase or are inserted on immediately pre-focal constituents. To this effect the results of the statistical analysis additionally do not confirm İpek & Jun's (2013) intro-perspective somehow controvert perception that the supposed left aligned nuclear boundary tone is realized with a lowering of the acoustic correlates when compared to an NP-final boundary tone. This lowering is not confirmed by the results of the maximum *f0* analysis on subjects and objects in the immediately pre-focal position when compared to an all-new condition. The values are neither significantly lower nor higher.

However, even in the absence of pre-focal boundary insertion, the phonologic and phonetic data analyses reveal that prosodic boundary alignment is involved in the prosodic marking of IS in Turkish. Not via boundary tone insertion to the left of a focused constituent, but by means of the deletion of pitch on post-focal constituents up to the IP final boundary.

III.5.4PITCH INCREASE

In addition to the analyses of pre-focal boundary insertion in order to mark focus and dissolve phonological ambiguities also pitch increase on focused constituents was analyzed as a possible prosodic cue to dissolve ambiguities. The results confirmed the previous observations that pitch increase is not used in Turkish to mark focus prosodically nor is it used to dissolve phonologic ambiguous structures in prominence marking. Pitch increase was not observed on focused constituents when compared to the same constituent in the all-new baseline condition, not even to dissolve the ambiguous phonological structure of verb focus and all-new sentences. Since the same tonal structure was observed for both conditions, the maximum *f0* of the word stressed syllable of the verb in both conditions was measured in order to test if pitch increase is used as a prosodic cue in Turkish in order to dissolve the ambiguity in the tonal structure by phonetic means. The measurements were also motivated by the initial expectation that both conditions differ with respect to pitch accent assignment on the verbs. The intonation structure reported for all-new declaratives in the literature showed that no pitch accents are assigned to verbs in simple SOV sentences. According to the phonetic measurements realized in İpek (2011) a pitch accent on a verb in verb focus on the other side was expectable. This should have an impact on the *f0* on the word stressed syllables of the verb in a comparison of both conditions. However, the phonological analysis revealed that in SOV contrastively in-situ focused yes/no questions pitch accents are assigned to verbs in verb focus sentences and also in all-new sentences. To this effect the initial motivation was obsolete. However, the discovered ambiguity motivated the conduction of the phonetic measurements for other reasons. Different degrees of stress to disentangle ambiguous intonation contours was already proposed by Özge & Bozşhain (2010) and the highest peak of the IP was also claimed by Göksel et al (2009).

The analyses of maximum *f0* values on focused verbs in verb focus in comparison to the maximum *f0* values on verbs in an all-new condition revealed no significant difference (t= 1.761/ p= 0.165). For the sake of congruency, the same analyses was done for focused subjects (t= -0.089 0.775/ p= 0.929) and objects (t=-0.132/ p= 0.895) in comparison to the all-new baseline which also revealed no statistically relevant difference for in-situ focus pitch increase in the corresponding focus conditions. To this effect, the results of experiment 1 repeat the results for a lack of on-focus pitch increase in Turkish declaratives revealed by Ípek (2011). Focused constituents are not indicated by pitch increase in Turkish yes/no questions.

Furthermore, ambiguous structures in all-new and verb focus are common across languages and not resolved by phonetic means by *f0* increase in Turkish yes/no questions neither. Although the phonologic ambiguity between all-new and verb focus is not resolved by *f0* increase, it cannot be excluded that other phonetic cues, such as intensity and duration are involved in the marking of pitch accents related to higher perceived prominence on focused constituents. The data of the present study are exclusively tested with respect to *f0*.

III.5.5PROMINENCE ALIGNMENT IN TURKISH

In contrast to previous studies, the data analyses were not motivated by assuming a correlation of focus marking and pitch increase a priori. Instead, prominence increase of focused constituents, was investigated considering prominence increase as resulting from prosodic boundary alignment. Despite not using pitch increase and the insertion of pre-focal boundaries to mark a constituent as focused, the results of experiment 1 still reveal that Turkish has a prosodic correlate of IS, namely post-focal de-accentuation. The focused constituents of experiment 1 become prominent by aligning them to the rightmost prosodic boundary via tonal deletion after focus. Focused constituents can be aligned in-situ, i.e. without necessarily moving them into a prominent position. Focused constituents become prosodically prominent solely via the deletion of all following prominence indicating tonal *f0* movement. More concrete, pitch accents and PPh-final phrase boundary tones are deleted post-focally in order to align a focused constituent to the rightmost prosodic phrase boundary. On the base of the de-accentuation pattern observed in the data of this study, the following modification of the prosodic pattern in contrastive in-situ focused Turkish yes/no questions in relation to the prosodic marking of IS can be summarized:

(3.10): Prosodic phrasing and tonal structure of in-situ focused SOV yes/no questions

All-new:	$((S^{H-})_{PPh}\ (O^{H*}V^{H*L})_{PPh})_{\mathbf{F}/IP}$
Verb focus:	$((S^{H-})_{PPh}\ (O^{H*}V^{H*L}{}_{\mathbf{F}})_{PPh})_{IP}$
Object focus:	$((S^{H-})_{PPh}\ (O^{H*L}{}_{\mathbf{F}}V)_{PPh})_{IP}$
Subject focus phrasing:	$(S^{H*L}{}_{\mathbf{F}}OV)_{IP}$

In all-new and subject focus each of the three constituents of the SOV yes/no questions is realized with a pitch accent or a PPh-final boundary tone. In object in-situ focus on the other side the pitch accent on the verb is deleted. In subject focus the pitch accents on objects and verbs are deleted changing the phrasing structure. Whereas in the all-new condition the phonological phrases coincide with the syntactic phrase (NP and VP), in the subject focus condition only one IP is formed upon both syntactic phrases. The PPh-final boundary tone on the subject in the all-new condition is deleted and the subject is the only and last constituent realized with pitch movement. To this effect it becomes the most prominent constituent of the utterance. Not by pitch increase but by prosodic alignment.

Due to the observation of a lack of pitch increase on focused constituents and the lack of insertion of pre-focal boundary insertion, post-focal de-accentuation is the only indicator of prominence in Turkish. To this effect, the understanding of post-focal de-accentuation in Turkish differs from the concept of post-focal de-accentuation in other languages. As described in chapter 1, post-focal de-accentuation is a common prosodic cue to mark givenness in languages that use intonation and especially in languages that use intonation in relation to IS, such as German. In Zerbian (2015) e.g. it is stated that post-focal de-accentuation in German is used as a prosodic cue to mark givenness. Focus on the other side is most typically indicated by an increase in pitch on the respective constituent (cf. Féry & Kügler 2008).[42] However, the prosodic correlate of pitch increase is not

[42] The marking of focus and givenness by prosodic means in German will be explored in more detail in chapter V to provide a base for the prosodic focus marking in bilingual German-Turkish investigated in Experiment 2 of the present study.

present in Turkish. This observation was outlined in the study of Ípek (2011) and is confirmed by the phonetic measurements of the present study as well. The absence of pitch increase to mark focus in Turkish, automatically relates post-focal de-accentuation not only to givenness but also to a marking of focus. By means of post-focal de-accentuation, the focused constituent is aligned to the rightmost prosodic boundary and becomes the most prominent constituent of the IP. To this effect, focus is marked as prominent even in the absence of on-focus pitch modification, corresponding to the cross-linguistic observations of phrasing and IS marking outlined in Truckenbrodt (1995) and Büring (2010).

The results of experiment 1 indicate that the focused constituent always is the rightmost constituent of an utterance which is realized with *f0* movement as an indicator of prominence. It was stated in Chomsky & Halle (1968) already, that rightmost constituents are perceived as most prominent on a prosodic level and even in the absence of acoustically higher prominence than preceding constituents (Pierrehumbert 1980). To this effect, post-focal de-accentuation is a tool to mark prominence and givenness in Turkish, in contrast to German where pitch increase marks prominence and an additional post-focal de-accentuation is basically interpreted as a prosodic correlate to mark given constituents. In Turkish on the other side, de-accentuation correlates with both sematic concepts.

An alternative explanation for the observed pattern can be centered around Kan`s general assumptions on Turkish phonology as outlined in subchapter II . Following Kan (2009), Turkish has two levels of phrasing the phonological phrase (PPh) and the intonation phrase (IP). PPh's are determined by the assignment of pitch accents. Only the prosodic head which is the leftmost constituent of the PPh bears a pitch accent. If the formation of a PPh is based on the existence of only one pitch accent per phrase, an accent on the object in SOV's and a subsequent realization of a further pitch accent on the verb, as observed in the data for verb focus and the all-new sentences, would cause the formation of two separate PPh's. One phrase instantiating a pitch accent/phrase boundary tone on the final syllable of the object, a second one instantiating a pitch accent on the accented syllable of the verb and a final phrase boundary tone on the final syllable represented by the question particle. Hence, the phrasing structure of contrastive verb focus yes/no questions and the all-new baseline would be modified as outlined in (3.11).

(3.11) Alternative phrasing structure based on Kan`s (2009) phonology of Turkish

All-new:	$((S^{H-})_{PPh}\ (O^{H*})_{PPh}\ (V^{H*L})_{PPh}))_{\mathbf{F/IP}}$
Verb focus:	$((S^{H-})_{PPh}\ (O^{H*})_{PPh}\ (V^{H*L})_{\mathbf{F/PPh}})_{IP}$

All remaining focus conditions would be phrased as outlined in (3.10) above. However, the phonetic analysis of this study reveals no phonetic evidence for a separate phrasing in all-new and object focus, assuming that phrase boundaries have a higher phonetic reality by means of *f0* than pitch accents as observed by İpek & Jun (2014). Assuming that tonal values related to different functions add up when implemented on the same syllable (cf. Xu 2004), the implementation of a pitch accent in addition to a phrase boundary tone should be realized via pitch increase of the maximum *f0* in all-new and verb focus in comparison to object focus where only a pitch accent is implemented. However, this difference is not found in the present data and the phonetic measurements give no reason to assume a phrase boundary which would indicate focus. The analyses of the maximum *f0* show that the maximum *f0* on the word stressed syllable shows no significant difference in any of the focus condition with the exception of post-focal de-accentuation. To this effect, no increase or decrease of the maximum *f0* on the object in object focus in comparison to the all-new and verb focus condition was observed which could indicate a prosodic boundary and separate phrasing. Though I base my own data analyses in great aspects on Kan´s (2009) model of intonational phonology for Turkish, examples from other studies such as İpek & Jun (2013), who base their assumptions also on a database analyses, give good reasons to assume that phonological phrases containing more than one pitch accent can exist in Turkish. This observation is confirmed by the results of the phonetic measurements in experiment 1.

According to these observations, at this point I do not consider it necessary to assume separate phrasing, but that several pitch accents can form one PPh in Turkish as presented above. Still, the data analyses are only realized with respect to *f0*. It has been shown for other languages that the introduction of prosodic breaks is also a prosodic cue which can refer to phrase boundaries. In Korean and Japanese e.g. a break is introduced after the Wh-word in yes/no questions, but not after the wh-word in wh-questions (e.g. Maekawa 1991; Jun & Oh 1996). Furthermore, prosodic domains can be defined by domain final lengthening, like in French as shown by Jun & Fougeron (2000). However, the preliminary auditive analyses conducted here gave no hints to assume the introduction of prosodic breaks or final lengthening on objects in all-new and verb focus which would indicate a separate phrasing of the object and the verb in both conditions. Though, concrete measurements should be conducted in order to verify the auditive impression.

The contrasting results and theories show that focus realization in Turkish needs to be investigated further. On the basis of my SOV data I assume that right alignment by means of post-focal de-accentuation will also be used in syntactically more complex sentences. Even in a more developed structure such as modified noun phrases, I suppose that the prosodic alignment would be the same as observed in my SOV data. In İpek and Jun (2013) it is shown that in modified noun phrases consisting of an adjective and its noun, a pitch accent is instantiated on both constituents forming a single phonological phrase.[43] Based on this observation and the modification of the intonation contour by means of post-focal de-accentuation the following pattern for subject focus can be assumed in a more complex syntactical structure (3.12):

(3.12)

Syntactic-based phrasing	$((\text{Adj} \quad \text{S} \quad \text{Q})_{PPh} \; (\; \text{O} \quad \text{V} \quad)_{PPh})_{IP}$
Prosodic restructuring under focus	$(\quad \text{H*} \quad \text{H*L} \qquad\qquad)_{IP}$
	Güzel Merve mI annesini göruyor?
	(Is it beautiful Merve who sees her mother?)

Though the subject is modified in (3.12) and forms part of a syntactic NP together with its modifier, the subject is aligned with a pitch accent on the word stressed (final syllable) in addition to the pitch accent on the modifier which in Kan's (2009) notions represents the prosodic head of the first phrase, since PPh's are left headed in her model. According to what I have shown for SOV yes/no questions, the modification of the noun phrase should have no impact on prominence alignment when the subject is focused. All following constituents should be de-accented in order to align the focused constituent to the rightmost phrase boundary, just as in simple SOV yes/no questions. At this point I cannot see any need to phrase the subject and its modifier separately, other than Kan's claim that a phrase is formed upon one pitch accent only. To my understanding it is more economical and sufficient to assume the existence of various pitch accents in a PPh of which one may represent a prosodic head as shown by İpek & Jun (2013).

Despite the difference between both outlined alternatives in phrasing, both are of crucial relevance for the syntax prosody interface. I am critical about the straightforward mapping of syntactic phrases into phonological phrases as stated by Kamali (2011). The results of the observed phrasing structure of sentences in a subject focus condition do not represent the syntactic phrasing structure. In subject focus the data reveal that the two phrases derived on the syntactical level in SOV sentences are wrapped together in one prosodic phrase by tonal deletion on the level of prosodic phrasing and still build two syntactical phrases.

[43] Note that in Kan's (200) analysis only the leftmost item of the NP would receive a pitch accent, corresponding to the adjective. Otherwise, the instantiation of two pitch accents on two adjacent prosodic constituents would require the formation of separate PPh's.

III.5.6 PROSODIC CORRELATES OF SENTENCE TYPE

In addition to the prosodic correlates of IS, the yes/no questions of experiment 1 were also analyzed with respect to prosodic cues which would indicate them as yes/no questions. Two analyses were conducted respectively: the distribution of the final boundary tone and the use of pre-focal compression.

The results of the analysis of the distribution of the IP-final boundary tone show that the speakers of the experiment used a low boundary tone (L%) in 217 of the 220 yes/no questions. Only 3 sentences were realized with a high boundary tone (H%).

In the previous study of Kawaguchi et al. (2006) it was claimed that a high final boundary tone (H%) is used in Turkish yes/no questions in cases where the syllable preceding the morphological question marker –mI exhibits a low tone. Within the experimental design of experiment 1, word stress properties differed: all subjects and objects have final word stress, whereas all verbs have stress on a non-final syllable. To this effect, the question particle was either attached to a constituent with final word stress as in the case of subject and object focus or it was aligned to a constituent with penultimate word stress as in verb focus. In those cases where Q attaches to final word stressed constituents, the final word stress was realized by means of a high pitch accent realized on the nuclear syllable followed by a fall on the Q-particle. In those cases where –mI attaches to non-final word stress, namely on the verbs, the syllable preceding Q was low corresponding to the all-new and verb focus sentences of the experiment. However, this did not cause the implementation of a high tone on the Q-particle. On the syllable preceding –mI the low trailing tone of the preceding nuclear pitch accent (H*L) was realized and the IP-final boundary tone was also low (L%).

Hence, the segmental design guaranteed that the tone preceding the Q-particle was either high or low. Nonetheless, the quality of the final boundary tone was always the same. It was low in all sentences with 3 exceptions all realized by one speaker. To this effect, Kawaguchi et al.´s (2006) observation is repeated for all subject focus and object focus questions of this study. Here the syllable preceding the Q-particle corresponds to the word final syllable of the subject and the object which are realized with a bi-tonal rising falling pitch accent of which the low trailing tone is realized on the Q-particle meeting Kawaguchi et al.'s observation. Nonetheless, in all-new and verb focus sentences Kawaguchi et al.'s (2006) prediction is not met. In both conditions the Q-particle preceding syllable is associated with a low tone which within the approach of Kawaguchi et al. (2006) should generate a high final boundary tone. However, all-new and verb focus sentences are also realized with a low final boundary tone. The target sentences of the present study show no effect with respect to the quality of the syllable preceding –mI and the final boundary tone remains low in all focus conditions.

Moreover, the results with respect to the quality of the final boundary tone indicate that Turkish does not use the IP-final boundary tone as sentence type distinctive prosodic cue in yes/no questions. By this means the results of the study confirm previous observations that yes/no questions containing the morphological question marker -mI are not marked by a high final boundary tone, in contrast to wh-questions which are typically realized with a high final boundary tone (H%) in Turkish (e.g. Truckenbrodt 2013, Kawaguchi et al. 2006 amongst others).
Furthermore, the observations point to some theoretical aspects with respect to the indication of FBT's in Turkish AM-models. In the present study the final boundary is indicated by (L%) corresponding to the previous descriptions of Turkish intonation in the AM-framework of Kan (2009) who assumes a concrete IP-final fall (L%) or rise (H%), respectively. However, Kamali (2011) only assumes the implementation of a high FBT (H%). Whether (L%) indeed has a phonetic reality by means of a concrete and systematic *f0* fall on the last syllable of a yes/no questions cannot be explained by the data of the present study and will have to be verified by concrete phonetic studies. It is quite possible that the low *f0* at the end of sentences is a consequence of tonal spreading of the last implemented pitch accent similar to what has been described for German intonation (e.g. Féry 1993 vs Grabe 1998, see also chapter V of the present dissertation). However, the implementation of (L%) at the end of IP seems adequate for a phonological distinction and adequate since Turkish aligns PPh-final prosodic phrases with a high phrase boundary tone (H-). To indicate the final phrase and the whole IP as such, would be a systematic consequence to indicate finality. Since IP-finality corresponds to a higher level of phrasing than PPh-finality, I assume that (L%) overrides PPh-final (L-).
In addition to the analysis of the IP-final boundary tone, also pre-focal compression as a prosodic correlate of sentence type was analyzed. A phonologic analysis of the *f0* contour of all speakers in all focus conditions was conducted in addition to a phonetic analysis of the max*f0* on pre-focal constituents and their counterparts in the all-new condition as well as in relation to the pitch values of the following constituents within the same sentence.
Although pre-focal compression is generally documented as a correlate of focus marking (e.g. Féry & Kügler 2008 for German), Göksel et al. (2009) claim that pre-focal compression in Turkish is a correlate of sentence type as outlined in detail in chapter II. The phonologic analyses and additional phonetic analyses of the mean maximum *f0* of pre-focal constituents in experiment 1 nonetheless, do not repeat this previous observation. The phonetic analyses of the mean maximum *f0* of all speakers reveal that speakers do not use a lower pitch on pre-focal subjects in object focus (t= 0.106 /p=0.916) and they do not use a lower pitch on the subjects (t=-1.243/ p=0.216) and the objects (t=-0.223/ p=0.824) in a verb focus condition.
In contrast to Göksel et al.'s (2009) and İmer & Çelebi's (2006) claim, the focused constituent is not associated with the highest pitch of the utterance. In object focus instead, for the majority of the

speakers a natural declination pattern is observed, i.e. the maximum *f0* values decrease from one constituent to the next. On average the subject is aligned with the highest pitch value in all object focus sentences, followed by a lower pitch on the focused object and de-accentuation on the verb. To this effect, the highest pitch value in in-situ object focused yes/no questions does not correlate with the constituent where the question particle is attached but with the sentence initial constituent. In verb focus the same pattern arises. The focused verb does not correspond to the constituent with the highest pitch of the whole yes/no question. However, speakers show more variation with respect to the constituent with the highest *f0* in verb focus than in the other focus conditions and the all-new baseline. In verb focus only three speakers implement the highest pitch on the subject, six speakers implement the highest pitch on the object, and two speakers associate the highest pitch with the verb.

Hence, the sentence position of a constituent is a strong indicator of pitch values by means of predictable declination pattern in all-new sentences and object focus sentences, but not in verb focus. In fact the data analyses reveal that the Q-particle position is a more reliable predictor for post-focal de-accentuation. After the constituent where the Q-particle attaches to, no further tones are implemented. Furthermore, the position of the question particle has no impact on the *f0* value of the focused constituent, since no systematic rise is observed. This result can be seen in relation with Kan's (2009) observation that downstep is not a correlate of IS in Turkish declaratives.

However, a speaker by speaker analysis reveals that Göksel et al's (2009) observation of pre-focal compression is met by speaker 3 who constantly de-accents the subjects and objects in verb focus and the subjects in object focus yes/no questions. In verb focus, exclusively the verb is realized with a pitch accent and all previous constituents remain de-accented. Accordingly, in object focus only the object is realized with a pitch accent.

Several other speakers occasionally also show a compressed pitch contour in the phonetic analysis based on mean max*f0* values. Speaker 2 for example uses a lower mean pitch on the subject when the object is focused than in the all-new condition, but does not show pre-focal compression in verb focus. Furthermore, speakers 3 and 9 associate the highest pitch of the utterance with the focused constituent as observed by Göksel et al. (2009) and İmer & Çelebi (2006).

The variation observed in the speaker by speaker analysis motivates the assumption that they might correlate with dialectic variation in Turkish. Unfortunately, Göksel et al. (2009) remain silent about the sociolinguistic background of the speakers of their data set. In the data elicitation of the data set of experiment 1, all speakers were selected inter alia on the bases of birth in the Izmir area. However, it cannot be excluded that some of the speakers may have other dialectic influences from relatives or alike.[44] Despite the possibility that the observed has dialectic causes, it is also possible that the variation is a reflection of mere speaker dependent variation without dialectical influences.

Furthermore, the conclusions with respect to pre-focal compression as a typical feature for yes/no questions in Turkish by Göksel et al. (2009) are drawn on a very small data set. It is reasonable that a broader data set would have revealed the same variation in Göksel et al. (2009) as observed in the broader data set of the present study. However, the observations reported in Göksel et al. (2009) are not repeated here for object focus and verb focus in-situ focused yes/no questions and the all-new yes/no questions. Pre-focal compression is not a prosodic cue for sentence type distinction in the yes/no questions of the present data set.

As an additional outcome resulting from the observation that Turkish yes/no questions are not realized with pre-focal compression, it can be excluded that pre-focal compression is a correlate of IS marking in Turkish yes/no questions, as previously expected.

III.6 CONCLUSION

Considering the results of the present study within a cross-linguistic framework of focus prominence including the strategy of prosodic alignment, contributes new insights to the prosodic realization of IS in Turkish. Additionally, the results of experiment 1 provide further knowledge about general intonational phonology in Turkish. By means of complex phonologic and phonetic analyses, the remarks of the present study as well as the observations and assumptions generated in previous studies on Turkish intonational phonology can be put on solid grounds by empirical verification including IS and sentence type marking.

Previous research on prosodic focus marking in Turkish is mainly based on theoretical assumptions or very small data set analyses. Furthermore, so far only pitch accent implementation by means of pitch increase and/or pitch accent modification by means of categorical changes has been considered in the description of prosodic correlates of IS marking in Turkish (e.g. Özge & Bozşhain 2010, İpek 2011). Özge & Bozşhain (2010) assume distinct categories for focused (H*L) and pre-focal constituents (L*H) and prominence increase on focused constituents in case of ambiguity. The phonetic measurements of İpek (2011) contrastingly reveal no on-focus pitch increase in Turkish declaratives. Güneş (2013b) moreover claims, within her typological classification of Turkish as a phrase language, that Turkish

[44] In the elicitation procedure also a sociolinguistic questionnaires was elicited for each speaker, providing additional information about language acquisition, family background, language use, and alike. Unfortunatly, the interviewer missed to send me back the questionnaires from Turkey. To this reason, at this point of analysis, information about the speaker's background cannot be included into the analysis in order to draw clearer conclusions concerning the variation in the monolingual data.

has only limited reflex of IS in the *f0* contour which is restricted to a determined syntactical position. Isșever (2003) on the other side claims that in-situ focus marking in Turkish is possible, however it is restricted to contrastive focus marking.

To this effect, most of the former studies consider focus marking as prominence marking by means of pitch accent assignment and pitch prominence increase as originally claimed by Jackendoff (1975). Apparently, none of the studies on prosodic marking of IS in Turkish includes the concept of prominence alignment. Cross-linguistic research has shown that focus prominence is universal. However, several strategies are used by different languages in order to make focus prominent by prosodic means, though not all languages mark focus prosodically. In addition to pitch accent modification on focused constituents also the deletion and/or insertion of prosodic boundaries as to align focused constituents to prosodic boundaries in order to make them the prosodic head of their prosodic phrase has been described. Büring (2010) classifies those languages as boundary languages.

The results of the phonological and phonetic analyses discussed in the previous subsection show that within the limitations of the present experiment Turkish yes/no questions have a prosodic correlate of IS which is realized via a modification of the *f0* contour. However, focus prominence is not realized via pitch accent modification on the focused constituent itself but by aligning focused constituents to prosodic boundaries.

The previous analyses revealed that in yes/no questions with a simple SOV structure each constituent is realized with a pitch accent on the word stressed syllable (H*, H*L) or with a PPh-final phrase boundary tone (H-) on the last syllable of a non-final prosodic phrase. This default intonation contour is modified as soon as the focus condition changes. However, the modification is not realized by pitch increase nor by pre-focal boundary tone insertion, as previously expected according to observations in İpek (2011) and İpek & Jun (2013), but by de-accentuation which causes a change in prominence and a restructuring of prosodic phrasing for subject focus.

The analyses of maximum *f0* values on focused constituents revealed that focused constituents are not higher in pitch than the same constituents in an all-new condition confirming the acoustic measurements of İpek (2011) for Turkish declaratives. A modification of the pitch accent by means of pitch increase is not even observed in verb focus for the sake of disambiguation between verb focus and all-new yes/no questions which share the same phonologic structure. To this effect, ambiguity in the tonal structure in IS marked sentences is not unraveled by an increase in acoustic parameters as proposed by Özge and Bozşhain (2010).

The analyses furthermore revealed that pre-focal boundary tone insertion is not a correlate of IS marking in-situ in Turkish yes/no questions. In contrast to the previous expectations with respect to prosodic focus alignment the data show that constituents are not aligned to left prosodic boundaries by means of pre-focal boundary insertion. The analysis of the maximum *f0* on the syllable immediately preceding the focused constituent shows no significant difference across the focus conditions. İpek's (2011) observation of an immediately pre-focal pitch increase on objects in verb focus is not repeated for the yes/no questions of this study. Furthermore, the statistical analysis revealed no significant difference at all for the pitch height on immediately pre-focal constituents as proposed by İpek & Jun's (2013) model of Turkish intonational phonology. The corresponding syllables are neither significantly lower nor higher. To this effect, also the postulated left-aligned nuclear boundary tone by İpek & Jun's (2013) AM-model of Turkish intonational phonology cannot be confirmed by concrete phonetic measurements for IS marked yes/no questions in the present study.

What is repeated in the present study is the observation of post-focal de-accentuation which has been reported in other studies on Turkish intonation as well (e.g. Özge & Bozșahin 2010, İpek 2011). For the in-situ focused yes/no questions of the monolingual data set the analysis of subject and object focus revealed a systematic and statistically significant de-accentuation pattern starting right after the focused constituents. The focused constituent is aligned with a rising-falling pitch accent (H*L) and afterwards the contour remains flat until the IP-final low boundary tone (L%). For verb focus no post-focal de-accentuation is observed due to the SOV structure of the target sentences. For the remaining focus conditions on the other side the focused constituent constitutes the last one which is realized with pitch. All PPh-final phrase boundary tones and pitch accents are deleted after the focused constituent. By that means the focused constituent becomes the most prominent constituent of the IP and is aligned to the rightmost prosodic boundary of each sentence by means of post-focal de-accentuation. To this effect, the last constituent realized with a pitch accent in the rightmost prosodic phrase becomes the most prominent constituent in the whole IP. It can be concluded that prominence is indicated by prosodic alignment and not via an in-situ modification of pitch accents on focused constituents. The prosodic constituent becomes prominent by means of post-focal de-accentuation.

Within the strategy of prosodic alignment also a process of restructuring of prosodic phrasing was observed, contributing new general insights with respect to the syntax-prosody interface in Turkish. According to most theories of syntax-prosody mapping, a correlation of syntactic and prosodic boundaries in Turkish is generally assumed. However, a straightforward mapping is refuted by some authors, such as Kan (2009) and defended by others, such as Kamali (2011). The results of IS marking in experiment 1 show that IS requires the prosodic phrasing structure to change, whereas the syntactic structure remains like in the default condition. For subject focus in SOV yes/no questions it was shown that the two syntactic phrases are not maintained in the prosodic phrasing. In the all-new condition which consist of two phonological phrases $((S)_{PPh}\ (OV)_{PPh})_{IP}$ syntactical phrasing is reflected consisting of an NP and a VP. In subject focus only the subject is realized with a pitch accent, deleting al post-focal material including phrase boundaries until the IP final boundary. Due to the deletion of the phrase boundary tone (H-), in favor of the word stressed aligned pitch accent (H*L) on the subject in subject focus, the default phrasing structure is modified resulting in a single prosodic phrase $((SOV)_{PPh})_{IP}$. To this effect, subject focused sentences only consist of one prosodic phrase, though consisting of two syntactic phrases. This change contradicts Kamali`s (2011) proposal of a strict mapping of syntactic categories into phonological categories and confirms the observations of an independent prosodic structure as previously proposed by Kan (2009) and Ípek & Jun (2013, 2014) and confirms Güneṣ (2013a) proposal of limited reflex of syntax in *f0*. Syntax-prosody mapping is not systematic in Turkish. IS has an impact on prosodic phrasing in Turkish but not on pitch accent scaling.

By means of the observation of systematic post-focal de-accentuation in experiment 1, conclusions with respect to a typological classification of IS marking in Turkish can be drawn. Although, Turkish does not introduce pre-focal boundaries to the left of a focused constituent in in-situ focused SOV yes/no questions, as previously expected, prosodic boundary alignment is still a prominence marker. Focused constituents are aligned to rightmost prosodic boundaries and become maximally prominent in an IP. The alignment to the rightmost prosodic boundary is a result of systematic de-accentuation of post-focal constituents.

Concluding, the results of the present experiment on IS conducted with 11 monolingual speakers show that IS has a prosodic reality on the sentence level in Turkish corresponding to boundary alignment. In Büring (2010), languages which systematically align focused constituents to prosodic boundaries are typologically identified as boundary languages.

However, it cannot be concluded a priori that de-accentuation is the only prosodic cue to mark IS in Turkish. It is also possible that word stressed syllables show an increase in duration and/or intensity in a focused constituent in comparison to their unfocused counterparts. Nonetheless, from the observations in previous studies and the present results, de-accentuation seems to be the most reliable and constant prosodic cue in relation to prosodic focus marking in Turkish.

The results of the prosodic analyses of sentence type marking in experiment 1 on the other side do not reveal an impact on the prosodic structure, such as documented for IS marking.

Based on the previous literature review it appeared likely that the yes/no questions of the present data set would be realized with a high final boundary tone (H%) in addition to a low final boundary tone (L%). According to Kawaguchi et al. (2006) a low final boundary tone was expected in cases of final word stress on the constituent the Q-particle is attached to. A high boundary tone on the other side was expected in verb focus and the all-new condition where the Q-particle attaches to a constituent with penultimate stress. The penultimate stress pattern results in the realization of a final syllable with a low trailing tone (H*L) which is followed by the Q-particle which then should be realized with a high final boundary tone (H%) according to the Turkish chiasm proposed by

Kawaguchi et al. (2006). However, this pattern was not found in the yes/no questions of the present studies. The yes/no questions were realized with a low final boundary tone independent of the focus condition and the quality of the syllable preceding the Q-particle. Accordingly, a correlation to the prosodic marking of the pragmatic sentence type by means of final boundary tone implementation was not found. It appears possible that the high boundary tone implemented in 3 of the 220 sentences relates to emotional or other pragmatic meanings rather than sentence type as already hypothesized by Kawaguchi et al. (2006). Since the target sentences analyzed by Kawaguchi et al. (2006) are randomly selected without further background and discourse determination it is quite possible that the high boundary tones relate to different functions than sentence type indication. As a further explanation for the occurrence of high final boundary tones in yes/no questions, I refer to Kamali & Büring (2011) who propose that non-mI adjacent yes/no questions are typically aligned with a high boundary tone. However, in the present data set all sentences were designed with the Q-particle adjacent to the focused constituent.

In addition to the result that yes/no questions are realized with a low boundary tone and therefore do not have a distinctive prosodic correlate that marks sentence type by means of final boundary tone distinction, a further analyses concerning pre-focal compression in Turkish yes/no questions revealed that it is not a prosodic correlate of sentence type in Turkish neither. In a previous study, Göksel et al. (2009) observe a compressed pitch contour up to the focused constituent in yes/no questions which is realized with the highest pitch accent independent of its position in the sentence. Göksel et al.'s (2009) observations find no basis in the present data set. In yes/no questions the Q-particle is not systematically aligned to the constituent with the highest pitch accent in the sentence. Neither in all-new yes/no questions nor in in-situ focused contrastive yes/no questions. Pre-focal constituents are not lower in pitch than the focused constituent. To the contrary, the intonation pattern of all-new, subject, and object focus show a declination pattern throughout the sentences; i.e. each constituent is aligned with a lower maximum *f0* pitch than its preceding constituent. In verb focus on the other side, some speakers used a higher or equal mean maximum *f0* on the object than on the preceding subject. Still, the focused constituent, corresponding to the verb, was not realized with the highest pitch as proposed by Göksel et al. (2009). The difference in pitch height on pre-focal constituents in comparison to the maximum *f0* of the same constituents in an all-new condition was not significant for any of the conditions.

Only one speaker of the data set replicates the pattern proposed by Göksel et al. (2009). This speaker uses a compressed pitch contour up to the focused and –mI adjacent constituent. This could be an indicator of variance within the prosodic system of Turkish. Although the 11 speakers of the present study were all born in the Egais area, dialectal influences cannot be excluded completely. Still, I assume that this prosodic variation observed in one speaker of the data set is not a prosodic expression of sentence type. Pre-focal compression is usually associated with IS marking. German e.g. optionally compresses pre-focal constituents, aligns the perceptually highest pitch, which does not have to coincide with the highest pitch value, with the focused constituent and de-accents post-focal elements. The same pattern is observed in Göksel et al. (2009) for Turkish yes/no questions. However, they do not relate the pre-focal pattern to the prosodic strategy of focus marking, but relate it to prosodic sentence type marking. On this basis the claim that Turkish is exceptional and unique in the prosodic expression of sentence type is not confirmed. Pre-focal compression does not seem to play a role in sentence type marking in Turkish nor with respect to IS marking as previously expected. The prosodic cue to indicate sentence type is not realized right at the beginning of a yes/no question and moreover not even on the IP-final syllable as observed cross-linguistically for languages that indicate sentence type prosodically.

From the results of the analyzed data set of 11 monolingual speakers it can be concluded that the constituent where the Q-particle attaches to is not systematically aligned with the highest pitch of the intonation phrase, preceding constituents are not compressed, and the category of the final boundary tone is not determined by the syllable preceding the Q-particle. Structurally unmarked yes/no questions in Turkish end with a low final boundary tone (L%) and pre-focal compression is not used as a systematic prosodic indicator of sentence type or IS. These observations motivate the conclusion that Turkish yes/no questions have no prosodic correlate by means of *f0* to mark the prosodic sentence type in contrast to wh-questions which end with a high final boundary tone. Sentence type is obligatorily marked morphologically by the Q-particle making prosodic marking unnecessary for the contextualization of the pragmatic meaning. It would be an additional cue to contextualize a sentence as a question but at the same time it would be redundant.

However the limitations drawn for prosodic focus marking have to be considered for sentence type marking as well: conclusions with respect to prosodic sentence type marking and all other observations are limited to *f0* since no further prosodic cues were tested with respect to their relevance. F0 has been shown a reliable predictor for word and sentence stress in Turkish, however the analyses was not exhaustive. It cannot be excluded with respect to the results of the whole experiment that other acoustic devices are involved in the marking of focus and sentence type. An impact of final lengthening or break introduction, duration of the word stressed syllable of focused constituents or intensity increase on constituents in different IS conditions as well as in different sentence types cannot be excluded. Furthermore the acoustic correlates of IS and the lack of them in sentence type marking are solely based on speech production and lack perceptual evidence. Considering the limitations of the present study it becomes obvious that the conclusions stated here do not represent ultimate answers to the respective questions. Further studies including further acoustic parameters and also perception studies are necessary to achieve an extensive awareness about Turkish intonational phonology.

CHAPTER IV: MATTERS OF BILINGUAL ACQUISITION OF PROSODY

IV.1 INTRODUCTION

One of the most crucial questions concerning the acquisition and use of more than one language is the question how bilinguals develop linguistic forms that differ from monolingual languages and what conditions motivate structural changes in bilingual speech. The conceptualization of bilingual language acquisition models and prediction tools builds a fundamental basis for the understanding of bilingual speech development and linguistic change as investigated in experiment 2.

In the first following subchapter, a general introduction into central aspects of bilingual speech will be provided. The notion of bilingualism and its manifold specifications will be outlined as well as other basic theoretical aspects of bilingual language acquisition. Bilingualism has been subject to research from a broad range of linguistic areas including psycholinguistics and sociolinguistics. To this effect, I consider it helpful to have a look at several perspectives provided in the theoretical framework of bilingual language acquisition. Learning theories concerning the acquisition of phonetics and phonology will be discussed as well as the concepts of contrastiveness and structural markedness which play a dominant role in the prediction of changes in bilingual varieties. Furthermore, cognitive aspects such as the assumption of dynamic bilingual language interaction will be presented providing the baseline for an additive approach based on Matras' (2007,2010) observation of a functional motivation of language change and Paradis' (1993, 2004, 2008) approach of language activation. Considering the manifold observations in the manifold studies on bilingual language change from manifold perspectives give rise to the concept that contact induced language change does not occur randomly or exclusively follows universal structural constraints such as markedness but is settled in dynamic interactions based on functional prospectives. Functional interaction facilitaded through language activation caused by specific bilingual communicative needs which dnaturally differ from that of monolinguals will be the fundamental baseline to frame the complex results observed in experiment 2 with bilingual German-Turkish speakers.

Although most research on bilingual speech focuses on the acquisition of lexicon and syntax, the acquisition of phonology has become an attractive research field during the last decades. This interest recently also extends to the investigation of supra-segmental features in bilingual speech. Mennen (2015) even proposes an L2 intonation learning model. Most L2 models however are based on studies considering the impact of L1 in the development of structural changes in L2. Since the experimental study provided in experiment 2 considers the reverse phenomenon, namely the contact-induced changes in L1, an additional subchapter is dedicated to the impact of L2 on structural changes in L1. This phenomenon has basically been studied in the field of cognitive linguistics and mainly in connection with language attrition. Recently, an increasing interest in heritage language research has emerged which exactly focuses on contact-induced changes of L1 in the diaspora corresponding to the background of the German-Turkish bilingual speakers of experiment 2 of the present study. However, still in the German-Turkish context many more studies are conducted with respect to contact induced lexical and morpho-syntactical changes in L1 Turkish, research on changes in bilingual Turkish intonation is still an exception.

Based on a central assumption of bilingual language development, structural changes in the contact language are most likely to be found with respect to the features in which both languages of a bilingual differ. By that means a cross-linguistic comparison between German and Turkish is necessary to predict changes in the bilingual Turkish variety and to trace back changes to the influence of the contact languages. By means of the results of experiment 1 it was already shown how monolingual speakers of Turkish mark IS and sentence type prosodically in yes/no questions. With respect to German a further chapter will provide a short but comprehensive exposure of German prosody and its cues to IS and sentence type.

In addition to the results of experiment 1, the literature review on bilingualism, provided in the present chapter, builds the fundamental base for the motivation of the conduction of experiment 2 as well as for the interpretation of the results. Experiment 2 is conducted with German-Turkish heritage speakers and represented in the subsequent chapter VI.

IV.2 BILINGUAL SPEECH: TYPES, MODELS AND THE IMPACT OF L2 ON L1

After a period of intensive studies on general language acquisition in the 1960ies and 1970ies mainly conducted in the field of psycholinguistics, bilingual research has become an attractive field of investigation during the last years. Despite a clear tendency to concentrate on the lexical and morpho-syntactic aspects of bilingual language acquisition several models on bilingual language acquisition have been developed in the framework of phonetics and phonology. The most popular speech learning model is provided by Flege´s (1995) SLM (Speech Learning Model). Recently Mennen

(2015) even established a model of language acquisition explicitly referring to supra-segmental features, providing a set of tools for predicting the structural outcomes of bilingual speech based on Ladd´s (1996) cross-linguistic variation model. However, most studies on the acquisition and development of prosodic and especially intonational features in bilingual speech assume that segmental and supra-segmental language acquisition and development rely on the same or at least comparable mechanisms and are dominated by the same factors (e.g. Trofimovich & Baker 2006).

A determining and influencing factor in the development of L2-acquisition models is the concept of bilingualism itself already since it is hard to capture. There is no prototype of a bilingual speaker, but bilingualism is a term referring to manifold aspects of language use and mode of acquisition. Accordingly, different studies may differ with respect to the speaker and different aspects of bilingualism they are referring to in order to classify the term. However, most commonly researchers differentiate between second language acquisition and foreign language acquisition. Within that distinction a crucial difference is postulated with respect to the structural outcome of speakers who learn a foreign language in a classroom setting and speakers who acquire two languages in parallel from early childhood on (cf. Young Scholten 1993). Although this general distinction between foreign and second language acquisition is acknowledged in bilingual research a strict classification of bilingualism is still difficult, especially as globalization provides more and more variation within the concept of bilingualism. Nowadays not only economically initiated migration results in language contact situations providing ground for the development of bilingualism, but people are learning languages for a variety of reason. Sometimes a language is used as a second language at the work place, irrespective of whether that language is spoken as a first language in the geography at question, since globalization requires a lingua franca for working purposes.

Apart from the usage based influences in the determination of different types of bilingualism or the mode and context of acquisition which is also crucially determined by the age of acquisition (AOA), further sociolinguistic factors, such as language prestige or amount of language contact have been reported to motivate differences in bilingual speech development. Individual differences have also been pointed out to have a crucial impact in bilingual speech development just as in the acquisition process of monolingual speech. Hornby (1977) states that bilingualism is not an all-or-none property but an individual characteristic. More recent studies on the other hand claim that individual processes in language acquisition reflect general mechanisms of bilingual language acquisition (cf. Zerbian 2015). Different views on that topic make it even more important to clearly characterize the speaker a study refers to. The factor individuality in language acquisition and bilingual development nonetheless, does not exclude per se the possibility that stable bilingual communities may develop a stable conventionalized intonation grammar which differs from that of monolinguals of the respective language as shown by Selting & Kern (2008) for the German of Turkish-German bilinguals.

The manifold aspects that may influence the development of bilingual speech make it difficult to classify different types of bilingualism but also to develop reliable models for bilingual language acquisition and its determining factors. Models on bilingual language acquisition can hypothesize about features which may be subject to changes in bilingual speech when compared to monolingual speech but cannot be used to determine how language development occurs for each individual and each language situation. They are best understood as reflecting tendencies in bilingual language development.

In the following subchapter some of the manifold determining influences which are under discussion in bilingual research are outlined before presenting basic models of second language acquisition which explicitly refer to the acquisition of phonological features.

IV.2.1 ON THE MANIFOLD CONCEPTS OF BILINGUALISM

When reviewing the existing literature on bilingualism the first thing that leaps to the eye with respect to the use of the term is that it is not strictly reduced to situations where speakers or speech communities use only two languages but it is often used as a cover term to embrace situations of multi- and plurilingualism (e.g. Beardsmore 1986, Pavlenko 2005). Migrant situations, such as the one investigated in the present study are generally described as typical bilingual speaker groups since they speak the language of their origin in addition to the language of the country of migration. However, those typical bilinguals may have knowledge of further languages as well which may have an impact on their general language development. Within the special German-Turkish context of this study, the bilingual speakers may not only use German and Turkish as their communication channels, but also have certain knowledge in a further language, mainly English due to the German education system.

However, throughout the literature the term bilingualism is the most used one to describe situations of individuals or speech communities which use more than one language. Henceforth, this cover term will also be used to refer to the special speaker group of German-Turkish bilinguals investigated in this study. Nonetheless, the bilingualism in the speaker group under investigation in experiment 2 can be categorized as an early consecutive language learning of German and Turkish exclusively and no additional further childhood language. For all speakers the acquisition of the second language German started when they entered into kinder garden. The acquisition of L1 Turkish on the other side is based on the language of both parents of the speaker group. Turkish is the home language for all the involved speakers. No speaker has parents with different L1s.

The example of this concrete language situation indicates that the concept of bilingualism can either be a very narrow one or a rather broad one. Different authors provide different concepts with respect to the term. Generally, two basic reference points are considered in the determination of bilingualism. Either authors refer to AOA to describe the type of bilingualism they refer to, or authors determine the term by means of language use or proficiency.

With respect to AOA different assumptions circulate across the literature. A very narrow classification of bilingualism is provided by de Houwer (1996) who considers the short period of one month to differentiate between first and second language acquisition. All languages that are developed later than a month after birth do not result in bilingualism, but are differentiated as second languages. Here bilingualism basically refers to the more or less simultaneous acquisition of two languages. A similar view of diferntiation is proposed by Meisel (2006). She argues that the simoultaneous acquisition of two languages is better described as first language acquisition in each one of the languages.

However, most researchers state a broader period of 3 years of parallel language acquisition to describe bilingualism (McLaughlin 1978). This cut off point at the age of three years is basically described as *critical period.* The discussion about a critical period hypothesis (CPH) was initiated by Lenneberg (1969) and originally referred to the age of 12 years. CPH proposes that the ability to learn a second language diminishes in correspondence to the neurological maturing of speakers. Lenneberg casually observed that it is difficult to learn to pronounce an L2 without a foreign accent after the age of 12 years. Nonetheless other studies show the opposite. In Bongaerts et al. (1997) for example it is shown show that even adult learners are able to produce L2 sounds without a foreign accent.[45] Examination of the learning histories of the highly successful learners led the authors to argue that certain learner characteristics and learning contexts may work together to override the disadvantages of a late start.

In relation to the *critical period* a further distinction has been drawn between early and late and simultaneous, successive and consecutive bilingualism. For most authors, people who learn a second language before the age of six are early bilinguals (cf. Fabbro 2001). Children who acquire a second language before the age of three are simultaneous bilinguals, whereas children that learn a second language after the age of three are successively (sequentially) acquiring a second language (McLaughlin 1978, Grosjean 1982, Kornakov 1997, Neubauer 2006).[46] Following th former classification the speakers of the following bilingual Turkish experiment are considered as early

[45] In Bongaerts et al. (1997) Dutch learners of English and a native speaker control group were rated for accent by native speakers of English. The ratings obtained by some learners were within the range of the ratings assigned to the native speaker controls.

[46] Hamers & Blanc`s (2005) distinction is much narrower. For them simultaneous early childhood bilinguism is reduced to settings where a child develops two languages from the beginning on. Children who acquire a second language early in their childhood, but after the basic acquisition of the L1 are consecutive early bilinguals.

successive bilinguals. However, in any event, age margins are unclear and cannot be established for all children, since the cerebral formation is a continuous and individual process again. Assuming a critical period does not provide any insights of how bilingual language learning actually differs from monolingual learning, despite confirming Flege´s (1995) hypothesis "the earlier the better". Moreover, studies have shown that even in early stages of foreign language acquisition, even intonational categories of a non-first language can be fully developed (e.g. Zerbian et al. 2014).

For some researchers AOA is not relevant at all to determine a certain type of bilingualism. Weinreich (1964) was one of the first and most influential researchers who concentrated in language contact phenomena such as bilingualism. His definition of bilingualism is much more usage oriented. For him bilingualism is the practice of alternatively using two languages. Grosjean (1992: 51) follows Weinreich´s understanding of bilingualism by means of a regular use of two (or more) languages: *…bilinguals are those people who need and use two (or more) languages in their everyday lives.* Though both researchers basically describe language contact situations in which people live in bi-or plurilingual countries, their concept of bilingualism also includes situations in which individuals regularly practice two languages without necessarily living in a plurilingual country or migrant situation. Accordingly, bilingualism is defined by (Butler & Hakuta 2006: 115) as

> (…) psychological and social states of individuals or groups of people that result from interactions via language in which two or more linguistic codes (including dialects) are used for communication.

Within the usage based approaches, a very broad concept of bilingualism is provided by Steiner & Hayes (2009). For them solely the ability to speak, read, write or understand more than one language results in bilingualism. However, most authors have a more moderate concept of bilingualism.

The factors determining the various concepts of bilingualism represented so far, still do not distinguish between different stages of proficiency or language development in bilingualism which is by no means a steady system. Proficiency in bilingualism is crucially related to the concept of interlanguage. The concept of interlanguage which was developed by Selinker (1972) and refers to the fact that bilingualism is an ongoing process with respect to acquisition. The more proficient a learner gets the less its L2 differs from the monolingual variety. This concept is harshly scrutinized nowadays since diverging structures in bilingual varieties are considered as incomplete proficiency in the respective varietie. There is a clear lack of acknowledgement of an intrinsic motivation for languages to change through contact. Nonetheless, reflecting on the idea that language development and proficiency are subject to constant changes bilingual learning models can only represent stages of development and indicate directions..

The idea that bilingualism is a matter of degree and that bilinguals do not form a homogeneous group, but differ in proficiency, mode of acquisition, context of use and alike is also taken up by cognitive models of bilingual language acquisition. Paradise (1998) e.g. states that no speaker has a complete knowledge of two languages and that the heterogeneity in bilingual speech development indeed may also be a refection of structural differences of the involved languages which may facilitate changes or not. The structural difference between the two languages is one of the primary answers to the question why bilingual speech develops different structures than the corresponding monolingual variety. The determination of structural differences is taken up by models on second language acquisition, which will be outlined in the in the following subsection although not all of them should be considered as fully established models The research on structural differences in bilingual speech when compared to monolingual speech furthermore raises the question how the brain deals with two or more languages, how they are stored and to which degree they share structures and interact with each other. This aspect is primarily taken up by cognitive studies in the field of bilingualism with emphasis on language activation which is considered the main facilitator for language interaction and consequentl structural change. The point of motivation for exchange and interaction of structures in bilingual communication is most specifically discussed in the functional approach by Matras (2010) considering pragmatic aspects of language use. Both perspectives will also be discussed in the subsequent chapters.

The diverging mode of access to describe the output and underlying mechanisms of bilingual speech is as diverse as the concept of bilingualism itself is as shown in the present section. What is for sure is that no matter at which age a second language is learned or how often and how proficiently it is used. It differs to some extend from monolingual speech and so differs the concept of bilingualism. It may refer to a single speaker or whole community, it may refer to learners of a foreign language which only just have started to aquire a new language representing a very low profincy as it may refer to speaker which simoultaniously aquire more than one language at the same time in the very childhood or to the acquisition of a foreign language even in adult life. Sometimes the term is even used as a cover term for situations in which speaker have knowledge of more than two languages.

IV.2.2 THEORIES OF BILINGUAL LANGUAGE ACQUISITION

The conceptual diversity of bilingualism outlined in the previous section is repeated by the diversity of models and concepts of bilingual language acquisition. In this section I will refer to some of them. They are chosen by their relevance with respect to providing knowledge and understanding in form of a theoretical background for the interpretation of the experimental study with bilinguals in experiment 2. Accordingly, they are basically established in the framework of the acquisition of phonetics and phonology. Most of these models do not explicitly distinguish between different types of bilingualism, but assume the same processes independent of the concrete type of bilingualism.

The same under-specification is found for the different areas of language. Most theories are based on studies carried out on the segmental level of speech. However, the detected mechanisms and processes are also considered as relevant for the development of supra-segmental features (e.g. Lleó 1997, Mennen 1998, Chun 2002, Ramírez Verdugo 2005). The models outlined in the following primarily make reference to the L1 of bilingual speakers as an underlying baseline for the prediction of deferring structural features in the L2 of bilingual speakers. However, this influence is not uni-directional. A small amount of studies which concentrate on the structural changes in a bilingual's L1 are also successful in demonstrating the reverse effect, namely the influence of L2 on L1. However, the impact of L2 on changes in L1 is primarily discussed in the framework of heritage language and attrition settled in cognitive studies.

IV.2.2.1 CROSS-LINGUISTIC APPROACHES: CONTRASTIVENESS

At the center of cross-linguistic approaches on bilingualism is the structural comparison between the involved languages. Since Lado's (1957) Contrastive Analyses Hypothesis (CAH), differences in L2 are basically predicted based on structural contrasts between the L1 and L2 of a bilingual. CAH proposed that the acquisition of a second language is determined by the first language L1 of a speaker. The underlying similarities of L1 and L2 features were understood as perceived similarities of form and meaning between the both languages. Any difference between both languages was supposed to lead to a transfer of the respective feature from L1 to L2. For those structures which are similar in both languages CAH predicted no difficulty in the acquisition. An example of perceived similarities is provided by Chun (2002) who reports of a study, teaching Chinese and French intonation to American English speakers. Three word utterances all containing Chinese Tone 1 which results in a relatively straight high plateau-like intonation contour when produced by native speakers, were realized with a typical American English falling intonation contour by American learners of Chinese. Similarly, the French question *Qu'est-ce qu'il fait?* (What is he doing?) was produced by American learners of French with a typical English-like intonation contour (pitch accents on stresses syllables and final rise) rather than with a continuously falling sentence intonation typical for native French speakers.

However, research has shown that the binary distinction between similar and contrasting features is too simple and that the underlying mechanisms that govern language acquisition are more complex.

Research has shown that structural features cannot simply be classified as absent or present in the involved languages. By that means Mennen (2004) shows that languages can differ on the phonological level as well as at the phonetic level. A cross-linguistic comparison between Dutch and Greek indicates that even similar features in both languages can have a different phonetic realization. Greek and Dutch show the same phonological structure in pre-nuclear rises, but differ in their phonetic realization. Dutch has an earlier peak alignment than Greek. The bilingual Greek speaker of her study however not only differed in peak alignment in L2 Greek, but also in the peak alignment in their Dutch L1. The bilingual peak alignment developed away from the realization of native Dutch speakers that were not Greek learners and served as a control group. The development was directed towards a phonetic realization which was closer to Greek alignment.

Although CAH basically referred to the transfer of L1 features into L2, the results of Mennen (2004) show that the reverse phenomena is also possible. Convergence and divergence processes can occur in both involved languages. CAH on the other side acted on the assumption of one way directionality as it originally assumed that elements of L2 are substituted by elements of the L1. The speaker's L1 serves as the source language and the L2 as the target language for transfer.

However, Mennen's observation of bi-directional interference is also supported by the results of experiment 2 of the present dissertation. The observation of pitch increase in L1 Turkish of bilingual German Turkish speakers does not only indicate bi-directionality in the transfer of contrasting features, but also that complex form-functional related prosodic features from L2 can be integrated into the L1 of bilinguals. The transfer however is not interpreted as exclusively based in the structural differences but motivated by functional aspects and languge interaction based on interaction in order to fullfill pragmatic needs with the result of optimizing bilingual communication.

Central to a cross-linguistic comparison as a predictor for changes in bilingual varieties are concepts that reflect on the changes found in bilingual speech. Transfer, divergence and convergence are important concepts that are also found in the results of experiment 1.

Those notions were originally initiated by Weinreich (1953:1). Transfer was described as*:*

> (…) those instances of deviation from the norm of either language which occur in the speech of bilinguals as a result of their familiarity with more than one language.

By that means transfer is a language acquisition mechanism described as cross-linguistic influence from one language to another. In contrast to the assumptions of CAH, transfer as a mechanism is less restricted with respect to directionality and structural aspects since it covers several ways in which one language may influence the other (cf. Ringbom 2007).

Divergence and convergence are relational notions referring to processes or results of processes (Hinskens, Auer & Kerswill 2005). Generally spoken, languages diverge cross-linguistically in some of their features, but also converge with respect to some features. Weinreich (1953) uses the term convergent development in order to refer to a change in the function of morphemes that takes place in a replica language, inspired by a model language. In a broad sense convergence implies an increase of similarities between two languages (e.g. Silva-Corvalán 1994, Bullock & Toribio 2004). It is most often used in typological studies in historical comparative linguistics to explain the emergence of areal linguistic similarities (e.g. Muysken 2000, Bossong 2009)[47].

Whereas convergence involves the linguistic unification and homogenization, divergence amounts to linguistic diversification, growing diffuseness and heterogeneity (Hinskens, Auer & Kerswill 2005). Ringbom (2007) exemplarily outlines divergence by means of an example from foreign language learning. Divergence e.g. corresponds to a situation where one phoneme or lexeme in L1 corresponds to two phonemes or lexemes in L2. In Finnish for example *kieli* has two meanings: language and tongue. This organizing principle is transferred to L2 English which has two different words. Learners only know one of these and use it for both meanings as in the utterance: *he bit himself in the language*.

A fundamental differentiation which has to accompany a contrastive analysis is whether structural changes are truly based on cross-linguistic differences or if they indicate language internal structural development which also might lead to more similarities between languages. Namely, a change in bilingual languages is not always solely a result of structural differences between L1 and L2 but the contact can also accelerate the emergence of features which are already present in a language but lack conventionalization (cf. Schroeder 2007). Doğruöz & Backus (2009) state that contact situations may accelerate inclinations for a change which is already taking place in a language and that a change does not necessarily uncover overt influences from a contact language. However, these changes are also motivated by contact since they would not have occurred without it. A similar claim is proposed by Rehbein (2009) who uses the term catalyzer to describe the influence of a contact language. Schroeder (2007) proposes that linguistic change in contact varieties may be the result of a reinforcement of features that already exist in the source language, but lack conventionalization. With respect to the Turkish orthography of German-Turkish bilinguals Schroeder (2007) observes that bilinguals gain direction in their orthographic system through continuous contact with the German orthographic system, but cannot exclusively be traced back to the language contact by means of transfer. Schroeder observes that differences in practice in the Turkish in Germany emerge in cases where norms are not firmly established or new conventions are able to emerge, due to the

[47] Bossong (2009) refers to the historical development of Japanese by means of convergence. Whereas the grammatical system of modern Japanese developed in close contact with Korean, its vocabulary is predominantly borrowed from Chinese.

distance to Turkey. The impact of the contact language is that it offers orientation to those cases in the Turkish practice which vary. He supposes that differences may take the form of a stronger generalization for features that are also found in Turkey Turkish.

Independent of the direction of development- may it lead to convergence, divergence or conventionalization- the determining factor of language change according to a cross-linguistic view is settled in the natural divergence of languages. Only a cross-linguistic comparison makes it possible to trace back structures in a bilingual variety to the influence of a contact language and separate them from structures emerging through natural language internal development.

IV.2.2.2 MARKEDNESS

Based on a lack of global predictability of structural changes in bilingual speech solely by the contrastiveness of the languages since not every diverging structure between two languages results in the emergence of diverging structures in bilingual varieties, Eckman (1977) very early, integrates the concept of structural markedness into a theory of bilingual language acquisition. Corresponding to the analysis of cross-linguistic differences and similarities of languages as outlined previously, Eckman also bases his model on the assumption that difficulties in L2 learning are predictable by the differences between L1 and the respective L2 of bilingual speakers. However, to explain diversity within language change, he proposes that the relative difficulty of a structure is not derived from the languages themselves, but from universal constraints. The universal language constraint to which Eckman (1977) refers as the crucial determiner of difficulties in second language acquisition is markedness.[48]

Although markedness theory consists of a core set of parameters which determine the concept, there is considerable variation of how markedness is precisely understood and used including the presence or absence of overt marking, occurrence in the environment in which neutralization occurs, amount of evidence required for acquisition by child-learners, and the frequency of occurrence across the world's languages. For an overview of the different markedness theories I refer the reader to White (1987).

Despite the conceptual variation in the notion, all theories consider the opposition of language structural entities and their asymmetric relation. Typological markedness, as often focused in

[48] The concept of markedness was introduced by the Prague School of Linguistics in the theories of Trubetzkoy (1939) and Jakobson (1941). The idea behind markedness was that binary oppositions between certain linguistic representations, such as voiced and voiceless obstruents, nasalized and oral vowels, open and closed syllables, are not taken to be simply polar opposites. Rather, one member of the opposition has a wider distribution within a given or across languages and is designated as unmarked.

bilingual research, was extensively developed in the work of Greenberg (1963). For him typological markedness is an asymmetric, irreflexive and transitive relationship between linguistic representations across the world's languages, such that the presence of one structure in a language implies the presence of another structure, but not vice versa. In Gundel (1986: 108) Greenberg`s view on markedness is outlined as following:

> A structure X is typologically marked relative to another structure, Y, (and Y is typologically unmarked relative to X) if every language that has X also has Y, but every language that has Y does not necessarily have X.

In Chun (2002) a concrete example is provided for the theoretical assumption of markedness. Some languages like Korean only have voiceless obstruents. Other languages, like English or Spanish, have voiced and voiceless obstruents. However, not all languages have a contrast in voice. Nevertheless, it is possible to state a universal generalization about the occurrence of a voice contrast: since no languages have been described so far which only have voiced obstruents a voiced obstruent is typologically more marked than a voiceless obstruent.

Based on the general theoretical assumptions on the phenomenon of markedness in languages Eckman (1977) considers typolgical markedness and implication relations as crucial factors for second language acquisition. He argues that those features of L2 that are more marked than in L1 are difficult to acquire in L2. Those features of L2 which are less marked than in L1 do not provide difficulties in the language acquisition process. Applying this hypothesis to the above mentioned example of the binary opposition of voiced and voiceless obstruents, English and Spanish learners would have no difficulties in the acquisition of Korean voiceless obstruents since it is a less marked feature compared to voiced obstruents. Korean speakers on the other side would have difficulties in acquiring voiced obstruents since they are more marked than voiceless obstruents. For the acquisition process markedness theory indispensably implies that the distribution of a marked structure in L2 results in difficulties[49].

Young-Scholten (1993) more over claims that speakers do not always revert on transfer strategies from L1 to L2 when L2 exhibits a more marked structure than L1. Speakers can also just revert on less marked universals. This assumption implies that speakers have access to universal constraints at each age of acquisition.

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[49] Since Eckman (1977), typological differences have been considered over and over again to be the cause of different degrees of difficulties in the L2-acquisition process. By means of an error analysis Schmid & Dusseldorp (2010) e.g. show that long-term German migrants in Canada and the Netherlands show a relatively similar error distribution as a German control group. The proportion of errors occurring in the domain of case, gender, and plural marking are pretty similar across the three groups. Word order errors on the other side were pretty low for the control and the Dutch L2 group whereas more errors occurred within the English L2 group. Schmid & Dusseldorp relate this difference to typological differences. German and Dutch have almost identical word order rules, but both are quite different from English.

Thomason (2001) furthermore states that markedness is only one of three linguistic factors that are relevant in language contact and the resulting structural differences when compared to monolingual non-contact varieties. The degree to which features are integrated into the linguistic system and the typological distance between the contact languages is also crucial in language contact in addition to universal markedness. Marked features however are likely to change in language contact in favor of the development of unmarked structures in contact varieties unless both languages show typologically very similar systems. If both involved languages share the same marked features, they are expected even in the contact varieties (cf. Flege 1995, Zerbian 2015).

Though markedness considerations have mainly been outlined in the framework of segmental phonology the assumptions generally are used to predict changes on the supra-segmental level as well and are even adopted to make predictions with respect to changes on the pragmatic-prosody interface in language contact situations. Considering the prosodic features under investigation in this study, namely focus realization by means of pitch increase, post-focal de-accentuation to mark post-focal givenness and pre-focal compression to mark pre-focal givenness, prosodical markedness also plays an essential role. According to markedness theory those features correspond to marked prosodic features by means of binary implications. Their existence in a given language requires the use of pitch accents on a post-lexical level in the same language. Furthermore, the use of those features is not a mere structural determined feature, but a pragmatic matter of fact. With respect to structurally determined prosody in comparison to pragmatically determined prosody, Raisier & Hiligsmann (2007) propose a markedness scale stating that the presence of pragmatic constraints in accent placement implies the presence of structural constraints. Within that assumption structural constraints represent the unmarked case whereas pragmatic constraints in accent placement constitute the marked case.

In a study with Dutch and French learners, Raisier & Hiligsmann (2007) show that French learners have difficulties in acquiring Dutch accent placement, whereas Dutch learners have no difficulties in acquiring sentence accent in French, given that French is less marked than Dutch with respect to accent placement.

Zerbian (2015) also argues that the prosodic marking of information structure (IS) is typologically marked and hence difficult to acquire. In contact languages, prosodic marking is therefore less likely to be found. However, she mentions with respect to Raisier & Hiligsmann`s markedness scale that every language has intonation, but not all languages use pitch accents in sentence prosody. Within a cross-linguistic perspective she argues that it is more appropriate to talk of a typology of sentence prosody instead of sentence accent. Every language shows structurally determined sentence prosody, but sentence prosody is not always determined by pragmatic considerations. Transforming this typological implication into a markedness scale she states that structural prosody is less marked than pragmatic prosody. This assumption implies that pragmatically determined sentence prosody will cause difficulties in language contact situations such as the one under consideration here, namely the language contact of Turkish and German, given that IS interacts with prosody in both languages but to different extents as a cross-linguistic comparison will reveal which is presented later.

Evidence of language change due to contact situations for two of the respective crucial pragmatically determined prosodic features, pitch increase and post-focal de-accentuation, is provided by Xu, Chen & Wang (2012). Post-focal de-accentuation is denominated as post focal compression (PFC) in their study, since they assume for tone languages that underlying lexical tones are still present in the prosodic structure though they might be represented very compressed after focus. In a study on focus marking in Taiwanese, Taiwan Mandarin and Beijing Mandarin they show evidence that Taiwan Mandarin most probably has lost PFC due to close contact with Taiwanese. Acoustically, the main difference between the three languages lies in the presence and absence of PFC in the *f0* contour. In Beijing Mandarin *f0* is lowered on post-focus words, whereas in Taiwanese and Taiwan Mandarin PFC is totally absent. At the same time the speakers of all groups increased *f0* on focused words. The authors state that the most unexpected finding in this study is that Taiwan Mandarin, which is closely related to Beijing Mandarin, realizes focus in a manner very similar to Taiwanese. Given the historical origin of Taiwan Mandarin, the absence of PFC is interpreted as a possible loss of PFC as a result of close language contact with Taiwanese, mainly due to the highly developed bilingualism in Taiwan.

The assumption that PFC is lost via language contact is also supported by other studies, e.g. Swerts & Zerbian (2010) for English as a second language. A failure to de-accent given information is also reported in Gut (2009) for learners of English from various L1 backgrounds. Ramírez Verdugo (2002) also reports difficulties with marking prominence relations corresponding to IS for Spanish learners of L2 English. No studies have been carried out so far that show the opposite effect. A typological change towards the integration of PFC or other marked features into a language which originally does not use this prosodic feature is not reported yet in the corresponding literature. Accordingly, the results of these studies show that markedness is a further tool to make predictions with respect to contact-induced language changes on the supra-segmental level. Although the integration of a marked feature which has been transferred from a marked language to a less marked language has not been described yet in a study I am aware of, the successful acquisition of marked features has been shown already in different studies of bilingualism indicating that markedness might be a usefull feature in predicting changes/ difficulties in L2 acquisition, but also lacks global vadility. In a study with Turkish learners of German as a foreign language Zerbian et al. (2014) report that one out of seven students shows no difficulties at all to produce pitch increase and de-accentuation in German which are marked features, though pitch increase is not a feature of the L1 Turkish of the speakers.

Sennema et al. (2016) discuss the concept of markedness by the help of PFD in German as a tool for teaching German as a foreign language.

The results of the following experimental study with German-Turkish bilinguals more over show that marked prosodic features may even be transferred from L2 into L1 based on and contributing to requirements of bilingual communication.

IV.2.2.3 FLEGE´S (1995) SPEECH LEARNING MODEL (SLM)

A concrete model of second language learning in Phonology constitutes Flege`s (1995) Speech Learning Model. It provides a more multifaceted perspective of bilingual language acquisition not soley based on structural implications but including variation based on individual language acquisition. Flege and his colleagues conducted a considerable amount of bilingual studies on the production and perception of phonetic segments in a second language (e.g. 1987 Flege & Port 1981, Bohn & Flege 1992, Flege & Munroe 1994, Flege, MacKay & Piske 2002 Flege, Schirru & MacKay 2003). Although the main goal of their research is to understand how speech learning changes over the life span, their model provides multiple aspects which lead to establish a model indicating general tendencies and motivations for changes in bilingual language development. To this effect some of the aspects taken up in their model can serve as a toolbox for predictions with respect to expectable changes in bilingual varieties.

In SLM it is claimed that one of the most important principles governing the structural output of bilingual speech is AOA as reported above with respect to the determination of different types of bilingualism. *The earlier the better* is one of the general observations with respect to L2 acquisition in the studies of Flege and his colleagues. Nonetheless, they also report cases were AOA does not seem to have an impact on the development of L2 primarily observed in individual language production. To this effect and in contrast to their claim of *the earlier the better* which implies that the ability to learn a second language diminishes in correspondence to the neurologically maturing of speakers, Flege (1995) assumes that the phonetic system used in speech production and perception remains adaptive over the life span. Despite the general observation that for most learners more success in L2 acquisition is provided the earlier the acquisition starts, he claims that there is neither objective evidence for a sharp drop in L2 learning success at a particular age, nor evidence for the successful acquisition of an L2 by all children and a failure for all adults. Accordingly, SLM departs from Trubetzkoy’s (1939) claim and Lado’s (1957) adaption that L2 learners perceive L2 sounds through the grid of their L1 phonology. Learners are said to produce and perceive L2 phonemes as if they were L1 phonemes. Weinberger (1990) for example reports of Japanese and Russian learners of

English who mispronounce English /θ/ as /t/ or /s/ given that Japanese and Russian both have /s/ and /t/, but lack English /θ/.

SLM on the other hand SLA claims that the non-native perception of L2 sounds does not remain constant. L2 sounds may at first be identified with an L1 sound but, as learners gain experience they may gradually discern the phonetic difference between the L2 sounds and the closest L1 sounds. A phonetic category representation may be established for the new L2 sound that is independent of representations previously established for L1 sounds. SLM proposes that the development of new categories is influenced by two important variables: the cross-linguistic distance of the categories and the age of acquisition (AOA).

It is more likely that speakers establish a new category in L2 the more the L2 sounds differs from the closest L1 sound. The earlier acquisition starts the less distance is supposed to be needed to trigger a new L2 category formation (e.g. Flege 1992, Huang & Jun 2011, Chen & Fon 2008). Experiments on feedback training (e.g. Strange 1992) for example show that language specific perceptual patterns are modifiable to some extent showing that the perceived relation of L1 and L2 sounds may change during L2 learning. In a study with late and early Italian English bilinguals Flege, Schirru & McKay (2004) show that both early and late bilinguals can gain access to features that are not used in their L1. The study furthermore tests the hypothesis that bilingual vowel production in L2 differs from monolingual vowel production as a result of two mechanisms: phonetic category assimilation and dissimilation. SLM posits that an L2 phonetic category may dissimilate from a neighboring L1 category in order to preserve phonetic contrast between the elements of L1 and L2. This mechanism is thought to operate when a new category has been established for an L2 speech sound. Category assimilation on the other side operates when a new category fails to be established in L2. Category formation is blocked if instances of an L2 category continue to be identified as instances of an L1 category. In this case SLM predicts that a merged category will be developed that subsumes the phonetic categories of the perceptually linked L1 and L2 sounds. By means of the results of an acoustic analysis of the production of English /e^{I}/ by different Italian L1 and English L2 bilinguals (early vs. late bilinguals and high vs. low use of L1) Flege shows that early bilinguals with low use of Italian produce the English vowel with significantly more movement than native English speakers. The exaggerated movement produced by these speakers is interpreted as a dissimilation effect in order to maximally separate both languages from each other given that Italian /e/ is produced with less movement than the English vowel. Both late bilingual groups on the other side produce undershoot of movement of English /e^{I}/ when considered as groups which at first sight is interpreted as a failure of establishing a new category resulting in assimilation by merging both categories. However, they produce vowels with more movement than Italian monolinguals. Still some late bilinguals produce native-like vowels indicating the learnability of categories at each AOA. These observations, which are also confirmed by speech perception experiments (e.g. Flege & Hammond 1982), refute the hypothesis that L2 speakers produce and perceive L2 sounds solely through the grid of their L1 phonology and show that new categories in L2 can be developed during language acquisition.

A further crucial claim of SLM concerns the interaction of both languages of bilinguals. Based on the findings of a study on the production of vowels by adult German learners of English conducted by Bohn & Flege (1992), SLM proposes that L1 and L2 categories exist in a common phonological space. In order to maintain contrast within that phonological space SLM hypothesizes that a category which is established for L2 may be deflected away from the L1 of a bilingual and so differ from a native speaker`s category of the L2 sound. This leads SLM to expect that even when categories are established in L2, the L2 sound might not be produced exactly as by native speakers. This view is also supported by the observation that very proficient L2 speakers tend to keep both phonological systems as distant as possible which leads to dissimilation processes or divergence as originally assumed by Weinreich (1954). However, divergence does not imply separation of the language systems but supports the hypothesis that L1 and L2 are phonetic subsystems that interact with each other through phonetic category assimilation and phonetic category dissimilation.

Related to the assumption of language interaction Flege (1995) criticizes that there is only small or no interest in the influence of L2 on L1. Interaction by means of interference cannot be considered a uni-directional phenomenon. Learning an L2 can also affect the segmental production in L1, since the phonetic subsystems of both languages cannot be separated from each other. Flege (1987b) reports of experienced native English speakers of French who produce English voiceless stops /p t k/ with shorter (French like) VOT values than monolingual English speakers do. Conversely, experienced native French speakers of English produced /p t k/ with longer (English like) VOT values than monolingual French speakers. According to SLM, category formation may be blocked by the continued perceptual linking of L1 and L2 sounds. The phonetic norms may be approximated indirectly through a restructuring of the properties specified in a phonetic category used to process perceptually linked L1 and L2 diaphones. This explains why the production of L1 stops begins to resemble that of corresponding L2 stops. The observation that L1 and L2 are not isolated systems has prompted more cognitive-oriented approaches of language change which will be discussed in more detail in the subchapter IV.2.3 (e.g. Paradis 1978, Mack 1989, Grosjean 1989).

Though SLM`s hypotheses are mainly based on observations on the segmental level, they are commonly used to make predictions for structural changes on the supra-segmental level as well. Recently, Mennen (2015) presents a model which exclusively targets the development and acquisition of supra-segmental features. Different linguistic dimensions including the relationship between pragmatics and prosody in bilingual language acquisition are considered. Since the the relation between prosody and pragmatics in bilingual language acquisition is a core feature of the present thesis, Mennen's model will be shortly summarized in the following subsection. The model is furthermore of interest since it represents (i) a synopsis of former theories and models of language acquisition and change from different linguistic areas and (ii) an adaption of Ladd's (1996) cross-linguistic variation model to L2 acquisition.

IV.2.2.4 L2 INTONATION LEARNING THEORY (LILT)

Most models on second language acquisition focus on the acquisition of segmental features. However, intonation is regarded as particularly vulnerable to cross-language influences as shown in several studies (e.g. Mennen 2004, Grabe 2004, Jilka 2000, Gut 2009, Ramirez Verdugo 2002). With LILt Mennen (2015) provides a model of bilingual language acquisition especially concerning the acquisition of intonation. Based on Ladd`s (1996) cross-linguistic variation model LILt proposes four dimensions in which similarities and differences in the inventory of phonological elements and their combinations can occur in the intonation across languages. By means of those dimensions predictions can be made with respect to structural differences between two languages with the aim of predicting relative difficulties in the L2 acquisition process.

The four dimensions proposed by Mennen (2015) along which similarities and differences between L1 and L2 can be characterized are: (1) The systemic (phonological) dimension, (2) the realizational (phonetic) dimension, (3) the semantic dimension, and (4) the frequency dimension.

(1) Similarities and differences in the phonological dimension concern cross-linguistic typological differences in the inventory of phonological elements (e.g. pitch accents, boundary tones, phrase tones etc.) and also how the different structural elements combine with each other.

(2) The phonetic dimension concerns how the elements of the phonological dimension are phonetically implemented, i.e. how pitch accents align with segments, how pitch accents are scaled, or what their slope is, since studies have shown that languages may have similar phonological categories, but differ in their phonetic implementation (e.g. Atterer & Ladd 2004 for pre-nuclear rises in German and English).

(3) With respect to the semantic dimension the similarities and differences between languages in the use of structural elements to convey meaning are concerned.

(4) In addition to Ladd (1996), Mennen adds a further dimension for cross-linguistic comparison which refers to the similarities and differences in the frequency of use of the inventory and distribution of primitives like rises and falls or the implementation of pitch accents or boundary tones. She states that although languages may have the same tonal inventory or

phonological categories they might differ in the quantity of usage. Evidence for this is provided by many studies. Jilka (2000b) for example reports that American learners of German use rises in certain discourse situations, where L1 German speakers would typically use a fall, though both languages share rises and falls.

By means of the four dimensions proposed by Mennen clear predictions can be made for the structural deviations of the languages of a bilingual in comparison to monolingual realization. However, Mennen notes that it is not always easy to classify deviations within the four dimensions, since dimensions can also interact with each other. A deviation in the realizational dimension may result in a semantic or functional deviation as shown by Kühn (2009) for German learners of Spanish. Whereas monolingual Spanish speakers produce different interrogative intonation patterns to signal different pragmatic meanings of interrogativity, German learners of Spanish with different levels of proficiency solely use a final rise to indicate interrogativity which leads to perception errors by monolingual Spanish speakers. With respect to the results of this study Mennen's four dimensional model does not only show value in predicting difficulties in the interplay of pragmatics and prosody, but also for the discussion of the results in the light of the difficulties of the acquisition of functional-related prosody as outlined in the previous section (cf. Zerbian 2015). Additionally Mennen's model emphasizes that it is of specific importance in the acquisition of intonation to consider the semantic dimension when making predictions with respect to the relative difficulty in L2 intonation. The consideration of the semantic or pragmatic dimension respectively, is also of crucial relevance for the following experimental study of bilingual intonation, since the intonational cues under consideration are related to the pragmatic meanings of IS and sentence type.

Once languages are compared across the dimensions, predictions with respect to deviations in L2 can be made. The goal here is to predict the relative difficulty learners experience with certain L2 parameters. As her model still lacks concrete empirical evidence, Mennen generates hypotheses concerning L2 acquisition difficulties from prior second language models, first of all SLM as outlined above and Best & Tylors`s (2007) Perceptual Assimilation Model for Language Learners (PAM-L2)[50] . The PAM-L2 model is not explicitly outlined in this chapter since it is a further speech learning model of the segmental level with similar hypotheses as SLM. In addition to SLM, PAM-L2 includes observations on physical abilities or disabilities of L2 speakers which may affect native like production of L2 sounds.

[50] According to SLM (Flege 1995), Best & Tylor also assume that the L1 and L2 sound systems interact on the phonetic and phonological levels and they also support the hypothesis that L1 and L2 phonetic categories exist in the same phonological space. As proposed in Flege (1995) they assume that listeners may identify L1 and L2 sounds as functionally equivalent even if the phonetic representations are dissimilar. The ability of a language learner to establish new phonological categories is based, in part, on the perceived similarities and differences of the L1 and L2 sounds; specifically how the tokens of an L2 contrast assimilate onto L1 segments. Within this assumption they propose different assimilation categories along which discrimination of L1 and L2 features occur.

Based on the assumptions of both models, Mennen assumes that depending on the similarity and difference of the L1 and L2, sounds will either be assimilated when they are sufficiently similar or new categories will be developed when they are sufficiently different. On the basis of Ladd (1996) and Gussenhoven (2006), Mennen (2015) furthermore claims with respect to intonation that it is more difficult to determine the existence and perception of intonational categories due to their gradient and categorical variation and their relation to paralinguistic meanings. However, she assumes that the explicit distinction between phonologic categories and their phonetic realization for the segmental acquisition of categories also holds for the acquisition of intonation. She states that similarities and differences can occur along more than the phonological dimension and that phonetic variation therefore may have an impact on the ability to perceive and produce phonological categories in L2 intonation.

Along with Flege (1995) she also hypothesizes that AOA is an important determiner in predicting overall success in L2 acquisition of intonation. However, she also mentions that support for an age effect is not systematic across studies. Beside speaker dependent variation she emphasizes that AOA appears to have an impact on different aspects of intonation to varying degrees referring to a study by Chen & Fon (2008) who found an effect of AOA in the acquisition of nuclear pitches but not on pre-nuclear pitch accents.

A further study showing that not all dimensions present the same amount of difficulty in L2 learning is provided by Jun & Oh (2000). They found that more advanced American learners of Korean were better than less advanced learners only in the production of target like phrase final tones to mark phrase boundaries, but not in the phonetic realization of accentual phrases. This shows that they were better in producing aspects of the phonological dimension than of the phonetic dimension. Furthermore, they had difficulties producing phonological phrasing related to semantic aspects. Hence, Mennen assumes within the LIlt model that intonation production is more successful when acquisition starts early, still it is not assumed that the influence is necessarily the same for each dimension of intonation.

A further hypothesis generated from SLA and PAM-L2 concerns the assumption that the same learning abilities are available to adults learning a L2 as to children learning an L1 or L2. Accordingly, Mennen assumes that learning mechanisms used in L1 learning are available to L2 learners also for intonation. In other words learners are able to reach L2 norms with respect to the production of supra-segmental features. L2 intonation parameters will approximate L2 norms as learners gain experience.

Finally, with respect to the interaction of L1 and L2, Mennen agrees with SLM and PAM-L2 in assuming that both share a common phonological space. The existence of a common space allows phonological categories to interact with each other. The interaction can not only result in assimilation or merged structures, but can also take the form of dissimilation at the supra-segmental level. This polarization effect is interpreted as a mechanism to maintain contrast between the phonological categories of L1 and L2 existing in the common phonological space as proposed by Flege (1995). In the study of Leeuw et al. (2012) mentioned above, where assimilation processes are observed in the variety of German learners of English, also dissimilation is found by means of later peak alignment in pre-nuclear rises of the speaker's L1 in comparison to German monolinguals. This dissimilation effect furthermore provides evidence for the impact of L2 on L1.

By making reference to AOA and the existence of a common phonological space, Mennen's model includes observations primarily based on neurolinguistics studies. Though not explicitly mentioning aspects of language activation and the storing of languages in brain her claim of different dimensions along which language acquisition occurs and especially the claim of a frequency dimension shows parallels to crucial ideas of neurolinguistics models of bilingual language organization and acquisition as the Activation Treshold Hypothesis and the Subsystem Theory (e.g. Paradis 2004) which will be explained in detail in subchapter IV.2.3.2.

With LIlt Mennen provides a concrete model to make predictions with respect to the relative degree of difficulties in the L2 acquisition process of supra-segmental features. Differences in bilingual production are not reduced to features in which the involved languages indeed differ from each other, similarities are also supposed to cause changes in order to keep both languages separate. Although the contrastive analyses of differences and similarities between two contact languages along four different linguistic dimensions offers a compound tool to predict structural differences in bilingual speech, it still does not capture the amount of variation observed in bilingual speech. It still does not provide sufficient explanation to what actually motivates the interaction of two phonological systems and what hinders them to interact. As outlined here, studies often show varying results not only with respect to the transfer of the same phonological feature. Whereas some studies of second language acquisition report difficulties in the acquisition of PFC, other studies report the successful acquisition of the same feature even in early stages of acquisition. Hence, a comparison between two languages along different linguistic dimensions is a fruitful point of departure to make predictions for possible changes. Nonetheless it pretty much adheres to structure once again. But language competence is more complex- as already correctly pointed out by referring to different dimensions- and so acquisition must be more complex. There must be an underlying substancial structurally independent reasoning why structures change in one language constellation and in another comparable constellation not.

Linguists from other language disciplines, such as sociolinguists and neurolinguists have a different perception of variation and interaction, of course. Their perspective is less surface- and output-oriented, but may. consider the benefit of a change and/or pathologic aspects of bilingualism amongst many other aspects. An approach which basically negates an intrinsic structural motivation in language change and interaction is Matras (2007, 2009, 2010). His approach considers the advantage of interaction in bilingual conversations and is much more oriented towards communicational goals. A feature is transferred from L1 to L2 on the base of its contribution to communication. Neurolinguistics in turn focus on the role of language activation in bilinguals and how languages are represented in the cerebrum. The degree of activation facilitates the interaction of two language subsystems in one common language supersystem. Both perspectives: the functional and the activational will be examined in separate subsequent subchapters. Fundamental in the development of neurolinguistics theories on bilingualism have been observations on bilingual individuals with language impairment, especially aphasia. Studies on these grounds provide knowledge on how the brain organizes the various languages it has to deal with. For its very nature attrition is a generic topic in language impairment studies for which it interfaces with non-neurolinguistic approaches of bilingualism. Attrition has played a major role in research concerning the impact of L2 on L1 which is still under represented in bilingual research, but focused in the present thesis. Independent of the question if patalogical attrition should be tretened together with non-patological attrition, or if a separate and specified terminology would be more adequate, research on attrition will be examined in the next subchapter in order to get an idea of bidirectional interferences which the models examined so far all assume, but not exemplify. Before going over to the examination of attrition as well as the mentioned functional and activational approaches of language interaction, I will give a brief summary on the L2 learning models of phonology presented in the preceeding subchapter.

IV.2.2.5 SUMMARY L2- LEARNING THEORIES

In the preceding section theories and concepts which have been crucial in the development of approaches considering bilingual language acquisition in the fields of phonetics and phonology were outlined. Starting the discussion with cross-linguistic approaches which focus on the contrasting structural features between languages, the task of comparison is maintained as a baseline in all following theories and approaches. However, additionally similarities and also different dimensions have become the focus of attention in making predictions with respect to difficulties in bilingual language acquisition of supra-segmental features. Transfer as one of the crucial mechanisms in bilingual language acquisition is picked up by all theories and models as a central theme in bilingualism. Whereas CAH initially states that any difference between both languages of a bilingual leads to the transfer of the L1 feature into the L2, markedness considerations relate transfer to the universal markedness of a feature and state that those features which are more marked in L2 than in

L1 will cause difficulties in the language acquisition process. Within the framework of markedness, Zerbian (2015) argues with respect to intonation that pragmatically determined sentence prosody is more marked than structurally determined sentence prosody implying that the former causes more difficulties in bilingual language acquisition. Within this framework the intonation of focus and sentence type, as investigated in the present thesis, are considered as marked features which should cause difficulties and/or structural changes in bilingual varieties.

In Flege's (1995) SLM It is also assumed that category development is crucially influenced by the cross-linguistic distance between L1 and L2 categories. Speakers are supposed to be more successful in the development of new sounds the more it differs from the closest L1 sound. L2 sounds are first identified with an L1 sound. However, L2 learning is a dynamic process. As learners gain experience with the L2 they gradually discern the phonetic differences between L2 and the closest L1 sounds establishing a new category for L2. Two crucial mechanisms are involved in the structural development of new categories: assimilation and dissimilation. Assimilation is supposed to operate when a new category fails to be established in L2 and the category continues to be identified as an instance of L1. A merged category will be developed that subsumes the L1 and L2 sound representations under the same category. Dissimilation implies that even when a new category is established the sounds still may differ from monolingual sounds in order to preserve contrast between L1 and L2. Both, assimilation and dissimilation may cause structural changes not only in L2 but also in L1. According to what Grosjean (1989) proposes, SLM assumes that L1 and L2 share the same phonological space implying that both languages constantly interact with each other. With respect to bi-directional interaction, SLM hypothesis that L1 and L2 sounds are perceptually linked to each other resembling each other resulting in different realization of L1 sounds by bilinguals compared to monolinguals. Though SLM delivers a complex tool box to make predictions with respect to structural changes in L1 and L2 it is based and built upon observations on the segmental level of phonetics and phonology.

Mennen's (2015) L2-learning theory explicitly focuses on the bilingual acquisition of supra-segmental features. She assumes four different linguistic dimension along which languages may differ. A cross-linguistic comparison of the contact languages enables the prediction of the relative degree of difficulties in the learning process. Similar to Zerbian's (2015) consideration based in the markedness theory, LILt assumes that the phonological realization of tunes related to pragmatic meanings such as sentence type and focus should cause difficulties in the acquisition process assuming that both languages involved differ in the realization of the respective features.

All of the presented theories of bilingual language acquisition with focus on phonology emphasize to some extent the determination of differences or similarities between contact languages in order to predict structural differences in bilingual speech development. Hence the focus of these theories and most research studies is on the structural aspect of language acquisition. The structural output in bilingual varieties is explained by the structures of the underlying monolingual varieties of the involved languages, including differences and similarities. Hence, structural change is motivated by the structure itself. However, the same studies observe variation in the acquisition of structural features which cannot be explained in a satisfying way departing only from the structure itself. Structurally-based approaches cannot provide a global understanding of the complex and diverse process of bilingual language acquisition, use and its diversity. As already emphazised in Mennen's model via the integration of multi-dimensionality of linguistic features, the integration and investigation of multiple aspects of the language reality are required to reliably describe bilingual language varieties and the mechanisms at work. In a way a synopsis is needed, bringing togetjher views and results from diverse angles of linguistic research. Structurally based approaches can only point out tendencies in the direction of development of bilingual speech. But they are not sufficient to capture the huge variation observed in bilingual studies in a nourishing way. The use of prosodic features to indicate pragmatic cues in bilingual Turkish as observed in the following study cannot be related to approaches relying on structure only. Indeed, the results of the study on German-Turkish bilinguals contradict the predictions the markedness approach is based on, since marked prosodic features are used in a bilingual variety while the corresponding monolingual variety lacks such features. For the sake of a holistic understanding of the diversity and variation in bilingual speech, and especially the results of experiment 2, they have to be integrated into a synopsis of different view points. A functional dimension needs to be taken into account in addition to the underlying neurophysiological reality of bilingual language organization.

In the next subsection I will dwell on cognitive aspects of bilingualism which provides a base for the exploration of a functionally motivated language development Aspects have already been considered within the structural models presented so far, such as the idea of a common phonological space. However, cognitive studies deliver concrete evidence of such ideas by the help of modern technology such as neuroimaging. Most influencing in the development of neurlinguistic approaches to bilingualism have been studies on attrition. Although originally neurolinguists use the term attrition to refer to the loss or unavailability of certain aspects of language caused by a demage of the underlying cerebral structures, researchers of other linguistic subfields use to transfer the term to observations of non-pathalogic language "loss"in any kind of bilingualism especially considering the decline of L1 competence due to the impact of L2. By that means studies on attrition provide further background to theoretical and practical aspects of the following experiment 2 which deals with changes in L1 that can be related to the impact of an early acquired L2 which is considered only marginally in the preceding structurally based theories of bilingual language acquisition.

IV.2.3 THE IMPACT OF L2 ON L1

The study of transfer from L1 to L2 has a stable tradition as seen in the preceding subsection and generates a whole cluster of research from different perspectives to understand and describe the changes occurring in L2. The opposite influence, that of L2 on L1 which according to Cook (2003) might be termed reverse or backward transfer, or bidirectional transfer as in Flege (1995), has attracted much less interest. However, under certain circumstances not only L2 structures undergo changes, but also native language skills may change due to the impact of bilingualism. The impact of L2 on L1 is primarily discussed in the framework of heritage language and attrition settled in cognitive studies. Psycholinguistics is predestined to find effects of L2 on L1 since it strongly concentrates on the development of organizational models of language storing. Studies try to determine organization principles in the representation of several languages in the brain and their potential interaction. Sharwood Smith (1983) proposed the term cross-linguistic influence to describe the interaction between two or more languages including mechanisms resulting from interaction such as transfer, borrowings and other influences to cover a wide range of language change and its orientation towards both directions.

L2 influences on L1 have often been observed in connection with a person´s prolonged stay in a different country usually resulting in less frequent contact with L1. Paradis (2008) states that L1 concepts may become less and less available and may merge with the closest L2 equivalent after a long and extensive exposure to the L2 cultural context. But also in rather stable bilingual settings with regular contact to both languages changes in L1 are commonly observed such as typically occurring in migrant communities. Migration is often associated with the pressure to acquire the language of the country of residence and contact to the point that L1 decreases or is reduced to the language within the family. This aspect of the impact of L2 on L1 has also become an interesting sub-segment within the field of research on the so called heritage languages. Although there is no clear concept of the term heritage language, it basically refers to the use of languages other than the dominant language in a given social context. This includes foreign languages which are familiar to people with cultural connections other than the dominant culture and language. These languages are familiar to individuals or communities in a variety of ways. They may speak, read and write the language on a daily base or solely have a passive understanding of the language. Within the German context, Turkish has been described as a heritage language which is acquired on a stable base by means of first language acquisition within the German-Turkish minority. Heritage languages have alternatively been called minority languages, community languages or home languages.

Within the field of language change, language shift, and language death within communities in language contact situations, such as immigrant communities or language minorities the successive loss of the first language has only recently gained deeper interest in linguistic research. Attrition is the term that mainly has been used to refer to the structural changes in the L1 of bilingual speakers.[51] Although researchers, amongst them Gross (2004) and Cherciov (2011), define attrition as the reduction of L1 language skills and the restructuring of L1 according to L2 patterns to the point where communication in the L1 is impaired, the term is not only used in the sense of permanent changes including the loss of a feature in L1, but it is also used to refer to temporal changes. Attrition is preferably investigated within the framework of cognitive linguistics, though increasing interest can also be observed in studies of diverse backgrounds such as general language descriptions in phonetics and phonology. However, the notion attrition is used to a much lesser extent in these studies to refer to diverging structures in L1 and L2. Studies which report of structural changes in L1 in the area of phonetics and phonology (e.g. Flege`s 1987, Major 1992, Mayr, Price & Mennen 2012) rarely use the term attrition in contrast to studies reporting lexical and syntactical changes. Instead, most commonly researchers refer to processes of assimilation, dissimilation or merging as described in the previous subsection.

In the discussion of the phenomenon of diverging structures that emerge in the development of the L1 of a bilingual speaker it is supposed that bilinguals follow similar courses of language development as monolinguals do, however experiments show that the structural output of both groups may differ. The challenge now is to identify and interpret these differences in a way that considers both directions of the different structural development with the goal of establishing a more holistic understanding of language acquisition and use.

It has long been assumed that language attrition or maintenance specially depend on personal background factors such as AOA or length of residence (LOR) and other extra-linguistic factors such as input and exposure, personal attitudes and experiences Contrastingly, nowadays it is assumed that attrition is governed by the same mechanisms and processes that have been show relevant in all other aspects of language acquisition and use (e.g. Schmid 2013). During the last three decades linguists came to realize that attrition is not an isolated phenomenon experienced by individuals

[51] However, attrition is not reduced to the L1 of a speaker or speaker community, but it is also used to describe language loss in L2 or foreign languages. In that way attrition is defined by Ecke (2004) as the decline of any language (L1 or L2) skill or proportion thereof in a healthy speaker. De Bot and Hulsen (2002) accordingly state that neither first nor second languages are immune to attrition. They state that through use languages keep their place in the memory, with none-use they fade. They become less accessible and the knowledge might get lost.

under certain circumstances, but part of the process of language development. Anderson (1982: 86) already suggests that:

> Language attrition is a special case of variation in the acquisition and use of a language or languages and can best be studied, described, documented, explained, and understood within a framework that includes all other phenomena of all other language acquisition and use.

Referring to language development, Ecke (2004) argues that bilingualism is not by all means an all win situation. He assumes that acquisition is achieved only by the cost of loss and divergence from monolingual competence- a pretty polemic view perhaps. To shed more light on that relationship, investigations on bilingualism would be useful which include both L1 attriters and L2 learners since they can provide additive value over the more traditional comparison of L2 speakers with monolingual speakers alone. Any theory of language development should account for attrition alongside other aspects of acquisition, use and processing.

Also Jessner (2003) argues that language attrition is a function of language acquisition. He argues that psycholinguistic systems that contain several languages are less stable than monolingual systems and require more repair and reactivation processes to maintain the system in a steady state. Within this framework L1 attrition is defined as retrievability of linguistic knowledge in L1 and an increase of competition with increased knowledge of L2. This perspective gives L2 a clear role in furthering L1 attrition. It also implies two sources for L1 attrition: increased use of another language and the direct interaction with L2 through increased use and proficiency in L2. The relative lack of natural maintenance in an L2 environment is coupled thus with greater proficiency in L2.

The link between both processes is also established in studies on language use and proficiency. In a study of Hulsen & de Bot (2001) where proficiency levels of first, second, and third generation immigrants are investigated, it is shown that speakers perform best in the original L1 in the first generation and worst in the third generation with respect to accuracy and speed in production and perception tasks. Language attrition is taken to be the result of a serial of internal changes in the L1 and as a consequence of the increasing proficiency in L2. Paradis (1993), concentrating on language activation states with respect to attrition that a lack of use is sufficient for a language to attrite. Herdina & Jessner (2002) furthermore claim that from a psycholinguistic perspective, forgetting is a neutral process which also includes linguistic knowledge. The more time passes since acquisition and use and the more other knowledge in a further language is acquired, the harder it gets to recall information.

Regarding this negative connotation connected to the term attrition, reseasrchers should be more careful when using the term. It is a very small step to prejudge bilingual speakers for a supposed lack of competence by stating that acquisition/learning a second is only possible by the cost of the first language. This fact poped up very clearly while recruiting probands for the present thesis and further experiments within the SFB 632. Bilingual speakers of Turkish and German were ashamed to participate in language experiments. Many of them thaught that they now would even be stigmatized by their native language competence in Turkish as previously come to pass with their L2 German. Bad reputation about their German competence had spread through media with respect to the results the PISA studies. In our profession as linguists we have to reinforce the awareness that learning more than one language does not automatically diminuish first language competence, but that variation and the emerging of varieties are as natural as having different dialects of a certain language.

With respect to the identification of rule governed processes by and large the same mechanisms described for L1 on L2 impact, such as transfer, simplification, generalization and the reduction of markedness have been described for the impact of L2 on L1. Mayr, Price & Mennen (2012) e.g. report of L1 differences in the speech of Dutch female twins of which one emigrated to an L2-English speaking environment 30 years ago. Acoustic analyses of VOT and vowels indicate changes to the emigrant twin's L1 accent. They describe observed attrition in the form of cross-linguistic assimilation patterns confirming claims that L1 and L2 sounds may be related to each other at a system wide level.

Still, there is no certainty regarding the concrete principles governing bilingual language acquisition and how attrition is related to acquisition. On the one hand it has been observed that speakers follow similar and comparable paths in language acquisition. On the other hand, language learning and change by means of attrition is not a straightforward process and depends on several phenomena. Taking a multicompetence perspective, language development needs to be seen as a process with constant amenability to changes concerning all languages and the speaker dependent (extra) linguistic background. Bilingual speakers constitute a speaker group which is distinct from monolingual users which should be studied in their own right. Neither language acquisition nor attrition is adequately understood when they are discussed in isolation.

The L2 learning models and approaches based on phonetics and phonology outlined above (e.g. Flege 1995, Mennen 2015) have shown that a multitude of variables play a role in the language acquisition process and so they do in the process of attrition. These include factors from within the linguistic system as well as non-linguistic factors and individual characteristics of each speaker. Among the external factors that may force attrition, also AOA has been shown as a relatively straightforward impact feature. A fairly large amount of studies provide evidence that L1 maintenance and attrition differs for speakers who´s full exposure to L1 ceases before puberty (for an overview see Montrul 2008). It has been shown for migrants who leave the L1 country before puberty that attrition does not affect the underlying structural aspects of the L1, but attrition is merely a result on the surface reflecting online problems in the integration of linguistic knowledge at the performance level (e.g. Schmid 2009).

A further variable which has been pointed out as having a deeper influence on attrition/maintenance of the L1 is the social class a bilingual is associated with. Social class is potentially linked to education level which along with language prestige, attitude and acculturation may foster or hinder interaction with the host community. The association of the L1 with a low social status would encourage bilinguals to abandon it in favor of the higher status L2. Schmid (2004) argues that attitudinal factors and the speakers desire to integrate into the host community are among the strongest predictors of language loss. Empirical studies on education as a key factor to integration into the prestige society and giving up the L1 in favor of the L2 on the other side are rather inconclusive with respect to the impact on attrition. Yağmur (1997) conducted a study with L1 Turkish and L2 German speakers, using education as a control variable. The results of two different groups with differing educational backgrounds do not reveal significant inter-group differences with respect to attrition which could be related to education.

A slightly different view on attrition is contended by Pavlenko (2005). She argues that L2 influence on L1 is a phenomenon in its own right and cannot always be taken as evidence for language attrition. Within a cross-linguistic influence framework she argues that attrition is just one out of several processes at work in the interaction between languages beside co-existence, transfer, internalization of new concepts, restructuring, convergence, and shift. Pavlenko (2005) furthermore concerns the temporal status of changes in the L1 of bilingual speakers. She states that structural differences may be a temporary or permanent phenomenon, but rarely signify that corresponding L1 structures are permanently lost.

Within the light of Pavelenko's (2005) assumption, many questions remain open or yield conflicting evidence even after three decades of research on attrition. It is hard to determine if an observed feature which differs from a monolingual realization represents indeed a phenomenon of attrition in the sense of permanent underlying change or even loss or if it represents a superficial phenomenon. It is also difficult to decide whether differing structures observed in a bilinguals L1 are a temporary phenomenon in language processing or if indeed the linguistic knowledge changes. To this effect Seliger & Vago (1991) propose a competence-performance dichotomy. They argue that it is crucial to distinguish between those attrition phenomena that are the outcome of two active linguistic systems at the same time and those which are an indication of underlying grammatical knowledge in L1 being influenced by the presence of L2.

Considering the types of changes the question arises whether attrition affects the competence of a language itself or merely the performance of a language. In a study concerning a Spanish migrant population in Switzerland, Grosjean & Py (1991) state that attrition at the level of linguistic knowledge entails a restructuring of stored presentations. Grammatical acceptability tests show that a new so called hybrid Spanish arises resulting from the close contact between L1 and L2 where new structures are progressively integrated into L1. At the level of performance Köpke & Schmid (2004) describe that attrition results in difficulties in the control of that knowledge which may remain intact. This implies that attrition is performance-related rather than a phenomenon of competence. Likewise de Bot & Hulsen (2002) state that for lexical knowledge language loss is in fact nothing but a decrease in the ability to have immediate access to a word in production and perception. However, it is a methodological challenge to distinguish competence from performance. Jessner (2003) claims that attrition is ultimately only traceable through performance. It is almost impossible to filter out performance effects in language research. All testing involves performance aspects to a greater or lesser degree. They can be minimized but never totally eliminated.

To this effect, an essential point of critique with respect to the term attrition is that it is commonly considered as a permanent or temporary regression from a speaker's previous linguistic performance and competence. The concept of attrition in the sense of losing features of L1 due to close contact to L2 presupposes that the respective feature which undergoes a change has been used previously by individual speakers. In the case of heritage languages as represented in experiment 2 it cannot be concluded a priori that features from monolingual Turkish that are not used in bilingual Turkish have been acquired previously by that speaker group. It is quite possible that due to the permanence of the contact situation, speakers of the second or third generation do not acquire certain features in their mother tongue at all anymore. Unlike adult attriters who were fully proficient speakers of their L1 before learning the L2, children's competence of their L1 might not develop in the same way before getting in touch with L2. Accordingly, children of the second or third generation of migrants speaking heritage languages may from the very beginning develop structures that differ from monolingual L1 structures due to a different input in their L1 acquisition. The presupposing of a previous L1 knowledge with respect to certain features corresponding to a monolingual variety would be a mere illusion then. This discussion indicates once more how delicate the term attrition should be used. Since attrition originates from clinical research with patients who lose their language abilities through suffering cerebral damage through a stroke or alike, the use of the term originally refers to the unaccessability of language features formally acquired and performed. We cannot by it self conclude that bilinguals acquire the very same features of a language as monolinguals do.

Furthermore, discussing this discrepancy also strongly refers to the problematic highlightened in the first subsection of the present chapter: the various concepts of bilingualism. Researchers must be very specific about the speaker group they refer to. Even heritage speaker groups are not all alike.

Due to the equalization of attrition and language loss researchers within the field of attrition fortunately recently prefer using more neutral terms like language maintenance or language change.

Recognizing the fact that L1 structures do not just disappear, but that structures are often replaced by others, some authors also argue for a use of the term enrichment instead of attrition (e.g. Hulsen et al. 2002). Looking at the process of changes in L1 within the concept of language loss or attrition can somehow be reductive since it implies that potential changes are judged as a negative effect of bilingualism ignoring possible positive communicative effects.

Within the aims of the present study I suggest that studies on second language acquisition and first language attrition –independent of the adequateness of the used terminology- can strongly contribute to a holistic understanding of the nature of the acquisition of two languages and the interaction between two language systems. Attrition is understood as an integral component of language acquisition, but the attrition of features in the first language due to the impact of bilingualism is not understood as the initiation of complete language attrition, i.e. language loss. In the present study attrition is understood as a developmental process which provides space for structural innovations in L1. I also assume that attrition can be part of a binary opposition by means of gaining new features, but the gaining of new features does not necessarily imply the loss of L1 features, it can also enrich the L1 by filling gaps. Within the results of the present study I will show that bilinguals can rely on a much more complex inventory of phonological features based on the competence in both languages which might be used in bilingual conversation to maximize communicative goals by means of contributing to an optimized contextualization of a massage by the help of using features of both languages.

IV.2.3.2 DYNAMIC INTERACTIONS AND LANGUAGE ACTIVATION

Apart from the consideration that the L2 of bilinguals is a determining factor in the attrition, change, or maintenance of the L1 of individuals or bilingual speech communities, psycholinguistic studies contribute a further important aspect of the mutual influence between the languages of bilinguals. Studies considering the mental representation of languages and their activation show that languages are not stored separately but constantly interact with each other.

Grosjean (1998) proposes that bilingual speakers are not two monolingual speakers in one person. The knowledge of two languages is not just the cloning of monolingual competences, but a different state. The languages of a bilingual speaker are not independent, stand-alone systems, but are constantly interacting within the same mind. Cook (2003) proposes that two languages in one mind must form a language super system at some level rather than being completely isolated systems.

As with approaches on bilingual phonological language acquisition there are several theories in the framework of neuro-and psycholinguistics about the presentation of languages in the brain too. The most accepted nowadays is the Subsystem Theorie with Paradis (e.g. 1981, 2001, 2004, 2009) as its main defender. Paradis (2004) claims that language is part of the larger verbal communication system which is constituted upon at least four systems: implicit linguistic competence, explicit metalinguistic knowledge, pragmatic abilities and affect/ motivation. Each of theses functions relies on different cerebral systems. An important fact for bilingual research since the degree of reliance on each system is a great source of variability in bilingual communication. Language itself (referring to what usually is called grammar) as a neurofunctional system is divided into modules subserving phonology, morphosyntax and semantics. Each individual posseses as many subsystems for each modul as languages are spoken. Hence, a bilingual speaker disposes of two phonological subsystems which are integrated into the larger language system. Each modul is independent of the other moduls as the underlying principles are different in natur. By that means German phonology has more in common with Turkish phonology than with German syntax. It is different parameters of the same principles.

According to what has been proposed in Levelt's (1995) language production model for monolinguals, Paradis (2004) proposes that the conceptualizer is one integral part of the verbal communication system, but it is outside the linguistic system composed of the different moduls. Pragmatic competence, i.e. to infer meaning from non-linguistic cues, is not only phylogenetically and ontogenetically prior to linguistic competence, but represented in distinct areas of the cerebrum. Whereas grammar is settled in the left hemisphere, pragmatics is settled in the right hemisphere. Both grammar and pragmatics are necessary for the interpretation of an utterance. Both are used simoultaniously though each has its own isolable neural substrate. Evidenz for different locations is provided by individuals with lesions in the right hemisphere which show deficits with inferring meaning from contextual information such as the perception of affective prosody. In other words, bilinguals share one common conceptualizer wheras they have different substystems, for e.g. phonology for the languages they speak. This view is of special interest since it demonstrates that pragmatic competence as a part of the conceptualizer is processed equally for monolinguals and bilinguals. By that means pragmatic concepts such as information structure which are actually language and cultural specific should be stored together in one common conzeptualizer in bilinguals wheras the phonological knowledge e.g. the use of prosodic features to indicate information structural concepts is stored in different subsystems.

Besides pragmatic competence verbal communication comprises of two different sources of knowledge: implicit linguistic competence and and metalinguistic knowledge. What is represented in metalinguistic knowledge is different from what underlies implicit linguistic competence. One may be aware of a specific grammatical rule, but one is not aware of its set of implicit computational procedures. Both rely on different memory systems with different anatomically distinct, neural substrate: procedural memory and declarative memory (Paradis 2004: 45). The development of each component depends on context. In L1 acquisition implicit linguistic competence develops prior to explicit linguistic competence. In L2 learning usually metalinguistic knowledge develops first. To the extent that there is implicit linguistic knowledge it develops in parallel with explicit knowledge in L2. Competence and knowledge are both age-driven in individuals and teaching-method-driven within institutions. Paradis (2009:114ssq.) states that the acquisition of implicit linguistic competence is basically determined by the gene human FOX P2. It determines the expression of various genes at specific time points during brain development and at diverse time points during life time.The lack of exposure to language input at the time of its programmed triggering of the relevant genes disrupts language acquisition. Individuals must than compensate through explicit memory. Biologically, a gradual loss of plasticity of the procedural memory is observed after about age 5. Cognitively, a greater reliance on conscious declarative memory for learning is observed from about age 7.

During L2 learning there is no transformation of explicit knowledge to implicit competence, rather there is a gradual shift to using implicit competence. Paradis compares this incidence to a French boy who over adolescence goes over from drinking water for supper to drinking wine by gradually adding more wine to the water. The water does not convert into wine, but it is gradually replaced. Metalinguistic knowledge remains available in L2 learning, even if it is simply not generally used anymore. During learning metalinguistic knowledge serves as a model for practice. Practice itself leads to the internalization of implizit computational processes.

L2 acquistion in early bilinguals on the other side is largely carried out in parallel to L1 acquisition. It is presumed that grammatical rules are not explicitly learned, but implicitly acquired just as in L1. However, neuroimaging studies suggest that even when a L2 has been acquired early (not learned) the two languages are each subserved by distinct language specific circuits at the micro-anatomical level though within partially overlapping and shared neurofunctional language areas (subsystems). Accordingly a limbic base in early L2 learning is supposed. During acquisition the L1 is integrated into the phylogenetically and ontogenetically earlier communication system for which it posseses a solid limbic base which is responsible for drives, desires, emotions, motivation.

Motivation constitutes a further component of the verbal communication system. It is basically this drive that is missing in L2 learning and it is a fundamental indicator of individual variation in language learning. Formal L2 teaching leads to the exclusive use of neocortical areas- hence without limbic participation. Language learning is than comparable to any abstract knowledge, just as learning mathematics or geographie. To the extent that L2 teaching provides motivation, it will engage the dopaminergic system and improve performance in learning and acquisition. Practice will either speed up controlled prozessing or promote implicit competence. The frequency with which a feature is encountered eventually promotes internalization.

Reference to practice and frequency of use is a further breakthrough in neurolinguistic research in bilingualism. Based on generalizations about what is known about neuron activation potentials Paradis (1993) proposes the Activation Threshold Hypotesis (ATH). Individual neurons have a critical level of activation (threshold) that must be reached for a cell to generate activation potential. This mechanism of neuron activation and signal transmission as a result of chemical/ electrical signals is supposed to be involved in the activation of mental processes in general and linguistic representations in particular (Paradis 2009: 28ssq.) It is propsed that an item is activated when a sufficient amount of positive neural impulses have reached its neural substrate. Every time an item is activated its threshold is lowered and fewer impulses are required to reactivate it. The selection of a particular item requires that its activation exceeds that of any other possible alternative. This implicates that its competatives must be inhibited, i.e. their threshold must be raised.

The same applies to the activation/ inhibition of the different languages of a bilingual. Each language system has a specific activation level. Every time a language is activated the activation of the other language is inhibited and its activation threshold is raised. ATH is automatically raised to avoid interferences. Hence, the activation of antagonistic processes can be observed. However, intensive use/ exposure to one of the languages in a bilingual environment lead to a lower activation threshold for the language even in early fluent behaviourally balanced bilinguals (cf. Perani et al 2003). Thus frequency of use facilitates the activation of a language. On the opposite, long-term disuse of a language leads to a higher activation threshold. Access difficulties may lead to dynamic interferences where features of a more activated language might be used to generate utterances in the other language. Schmid, Köpke & de Bot (2013) state that for native speakers and very advanced L2 speakers processing is largely automatized. Less advanced speakers or speakers that have not used a language for a long time encounter difficulties. As a result, trade-off effects between phenomena concerning complexity, accuracy and fluency may be observed. Hence, active contact and use of L2 in various domains fosters the development of differing structures in L1.

Using cues from different languages in parallel ,as frequently observed in bilingual communities, indicates that the inhibitory mechanisms are not applied in these instances. An example for non-inhibition is given by Paradis (2009:156). In the expression “se fallío” English *to fall* and the Spanish Past Perfect are used in parallel. It is concluded that bilingual and unilingual modes are mind sets that bias the activation threshold; the bilingual vs. unilingual mind set allows or inhibits switches/ transfer. Since both languages are integrated into the larger language system interaction between subsystems is possible.

Grosjean (2001) moreover states that all linguistic systems remain to some degree active and available in a speakers mind at all times independent of the intention or requirement to use one language alone. Related to this, Grosjean (1998, 2008, 2012) also emphasizes that the language mode used in a study is crucial for the resulting structural output. He states that it is central to control for the mode bilinguals are in when they are recorded or tested, since bilinguals find themselves in various language modes in which they communicate. Modes are organized along a continuum at which ends they either communicate in a monolingual or bilingual language mode. According to Grosjean bilinguals communicate in a bilingual mode with speakers with which they share the same linguistic knowledge by means of two more or languages and in which codeswitching and borrowings may take place. On the other side bilinguals communicate in a monolingual language code when they interact with monolinguals of one of their languages. Beside these extreme modes, bilinguals also communicate in intermediate modes which depend on factors such as interlocutors, situation, content of the discourse, or function of the interaction. With respect to the elicitation procedure of the following bilingual experiment 2, the set-up is designed to gatter the communication in a bilingual language code. All speakers are bilingual as well as the interviewer who was instructed to exclusively talk Turkish. However, all participants knew from each other that they are bilingual German-Turkish speakers for which a bilingual mode should be activated in the recording section. Furthermore, both languages of the participants are used on a daily base which results in frequent activation of both languages implying a low activation threshold which should promote interaction. However, the domains in which both languages are used differ. Whereas L1 Turkish is mainly used as a home language, all speakers use German in the public domain in their social and professional life.

Interaction is also the foundamental base of bilingual communication within the framework of Dynamic System Theory (DST) in psycholinguistics. Herdina & Jessner (2002) develop the Dynamic model of Multilingualism (DMM) which considers a multilingual language system as a complex dynamic system in which all subsystems are supposed to interact with each other and with the surrounding environment. If one variable changes all other variables in the system are also affected. Subsystems are in constant adjustment to the changing environment and internal conditions to maintain a state of balance. Mutual interaction between variables implies that they influence and co-determine each other's changes over time.

IV.2.3.3 FUNCTIONAL INDUCED LANGUAGE CHANGE

In the previous section cognitive aspects of the representation of two languages in a bilingual's brain have been outlined. On the base of language activation processes and the understanding of langauges as subsystems of a higher language communication system exchange between the different languages of a bilingual are understood as instances of dynamic interactions independent of their underlying structure.Integrating the suggestion of interaction into a functional-driven conversation analysis of language change, Matras (2010) assumes that bilinguals do not organize their communication in the form of two languages or linguistic systems. Rather bilinguals have an enriched and extended repertoire of linguistic structures at their disposal. In Matras (1994, 1998) he states that bilinguals benefit from the interaction of two languages, since they are able to syncretize mental planning operations. This allows effective exploitation of the full linguistic repertoire while complying with context appropriate requirements.

To explain structural differences in a contact variety Matras (2010: 51sq) proposes to take the perspective of the bilingual speaker to investigate how bilinguals communicate in bilingual settings. He states that languages are not analytic systems to the speaker, but components of an overall repertoire of forms, constructions, experiences on which the bilingual draws in order to communicate. Similarily to what has been proposed with the antagonistic processes of activation and inhibition in language use, Matras claims that the key to communicating in a bilingual repertoire is to draw demarcation boundaries. Within the repertoire of bilinguals demarcation boundaries serve complete with communicative conventions of the surrounding speech community. The task of language contact research should therefore focus on how successful bilingual speakers maintain demarcation lines within their linguistic repertoire instead of describing how systems converge. The task of research is to describe communicative navigation strategies and the conditions under which speakers license themselves to lift boundaries and make discourse-strategic use of the repertoire in its entirety, or indeed of the contrast between the components of the repertoire leading to permanent changes. His basic assumption is that the demarcation of boundaries and their removal around specific structures are functional to communication in bilingual settings.

With this perspective Matras as well as Grosjean with his idea of a bilingual mind-set, open up to neurolinguistic research trying to integrate findings of this area into the ideas of classical linguistic research in bilingualism which basically considers contact-related change as a partial convergence of two systems. Matras (2009) alternatively describes convergence as a replication of a pattern based on pivot matching for which it is functional and not structurally-driven. Pattern replication can lead to a whole readjustment of morpho-syntactic structures and can result in a typological shift as in some contact languages of the Balkan region. As outlined in (4.1) continuous language contact leads to convergence in constituent order in Macedonian, Macedonian Turkish, Balkan Romani and Greek.

(4.1): Pattern replication in word order (Matras 2010: 73)

a. Macedonian Turkish:

(o)	*istiyor*	*git-sin*	
3SG	want.3SG	go-3SG.SUBJ	

b. Macedonian:

toj	*sak-a*	*da*	*id-e*
3SG	want-3SG	COMP	go-3SG

c. Romani (Balkans):

ov	*mang-el-a*	*te*	*dža-l*
3SG.M	want-3SG-IND	COMP	go-3SG.SUBJ

d. Greek:

(aftós)	*thel-i*	*na*	*pa-i*
3SG	want-3SG	COMP	go-3SG

'He wants to go.'

The four languages in (4.1) replicate the same word order although Macedonian Turkish does not use a complementizer. The pivotal feature that is replicated here in all languages is the order of constituent clauses. However, convergence developments by means of pattern replication can involve much more subtle shifts and still have the potential to bring about major shifts in the morpho-syntactic typology of a language. With respect to this, Matras postulates that the borrowability of a structure or the ease of change does not depend on particular conditions such as natural occurrence frequency, structural constraints, or sociocultural factors, but is motivated by the semantic-pragmatic features of a structure.

Isolating the semantic-pragmatic feature that motivates borrowing offers a hypothesis about the genesis of borrowing processes. Matras (1998) examines a sample of various Romani dialects in contact with different languages, a sample of languages under the historical influence of Arabic and a sample of some 40 Central American languages of contact with Spanish. The comparison of these samples reveals an implicational borrowing hierarchy with respect to coordinating conjunctions. A certain item is only borrowed if another item is borrowed too. In (4.2) the implicational hierarchy is outlined. The conjunction on the left is only borrowed if the preceding conjunction is borrowed too.

(4.2) Implicational borrowing hierarchy of coordinating conjunctions from Matras (2010: 79)

but > or > and

With respect to the outlined hierarchy in (4.2) Matras (2010) assumes that it is possible to reduce the opposition between the values to a single pragmatic feature, since they are all values of the same functional sub-category, namely coordinating conjunctions. The semantic-pragmatic feature that unites them is the expression of contrast. On this basis Matras postulates a link between the function and the likelihood of borrowing. The compromise between form-structure continuity and organizational adaption is what makes almost every structure of a language vulnerable to convergence in language contact.

Apart from Matras' (2010) observations on the segmental level, the form-meaning congruency is also observed by a study concerning the supra-segmental level of bilingual German-Turkish speech. Based on Gumperz' (1982) approach of contextualization cues, Queen (2001, 2006) shows that bilinguals use linguistic elements of both of their languages in order to contribute to the signaling of contextual pre-suppositions. Similar to the observation of merging processes by Flege (1995) on segmental phonology, Queen (2006) observes the integration of patterns from both languages in the German-Turkish of bilingual children. In Queen (2006) a study is represented referring to the use of intonation contours in German-Turkish bilingual children showing that bilingual children show effects of assimilation processes on the intonational level. Bilingual children develop merged categories which depart from structures that are present in the respective monolingual languages. More specifically Queen (2006) observes two different rising contours in the German and the Turkish variety of three German-Turkish bilingual preadolescent girls. Here she also observes the transfer of rising contours from Turkish into bilingual German and additionally she observes the opposite transfer from German into Turkish. The result of that transfer process is that the bilinguals use the same rising patterns to contextualize the same pragmatic meaning in both of their languages. The girls use Rise 1 for cases of continuation and cohesion among sequentially ordered PPh's. Rise 2 is used to signal pragmatically salient information within the narrative closing. The availability of distinct final rises widens the range of possibilities to indicate the mentioned narrative characteristics. Rise 1 is reserved to more or less normative functions of German, whereas Rise 2 is similarly used in Turkish. Both of the rises differ in their frequency of occurrence, are phonetically distinct since one rise is sharper than the other and they are related to different functions. She argues that the use of two distinct rises can be ontologically tied to the effects of the contact between Turkish and German and its stable bilingual community. In contrast to the more commonly used notions of assimilation, transfer, or merging for such changes on the segmental level, Queen proposes to call the merged categories fusion. The transfer process observed in Queen's study provides clear evidence that an intonational contour including its pragmatic meaning which has no corresponding prosodic realization in monolingual German, is carried over into the L2 of those bilinguals maintaining the same pragmatic meaning as in the source language. By that means the results of Queen (2001, 2006) confirm Matras' hypothesis that change is motivated by its semantic-pragmatic function in the discourse.

However, it is not only the lack of a certain feature or construction in a contact language that motivates language change, nor is the selection of structures necessarily conscious. Rehbein & Karakoc (2004) report that German-Turkish bilingual children sometimes use Turkish aspect forms with German functions. Herkenrath, Karakoc & Rehbein (2003) observe an extension rather than a total change of function of the Turkish forms.

In the model outlined in Matras (2010) based on observations outlined in Matras (2007, 2009) language contact phenomena are considered as the outcome of functional-driven choices. Choices are functional in the sense that they are supposed to be the product of language processing in goal-oriented communicative interactions. In order to meet communicative goals bilinguals exploit the meanings and functions of inherited structures and enhance them to carry out organization procedures which are replicated from the contact language. Heine & Kuteva (2003, 2005) also assume a mental comparison between a model and a replica language.[52] The result of this comparison is the use of a construction of the model language in the replica language with the potential to carry the same meaning. The construction is grammaticalized in order to take on the meaning conveyed in the model language.

According to Gumperz (1982) the contextualization of meaning is possible by accessing a broad repertoire of contextualization cues (e.g. prosody, lexical and syntactic choice etc.). All these cues have in common that their function as guides to conversational structure and inference relies on their contrastive relationship to other cues. Intonation is particularly robust as a contextualization cue and within narratives it has the function to cue the ordering and sequencing of a narrative event. Based on Auer (1995), Queen (2006) points out that a switch from one language to another may function as a cue in bilingual contextualization. However, in cases where codeswitching does not serve as a contextualization cue, bilinguals will rest in the repertoire of potential cues rather than specifically in the use of more than one language in contrast to monolinguals. This assumption is in line with Matras' approach that bilinguals can access or make use of their full linguistic repertoire in order to maximize communicative goals. Pattern replication follows a pivot-matching of both linguistic subsystems according to a communicative goal in order to choose a task-effective and context-appropriate construction. Within a bilingual communication situation a speaker can scan through his entire linguistic repertoire. As a result of this scanning a speaker identifies a construction

[52] In Heine & Kuteva's work as well as in Matras' work contact languages are classified as one language which serves the resource language- the model language- from which structures are borrowed and a further language which serves as the target language for the borrowed structures which is the replica language. Both models are primarily based on the assumptions of borrowing. Borrowing describes a mechanism of second language acquisition in which a feature is taken from one language and used in the other language.

which would serve a particular task most effectively. The construction which is identified as the optimal construction is assumed to not have an established representation in the replica language which is appropriate in this context. The speaker therefor tries to optimize communicative efficiency by combining the selected construction with context-appropriate forms. Such creativity has the potential of increasing and enriching the inventory of constructions in bilingual's interaction. However, pattern replication is not reduced to individual conversation contexts, but can be fully integrated into a bilingual grammar by means of grammaticalization. According to Matras (2010) the acceptability of such pattern replication is crucial to the success of grammaticalization. The acceptability of the use of a construction depends on the interlocutor's reaction which is crucial to the chances of being replicated by others and to eventually lead to language change. Matras states that new constructions are unlikely to be grammaticalized when they are introduced by a single second language speaker, while in a situation of collective bilingualism innovations are more likely to prevail.

In sum what is crucial to a functional perspective of bilingual language change is the assumption that the convergence or replication of patterns between the two languages of a bilingual maximizes the efficiency of speech production in bilingual communication (Matras 2010:70). The key to the understanding of the change is its function with respect to a communicative goal. This view offers a broadening of the understanding of the motivation of bilingual language change. It provides a perspective which understands language change not exclusively as structural driven, but bound with the task-oriented function that a certain category and change has. By that means a functional perspective of bilingual language change offers an additional approach providing a broader understanding of the motivation for the transfer of features from L2 into L1 which would not be expected within the framework of structurally-based theories. This approach will be of crucial relevance in the understanding of the changes observed in the following experiment 2 with bilingual Turkish speakers.

IV.3 SUMMARY: BILINGUISM IN THE FRAMEWORK OF PHONETICS AND PHONOLOGY

The preceding outline of learning theories, cognitive models of bilingual language representation including a functional perspective of bilingual language use, and first of all the manifold types of bilingualism lead to the conclusion that each study should be very precise in the description of the exact bilingual speaker group under investigation since the structural output of different groups may lead to different conclusions about language developmental processes. Adult learners of a second language tend to show different structural patterns than early simultaneous bilinguals though for both groups the L2 may have become the dominant language in use and they might tend to show similar mechanisms in the acquisition process.

As a second point, it stands out that all language models assume to some extent an interaction between both languages of a bilingual. This interaction has mostly been described as influence of L1 on L2, but by means of a holistic description of bilingual language development and the involved structural changes when compared to monolingual language varieties it also includes the reverse effect- the impact of L2 on L1. This reverse effect has mainly been discussed in the framework of language attrition. However, especially studies on bilingual phonetics and phonology avoid a reference to the term attrition which implies on the one hand that a changing feature has been formerly acquired and used by the individual speakers or bilingual speech communities, and on the other hand it implies some stage of language lost in favor of the other language instead of referring to a mere structural development.

To predict tendencies of such structural changes in bilingual language varieties most models refer to structural differences between the involved languages based on the concept that contrastiveness is a predictor for difficulties in acquisition and language change. Structural changes are basically explained by transfer mechanisms or the merging of structural features of both languages. In Matras' (2007, 2010) functionally-oriented approach on the other hand, the term borrowing is used to indicate the use of features of one language in the other.[53] As a promising predictor for changes in bilingual varieties universals such as markedness have been considered as determiners for the direction of language change. By means of markedness scales features are indicated as more marked than other features and understood as more likely to not occur in bilingual languages or to disappear easily in language contact in favor of less marked structures. With respect to intonation it has been stated by Zerbian (2015) amongst others that it is more difficult to acquire when it is related to pragmatic meanings. To this effect, also Mennen`s (2015) multi-dimensional approach of the acquisition of supra-segmentals proposes different degrees of difficulty in the acquisition process related to different levels of cross-linguistic contrasts between languages. Within the distinction of different degrees of difficulties across different dimensions the importance of the semantic/ pragmatic dimension in the acquisition process is emphasized. As in the markedness approach the acquisition of functional prosody, i.e. the pragmatic-prosodic interface, is supposed to cause difficulties in the learning process. Despite the detailed differentiation a point of critique which not only refers to Mennen`s theory, but includes most theories within the field of phonology is the lack

[53] Generally, borrowing refers to a mechanism which is observed as a phenomenon of code-switching (cf. Auer 1995). Code-switching by means of using features from two languages in spontaneous bilingual conversation in turn is not investigated in the following experiment. To this reason, I will base my observations in grand parts in Matras' (2007, 2010) approach while considering the changes in L1 Turkish as phenomenon of transfer and not as borrowings.

of differentiation between learning and acquisition. Though the surface reflections, like transfers, might be the same for learners as for early acquisition both phenomena rely on different mechanisms and memory systems resulting in a different processing of language with subsequent differences regarding e.g. fluency or accuracy as shown by many bilingual studies including phonological studies.

As a baseline for the emergence of transfer and language convergence or divergence, the interaction of both linguistic systems of bilinguals is presumed by all of the consulted approaches. The languages of a bilingual are not considered as indepently working systems, but are in constant interaction. This interaction most of all finds a solid grounds in neurolinguistics observations. Especially by the help of bilingual speaker with lesions approaches have been able to be developed providing strong evidence of how languages are organized in the brain with respect to their location and connectedness. The Subsystem Theory (Paradis 2004) proposes that the verbal communication consists of different components of which linguistic competence is only one part. A further component is pragmatic competence which works in parallel with the linguistic system although arealwise separated. The linguistic competence on its side is composed of as many subsystems as a speaker speaks. By that means a German-Turkish bilingual composes of two phonological subsystems. Pragmatic concepts, such as IS, however are processed in a common conceptualizer. For the activation of linguistic representations neurolinguistic research has furthermore shown that a sufficient amount of neural impulses is necessary and proposes the Activation Threshold Hypothesis (Paradis, 2004).With respect to the activation of lexical items the Hypothesis assumes that neural impulses spread to the lexical representations of both languages and the respective links to phonetic features, morphosyntactic forms etc. are triggered regardless of the language to be performed. To inhibit the activation of the respective item of the language that is not spoken, antagonistic inhibiting mechanisms are operating. Each time an item is activated fewer impulses are necessary and its activation threshold lowers. Frequent activation of items promotes their activation and use in the other language. By that means the bilingual mind-set biases the activation threshold and allows/ inhibits interaction for which the language subsystems of bilinguals are in constant adjustment to the changing environment and internal conditions. Heredina and Jessner (2002) therefore claim that bilingualism is a dynamic system. If one variable changes, all other variables change too.

Based on the assumption of interaction, Matras (2007, 2009, 2010) proposes to adjust the perspective of bilingual language change and its description from a primarily structural-driven understanding to a more speaker and conversation oriented perspective. He proposes that change is motivated by the aim to maximize the efficiency of speech production in a bilingual situation where the key to the understanding of change is its function with respect to a communicative goal.

The diversity of approaches departing from diverse linguistic areas concerning changes in bilingual varieties and their diverging results demonstrate that the description of bilingual language acquisition and development is inherently limited by the capacity of the particular theory. Each approach yileds important insights and consolidated findings, but non is reliably able to provide a comprehensiv approach including all variation combining the important observations of different linguistic areas. It seems like an unsolvable task resulting from stuckedness in micro-worlds. I do not deny that micro research at each single area is important, but maybe it is time to open up a bit more, to lower boarders and contribute to each other. Linguistic and neurolinguistics theories should be compatible as already projected by Whitaker- the founder of the journal *Brain and Language*- in 1974. Bilingualism and especially prosody is a fruitful tool for that. As one cannot understand prosody, if one does not consider pragmatics and the cognitive world behind it, one cannot understand structural phenomena of bilingual varieties without considering the working brain behind it. Bilingualism (multilingualism) is complex concern which requires a compound view. With respect to the observations of the German- Turkish contact variety outlined in Experiment 2, results are discussed considering suppositions of structural, functional as well as cognitive approaches. To this concern the previously outlined studies and approaches on bilingualism provide a first base for generating expectations with respect to the structural changes, the mechanisms and processes that drive the change and the cognitive motivation behind changes which are likely to emerge in the prosodic focus and question type marking of Turkish bilinguals with German L2. Considering the previous theories and assumptions on bilingual language change it becomes evident that hypothesizing about potential contact induced language changes requires a previous contrastive analysis of both languages. Structural divergences in a bilingual L1 can only be traced back to the influence of an L2 if we are aware of the respective features in the L2. For Turkish this analysis is realized by means of the previous literature review on Turkish prosody and the gap filling results of experiment1. For German, which is a much better investigated language, a literature review of the prosodic system is provided in the next chapter.

CHAPTER V: ASPECTS OF GERMAN PROSODY

V.1 INTRODUCTION

Although both main experimental studies of this dissertation concern prosodic focus and sentence type marking in Turkish (monolingual and bilingual) certain knowledge about German intonational properties is essential. Structural changes in bilingual speech are most often acknowledged as transferred features from the contact language. In order to reliably conclude that features which structurally differ in bilingual Turkish from monolingual Turkish, result from contact-induced changes originating from the German L2 of the speakers, also the intonation contour of German yes/no questions in different focus conditions needs to be taken into account.

In the present chapter a brief introduction into different aspects of German prosody is provided. They are chosen with respect to the core features under investigation in the experimental study: information structure and sentence type. As a point of departure, I will shortly outline the basics of German word and sentence stress assignment and comparatively sketch two basic models of intonational phonology of German in order to provide the basis for a following description of the impact of information structure and sentence type on the shape of the intonation contour in German. The literature review will be amplified by a short report of an additional experiment explicitly targeting the prosodic marking of focus and sentence type in German yes/no questions. The experimental design is comparable with the one used in the experiments concerning Turkish and helps to establish the contrastive features between both languages with respect to a specific constellation within the pragmatic-prosodic interface.

V.2 ASPECTS OF GERMAN WORD STRESS

According to the framework of AM theory pitch accents associate with word stressed syllables and build a fundamental part of intonation contours (cf. Ladd 1996). The pattern for stress location differs across languages.[54] The German word stress system is classified by the *Dreisilbengesetz* (three-syllable-rule) (Kiparsky 1966, Vennemann 1992) which states that German monomorphemic words bear primary word stress on one of the last three syllables. To this effect, Dohmas et al. (2013) describe that word stress in German is not fixed to a certain position. However, the most frequent stress pattern in German is penultimate stress.

With respect to the rules or principles that determine the word stress positions, syllable weight is the most discussed factor though approaches diverge with respect to the definition of light and heavy syllables.[55] Approaches concentrating on quantity sensitivity (e.g. Kiparsky 1966, Giegerich 1985, Féry 1998, Dohmas et al. 2013) show that German is sensitive to quantity like English, as final syllables bear stress as long as they are heavy. If not, the word accent swaps over to the penultimate when heavy or to the antepenultimate when the penultimate and the ultimate are light syllables. Féry (1998) as a representative for the assumption of quantity sensitivity, bases her assumption on a broad and detailed corpus analysis of word stress location in German. She claims that penultimate stress is the regular stress pattern for most German words based in the configurational nature of most German words which contain a light ultimate syllable for which word stress swaps backwards to the preceding heavy syllable.

Although studies agree in identifying penultimate stress as the most regular stress pattern in German words, the impact of quantity is refuted by other scholars (e.g. Vennemann 1991, Eisenberg 1991, Wiese 1996/2000, Kaltenbacher 1994). Wiese, as an example for the approaches that classify German word stress without the impact of syllable weight, bases his approach of German word stress

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[54] In languages with fixed word accent the placement is predictable and can be generated by stress placement rules which may be phonological and/or morphological determined. In languages with free word stress the placement is phonemic (distinguishes between different words) and is anchored in the lexicon of the language, as e.g. in Russian. To classify different stress systems in metrical phonology Hayes (1995) proposes four parameters that experience a language specific implementation as demonstrated in (2):

(2)	foot:	trochees vs. iambic
	direction:	from right to left vs. from left to right
	word:	first foot strong vs. last foot strong
	quantity:	sensitive to quantity vs. not sensitive to quantity

[55] Most approaches for German develop their own notion of syllable weight. The most common concept of syllable categories is described in Hyman (1985). He points out that languages with a quantity sensitive stress system, are defined in terms of moras, i.e. units of syllable weight. A syllable is normally counted as monomoraic, or light, if its rhyme consists of a short vowel, whereas a bimoraic, or heavy, syllable comprises a rhyme with either a long vowel or a short one followed by a consonant. Féry (1998) on the other side considers only super heavy syllables (i.e. syllables with three filled rhyme positions as in VVC or VCC) as heavy while Vennemann (1990, 1991, 1995) postulates that any closed syllable is heavy in contrast to open syllables, which he throughout classifies as light, irrespective of vowel length. Thus a VV rhyme is heavy in the traditional approach, but light in Féry's and Vennemann's approach, and a VC rhyme is heavy in the traditional and Vennemann's approach, but light in Féry's. Additionally, it has been pointed out that according to Giegerich (1985), final consonants are extrametrical and therefore final syllables are heavy if consisting of a long vowel or of a short vowel followed by two consonants.

on rules of stress assignment, similar to the rules proposed by Liberman & Prince (1977) and Hayes (1981, 1995) for English. Wiese's rules are outlined in (7).

(7) **Rules of word stress assignment** (Wiese 1996: 282)

(i) Foot Rule:	Going from right to left, construct feet of the type strong week, if not possible, strong.
(ii) Word Rule:	In a phonological word, the rightmost foot is strong.
(iii) Adjunction Rule:	Adjoin remaining syllables in a minimal way as weak members of a foot.

Wiese's rules also generate penultimate stress as the regular stress pattern whereas ultimate and antepenultimate stress are considered exceptional word stress pattern which are pre-specified in the lexicon (see also Eisenberg 1991). This shows that rule-based approaches have to find explicit explications for each and every variation across exceptional word stress. Constraint based approaches on the other side have the advantage to be able to integrate variation.

A further approach on German word stress which also identifies penultimate stress as the regular stress pattern is provided by Claßen et al. (1998). They propose to analyze German word stress by sensibility to prominence instead of sensibility to quantity based on Hayes' (1995) proposal that phonetic properties can have an impact on prominence.[56]

V.3 ACOUSTIC CORRELATES OF WORD STRESS IN GERMAN

Stress is usually realized on the penultimate syllable in German and can be described as acoustic salience related to a greater force of articulation based on complex acoustic features such as greater intensity, shallower spectral tilt and duration (Ladd 1996:58). The difference between stressed and unstressed syllables on the word stress level is basically realized by the differences between the phonetic realizations of vowels since they are the main segments carrying the stress/unstressed distinction.

Numerous studies (e.g. Isaçenko & Schädlich 1970, Kaltenbacher 1994, Heuft & Portele 1994, Jessen et al. 1995, Dogil 1995, Claßen et al 1998, Wiese 2000) have been conducted investigating the acoustic parameters that signal word stress in German. Experimentally established acoustic cues of

[56] Hayes states for example that many prominence factors seem to have a natural phonetic basis: e.g. tensed vowels are perceived louder than not tensed vowels due to differences in the spectral tilt.

word stress in German are similar to the acoustic parameters related to a greater force of articulation as described by Ladd (1996) including vowel duration, pitch and intensity changes, as well as laryngeal features. Though most studies (e.g. Macke 1949, Heike 1969, Dogil 1995, Jessen et al. 1995, Mooshammer et al. 1999, Lintfert & Schneider 2005 for children, Schneider & Möbius 2007) establish vowel duration as the primary cue to German word stress, its reliability is still under discussion and results of acoustic measurements diverge according to the methodology and stimuli involved respectively, see Heuft & Portele (1994).

Studies considering the role of intensity in German word stress diverge in their results. Whereas an experimental study of Isaçenko & Schädlich (1966) [57] reports of the decisive relevance of intensity in the perception of German word stress a study of Heuft & Portele (1994) on the other side shows that a manipulation of overall intensity makes no difference in the perception of stressed and unstressed vowels. Accordingly, the results of Jessen et al. (1995) show that intensity as a correlate to word stress strongly lags behind duration. Based on Sluijter (1995) Claßen et al. (1998) furthermore attest that accented syllables are produced with increased subglottal pressure, which coincides acoustically with an increased energy in the middle and high frequencies. Their results show that vowels of unstressed syllables have a reduced spectral tilt in comparison to vowels in stressed syllables and point out the perceptual relevance of intensity when regarded as spectral balance. They claim that together with duration, spectral balance indeed is a stable perceptual correlate of word stress. According to Hayes (1995) they propose a further level of prominence in the determination of word stress which is sensible to voice quality. They suggest that a reduced spectral tilt is a relevant factor of prominence in metrical phonology as a reduced spectral tilt has the perceptual effect of being experienced louder.

In addition to the impact of intensity in the perception of word stress Isaçenko & Schädlich (1966) find that *f0* is a decisive feature in word stress realization.[58] The study of Jessen et al. (1995) also includes *f0* in a hierarchical ordering of relevant word stress correlates although they claim that *f0* and intensity parameters do not contribute with much reliability to the expression of word stress in German. Dogil (1995) furthermore postulates that *f0* should rather be considered as a correlate of sentence stress than of word stress. According to Sluitjer & van Heuven (1996), the consideration of

[57] For a perception experiment they manipulated the minimal pair Überseten/ übersEtzen by keeping the f0 constantly monotone throughout the targets. The correct stress pattern was identified by 82 percent of the speakers for Übersetzen and by 96 percent for übersEtzen which Isaçenko & Schädlich attribute to intensity which still acoustically highlighted the target syllable.

[58] In a second experiment Isaçenko & Schädlich manipulate the minimal pair Überfahren/ überfAhren by assigning two different f0 levels. The higher f0 level was assigned to the stressed syllable of each target word respectively, the lower level to the unstressed syllables. 85 percent of the subjects correctly perceived stress on the first syllable of Übersetzen and 98 percent perceived stress on the penultimate syllable of übersEtzen. Apparently, the sole manipulation of f0 was sufficient to reverse the perception of the stress pattern, which leaded the authors to deduce that f0 is the crucial acoustic correlate of word stress in German.

f0 as a correlate to stress is a result of the elicitation methodology used in some studies. According to Sluijter (1995) duration or spectral energy distribution are more likely reliable correlates of word stress in Germanic languages.

In the following sections I will provide an overview on how intonation is modeled in German concentrating mainly on the implementation of *f0* on the sentence level since it will be the acoustic feature investigated in experiment 2.

V.4 SENTENCE LEVEL PROSODY

As outlined in the previous section word stress captures a relation of prominence between syllables of a phonological word in a phonological sense. In the early work of intonation research going back to the 19th century a distinction is already drawn between different levels of accent assignment. Bremer (1893) already distinguishes between *accent* and *stress*, considering *stress* as a lexical property and *accent* as a property of a sentence which may change depending on the meaning of the phrase. Unlike Boilinger (1958), who considers stress exclusively as a lexical specification, Ladd (1996) also claims that stress in the sense of prominence on the word level and accent as prominence on the utterance level are two entirely separate systems, but that both have a reality on the utterance level. As in the previous description of Turkish prosody, I distinguish between word stress and sentence level stress.

In West Germanic languages post-lexical pitch accents are usually aligned to metrically heavy syllables by means of acoustic features, especially *f0*. Since German has been classified as an intonation-only language (Gussenhoven 2004), it depends largely on pragmatic aspects such as IS, if word stress is post-lexically represented in the intonation contour by means of pitch accent alignment to metrically heavy syllables on higher levels of the prosodic hierarchy.[59] To this effect pitch accents can also be realized on non-word stressed syllables in order to indicate contrast. In addition to pitch accent implementation, boundary tones have been considered as relevant in the formation and description of the intonation contour on a sentence level in their function to delimit intonation and/or prosodic phrases though the identity of phrase tones is disputed.

In this section I will give a very brief overview of some approaches that have been developed to describe German intonation. Within the auto-segmental metrical approach of intonational phonology two main models have been developed for the description of German intonation which remarkably differ with respect to their tonal inventory since one exclusively represents phonological categories

[59] The prosodic hierarchy is outlined in detail in Selkirk (1978, 1986) Nespor & Vogel (1983) amongst others and was also briefly introduced in chapter 2

(e.g. Féry 1993, Grabe 1998, Mayer 1997, Peters 2014), whereas the other has a phonetic orientation (GToBI[60]).

V.4.1 GERMAN INTONATION MODELS

Besides the modeling of German intonation by means of configuration (e.g. Kohler 1991, Selting 1995, Niebuhr 2007), nowadays level-based models are commonly used to describe intonation contours. The earliest strictly level based approach was established by Isačenko & Schädlich (1966) reducing the number of pitch levels in German to two, high *f0* (H) and low *f0* (L) which has been maintained in current approaches. More recent level based approaches basically have been developed within the auto-segmental metrical theory. Ladd (1996) initially uses the term auto-segmental-metrical AM-phonology to refer to the approaches to intonation which are developed following Pierrehumbert´s (1980) description of American English intonation.[61]

V.4.1.1 AM-ANALYSES OF GERMAN PHONOLOGY

Within the level based approaches two major description models have been developed. Both differ with respect to some theoretical assumptions mainly regarding the relevance of leading tones and phrase boundary tones within the formation of the inventory of phonological categories for German.[62]

For the analysis and description of distinct pitch accent categories in the modeling of intonation Gussenhoven (2004) establishes the terms *on-ramp* versus *off-ramp* approaches. The *off-ramp* approaches are based on the traditional descriptions of intonation of the British school (e.g. Crystal 1969, Halliday 1970) considering the movement from the pitch target as crucial in the determination

[60] German ToBI was initially developed by the Universities of Saarbrücken, Stuttgart, Munich, and Braunschweig in 1995/ 1996 to describe Standard German intonation. A cross labeler consistency test was carried out and reported in Grice et al (1996). Since then GToBI has been slightly modified (e.g. Grice & Baumann (2002), Grice et al (2005)).

[61] As documented in chapter II already, in AM-phonology intonation contours are analyzed as sequences of tones. Tones specify phonetic targets which are determined by pitch levels. The intonation contour of an utterance is described by means of a sequence of target points and their transitions. For a detailed description of AM-phonology see (Peters 2014).

[62] In Kügler et al. (2015) a further annotation guideline for German intonation (DIMA) is provided, which is proposed to serve as a consensus system between German intonologists. DIMA does not distinguish between trailing and leading tones but simply between two accentual tones (H* and L*) and non-accentual tones (H and L). The occurrence of tonal targets outside the tone bearing syllable is indicated by (< and >) pointing to the direction of the associated syllable. Furthermore, DIMA distinguishes between initial and final boundary tone (%L and % H).

of pitch accent categories. Pioneering work within the *off-ramp* analyses of German intonation was done by Klinghardt (1925, 1927) [63], von Essen (1964) and Pheby (1975). The *on-ramp* approaches are based on Pierrehumbert's (1980) linear-tone sequence model for English intonation and are followed by the ToBI models for many languages amongst others Spanish, German, Greece (for GToBi see Grice & Benzmüller 1995, Grice & Baumann 2002, Grice, Baumann & Benzmüller 2005). They consider the movement of the *f0* towards the pitch target as crucial in the modulation of the intonation contour and develop a more open model with respect to phonetic variation of pitch accents.

The *off-ramp* analyses largely follow ToDI (Transcription of Dutch Intonation) which was originally developed for the tonal description of Dutch (cf. Gussenhoven, Rietveld & Terken 2003, Gussenhoven 2005). On the base of Gussenhoven's (1984, 1992) preliminary work, Féry (1993) proposes a model of German intonation patterns which is settled in the framework of *off-ramp* analyses.

In the following the formation of prosodic phrases and pitch accents in German as proposed by GToBi and the *off-ramp* analyses will be discussed. The *off-ramp* analyses is mainly based on Féry`s (1993) work and subsequent developments (Grabe 1998, Mayer 1997, Peters 2006, 2009, 2014 Fuhrhop & Peters 2013, Peters 2014).[64]

V.4.1.1.1 THE FORMATION OF PROSODIC PHRASES

Based on Selkirk`s (1984) assumptions, phonologists generally assume two levels of prosodic phrasing. These levels have been given different names such as minor and major phrases, phonological phrases, intermediate phrases, accent domains, rhythmic groups (Selkirk 1984, Nespor & Vogel 1986, Beckman & Pierrehumbert 1986, Gussenhoven 2004, Ladd 1990, Hayes 1995). For German, Féry (1993) and also the Pierrehumbert based GToBI approach assume that the (IP) is the domain where sentence intonation is realized and which is divided into smaller prosodic phrases described as intermediate phrases (ip) corresponding to a PPh as outlined in chapter II for Turkish.

With respect to phrase formation Selkirk (1984) states that the formation of prosodic phrases is primarily influenced by syntactic phrasing. The main idea behind the so called mapping is that

[63] Klinghardt was a founder of the British School approach to intonation. Of special interest for the present study is that Klinghard already particularly emphasizes the need of intonation systems for second language learning since languages differ in their intonation.

[64] However, it has to be mentioned yet that Féry's more recent work differs in crucial theoretical assumptions. In the subsequent work to her 1993 German Intonational Patterns she differs from earlier assumptions of the autosegmental-metrical approaches in two main aspects: Féry & Ishihara (2009) and Féry (2011) (i) assume recursive phrasing, and (ii) claim that prosody responds to syntax and information structure in different ways. However, these theoretical assumptions do not have changing influences on the inventory of phonological categories for German as established in her previous work.

syntactic categories are considered as isomorph with prosodic phrases. Féry (1993) and the GToBI system follow Selkirk`s approach by assuming that prosodic phrases generally have perceptible boundaries that coincide with syntactic boundaries. IP-boundaries are assumed as an equivalent to a syntactic clause which is typically limited by a boundary tone, final lengthening, or the introduction of a pause. However, both approaches clearly differ in the tonal realization of ip and IP boundaries.

GToBI assumes obligatory final boundary tone tones (H%, L%) which are implemented at the end of IP's. Phrase accents (H-, L-) are implemented at the end of ip's. When both fall together both are implemented respectively (L-%, L-H%, H-%, H-L%). In contrast to Féry´s account, boundary tones are implemented even in the absence of actual additional tonal movement on the final syllable. Furthermore, optional phrase initial high and low boundary tones (%H) and (%L) are assumed in GToBI.

Féry (1993) also assumes tonal units smaller than the IP corresponding to Pierrehumberts intermediate phrases which in Féry's later terminology are designated prosodic phrases (φ) at all levels of the prosodic hierarchy. In contrast to GToBI, Féry (1993) and the following *off-ramp* analyses assume that the ip is not delimited by a phrase tone. Following Gussenhoven's (1984) Tone Linking Rule, Féry assumes that the trailing tones of bi-tonal pitch accents spread to the end of the phrase and fulfill the function which is attributed to the phrase accent in ToBI. Since in German the nuclear accent is generally followed by an abrupt fall or rise, Féry postulates that it is more economical that the post-nuclear tonal realization is an integral part of the pitch accent. The trailing tone of the nuclear pitch accent is determined by phrasing. Motivated by Ladd (1983) who explicitly doubts that every prosodic boundary must be associated with a tone, Féry (1993) furthermore does not even assume obligatory IP final boundary tones in her model of German intonation. Similar to the absence of PPh boundary tones she justifies the lack of obligatory IP-final boundary tones by the lack of concrete tonal evidence. She claims that there is no indication for a tonal downwards movement at the end of an IP which could be determined as (L%). Kügler (2007:29) provides an example for the different tonal description of intonation contours in both systems (5.1).

(5.1) different labeling of intonation contours (Kügler 2007: 29)

GToBI L+H* L-%

Schon der VerSUCH ist strafbar. (Already the attempt is criminal.)

Féry H*L

In (5.1) it is demonstrated that in GToBI an obligatory intermediate phrase tone (L-) and subsequent final boundary tone (L%) follows a (H*) pitch accent. In the phonological description of Féry on the other hand the sentence final lowering is already included in the bitonal pitch accent by means of the low trailing tone which spreads through to the end of the utterance.

Irrespective of the lack of a low final boundary tone in the German tonal inventory, Féry assumes an optional high final boundary tone. A high final boundary tone (H%) is implemented at the end of an IP when an additional movement on the last syllable occurs.[65] Consequently, the only boundary tone which is represented in Féry´s (1993) approach is an optional high boundary tone (H%) at the end of some pragmatically marked intonation phrases, such as interrogatives. In Féry´s later co-work with Kügler (Féry & Kügler 2008) Féry reconsiders her concept of final low boundary tones in the determination of IP's. A low boundary tone at the end of an intonation phrase is assumed. This tone (LI) is associated with the syllable following the stressed syllable (H*) at the end of an IP. Féry and Kügler assume that the low stretch which is characterized by the low tone extends backwards from the end of the sentence to the nuclear accent. Additionally, they also describe a high boundary tone (HP) at the end of an ip.

The autosegmental description of German intonation by Grabe (1998) who bases her *off-ramp* analyses of German intonation on Féry´s tonal inventory of German, argues on the base of experimental data analyses that one level of intonational phrasing (the IP) is sufficient for German and that trailing tones spread through to phrase boundaries without the need of additional phrase accents. With respect to the tonal marking of IP's Grabe (1998) nonetheless differs from Féry`s model. Grabe does not exclude a priori the existence of (L%). In contrast to Féry's data, her data provide phonetic evidence for a binary distinction of final boundary tones. Beside a high tone (H%) which is optionally implemented at the end of some intonation phrases, a low final boundary tone (L%) is included into her tonal inventory of German realized as a final drop in *f0*[66]. L% is used for the annotation of phrases which indeed exhibit an additional tonal downwards movement at the end of an intonation phrase. For final boundaries where tonal movements are indeed absent she introduces (0%). The same boundary tone categorization is used in Peters (2014). Furthermore, Peters assumes optional initial high and low boundary tones (%L, %H).

In contrast to Féry`s (1993) assumption that prosodic categories such as the ip and the IP are hierarchically organized, in Féry & Herbst (2004), Féry & Ishihara (2009) and Féry (2011) the concept of prosodic phrases is discussed alternatively.[67] Féry & Herbst (2004) point out that the surface

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[65] GToBI proposes a low (L%) and high (H%) boundary tone based on experimental data. By means of a production study Benzmüller & Grice (1998) show that the trailing tone in falling accents does not belong to the pitch accent itself, but receives its own category. Nonetheless, it has to be pointed out that the results of the study showed variation in the actual alignment of the falling pattern, and that the experiment was only conducted with two speakers.

[66] In Féry & Kügler (2008) the final lowering is confirmed for German. Interestingly, not only the final lowering but also the drop itself was constant in their data: 80-85 Hz.

[67] In the prosodic hierarchy theory (e.g. Selkirk 1978, Nespor & Vogel 1983, Inkelas 1989) it is stated that speech is organized in a set of prosodic domains that form a hierarchy. Within the hierarchy each non-terminal constituent consists of constituents at the next level down. The relation between constituents

syntactic structure where prosodic phrases are projected from does not explain all observed accent pattern in German. More specifically, they show that in all-new sentences consisting of an argument and a verb the nuclear pitch accent is implemented on the argument[68]. The same pattern is observed when a modifier intervenes between argument and verb, regardless of the accentuation of the modifier. In former models of sentence accent assignment the formation of phrases relies on the presence of pitch accents as previously outlined in the discussion of Turkish. Gussenhoven (1992) proposes a Sentence Accent Assignment Rule (SAAR) which relates the presence of a pitch accent to the formation of a prosodic phrase. By that means prosodic phrases are proposed to have prosodic heads which are realized with the nuclear pitch accent. Truckenbrodt (2006) and Féry & Samek-Lodovici (2006) also propose for German that the assignment of sentence stress proceeds through the formation of headed prosodic phrases (Féry 2011: 1908). According to SAAR (cf. Gussenhoven 1992) a new phrase is created on the verb as soon as the modifier is wrapped in its own, non-projecting phrase. In (5.2) the prosodic phrase of the modifier is embedded in the prosodic phrase projected by the whole VP comprising the object and the verb.

(5.2) Recursive prosodic phrasing in German (Féry and Ishihara 2009: 54)

Melina hat [eine Arie [auf der Wanderung]φ gesungen.]φ

(Melina has an aria during the hike sung.)

In (5.2) the object is the head of a larger prosodic phrase. Due to this property it is assigned a pitch accent. Additionally, the verb and the modifier can also bear pitch accents. The modifier receives a pitch accent since it is the head of a further prosodic phrase, though it is a lower one and embedded. The verb can also bear a pitch accent since it is separated from its head and forms a prosodic unit.

Based on this previous observations and Ito & Mester (2006, 2007), Féry & Ishiara (2009) propose a phrasing model based on prosodic projections resulting in recursive prosodic phrasing.[69] They argue that distinct phrasal categories, such as the ip and IP are unnecessary in the prosodic hierarchy. Instead, they put forward that each prosodic category defines its own network of projections, represented by minimal and maximal projections. They propose the existence of a unique recursive category, the prosodic phrase (φ) represented on three levels: minimal phrase, non-minimal/ non-maximal phrase, and maximal phrase. This alternative proposed by Féry & Ishihara (2009) induces

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and levels is organized by rules. Within the set of rules especially non-level skipping and non-recursivity have been shown to be easily violated since they frequently occur in natural languages. Level skipping has been well motivated for weakly layered structures (e.g. Ito & Mester 1992).

[68] Verhoeven & Kügler (2015) furthermore show that the implementation of the nuclear pitch also depends on the type of the verb.

[69] Recursive phrasing in prosody has been demonstrated previously already by Ladd (1986, 1996), Gussenhoven (2005), or Truckenbrodt (2002) amongst others.

that prosodic phrasing is part of the syntactic derivation and an abstract structure submitted to phonological and phonetic realization. Prosodic phrasing determines potential locations of pitch accent assignment, but the actual realization depends on facts like adjacency, and IS as will be outlined in chapter V.5.

Furthermore, the relative scaling of subsequent pitch accents has been revealed as an indicator for the determination of prosodic phrases. This will be outlined in the following section since it requires certain knowledge about pitch accent formation.

V.4.1.1.2 PITCH ACCENT REPRESENTATION

In addition to the differences in the designation of prosodic phrases the *on-ramp* and *off-ramp* models of German intonation largely differ in the inventory of pitch accent categories. Both differ in the assumption of the structural realization of pitch accents and with respect to representation levels. Whereas GToBI is a surface oriented approach, *off-ramp* models assume two levels of tonal representation where underlying bitonal pitch accents can experience modifications on the surface. With respect to the tonal structure the *off-ramp* models assume only trailing tones resulting in strictly left-headed pitch accents. The GToBI analysis on the other side assumes trailing and leading tones undertaking left and right headed pitch accents[70]. In the following, pitch accent categories as assumed by the *on*-and *off-ramp* models are outlined in more detail.

As outlined in the previous subchapter, pitch accents are most commonly assigned to the most prominent syllables of their prosodic unit. A nuclear accent is the most prominent accent of an intonation phrase and is generally implemented on the head of the rightmost prosodic phrase in German all-new sentences. For a theory of head formation on each level of the prosodic hierarchy consult Truckenbrodt (1995) and also Halle & Vernaugh (1987).

To describe the tonal structure of pitch accents Isačenco & Schädlich (1966) propose two tonal levels for German intonation. This is adopted by Féry (1993) and the following approaches (e.g. Grabe 1998, Peters 2014) and also by the GToBI system. To this effect two tonal levels are assumed for German (H*) and (L*). The tonal levels are described relative to a speakers pitch range. The pitch range can be thought of as having a topline as an upper limit and a baseline as a lower limit. Pitch accents are relatively classified as high or low in relation to this line (cf. Ladd 1992).

Following Gussenhoven (1984), the *off-ramp* approaches assume that nuclear tones are modified exclusively by a following trailing tone consisting of a high or a low tone (H, L) resulting in various combinations of simple and complex rising and falling nuclear pitch patterns. Based on Gussenhoven

[70] By that means it is still an open debate whether Standard German should be modeled in terms of leading tones, since production and perception studies show different result (e.g. Grice & Baumann 2002, Grice et al 2005 vs Kügler & Gollrad 2015).

(1984) and the previous work on German intonation of Uhmann (1991), Féry (1993) assumes that nuclear tones are at least underlying bi-tonal. She describes two basic bi-tonal nuclear accents: a simple falling tone (H*L) and a simple rising tone (L*H). Depending on the surface structure these complex pitch accents can be realized as monotonal (L*) (H*). However, the monotonal realizations are basically restricted to pre-nuclear accents following Gussenhoven´s (1983) Tone Linking Rule. Bitonal sequences can be realized as monotonal when phrases are linked together. Since phrasing in German is not straightforward, phrases can be divided into several phrases, but also the reverse phenomena can occur and in this restructuring process phrases may fall together influencing the tonal shape of pre-nuclear pitch accents. The restructuring requires a sequence of pitch accents where at least one pitch accent can be found in a pre-nuclear position. In such a sequence the trailing tone of the underlying bi-tonal pre-nuclear accent can either undergo partial or complete linking. A tone is partially linked when it is moved across the unaccented stretch to a position adjacent to the final tone. A tone is completely linked when it is deleted. For a schematized representation of the differences in the pitch tracks caused by tonal linking consult Féry (1993:122).

Peters (2014), who also proposes an *off-ramp* analysis of German pitch accents, on the other side proposes 4 nuclear pitch accents including mono-tonal realizations (H*, H*L, L*, L*H).

In contrast to Féry´s approach GToBI is a surface oriented approach where pitch accents can be realized as either mono-tonal or bi-tonal. In the light of *on-ramp* analyses the main tone is aligned with the nucleus of the syllable and can be followed by trailing tones as in the *off-ramp* analysis and additionally be preceded by leading tones.[71] In addition to two monolingual accents (H*, L*) four bitonal accents are proposed (L+H*, H+L*, H*+L, L*+H).

The basic pitch accents can furthermore be modified by scaling differences. The most common modification concerns a lowering of the topline, shifting H-tones downwards. This process has originally been observed by Liberman & Pierrehumbert (1984) for English intonation. Subsequent pitch accents are represented by a reduced pitch height: an effect which they call downstep.[72] Downstep pattern are typically observed in all-new sentences in German (cf. Grice, Baumann & Jagdfeld 2009). The affected high tone is indicated with the diacritic “!”. If downstep occurs in a sequence all high tones are specially marked for range. When a new phrase starts after a phrase containing downstep the pitch is usually reset to the initial topline. In the ToBI models a downstep pattern can be reset by the presence of an intermediate phrase boundary. By means of the ip-

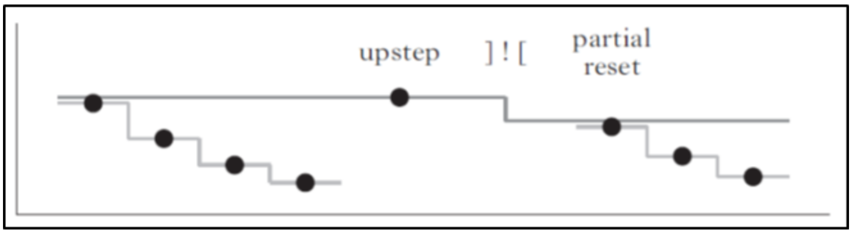
[71] Note that Féry (1993) also proposes that the main tone of bi-tonal pitch accents is assigned to the nucleus of a syllable. Grabe (1998) on the other side assumes that the nuclear tone is assigned to the rhyme of the tone bearing syllable.

[72] As already mentioned in chapter II for Turkish phonology, downstep generally describes the relative scaling of subsequent high tones and constitutes a relational notion between accents signaling equal prominence. In Pierrehumbert´s (1980) model certain tonal configurations trigger downstep. More precisely, bitonal accents trigger downstep. Whereas in a sequence of monotonal high tones (H*) no downstep occurs, a sequence of falling tones (H*L-) constitutes a minimal pair which is downstepped.

boundary tone the end of the ip is indicated and the downstep pattern is discontinued. The following high tone is higher than the preceding one and indicates a new intermediate phrase.

However, there are cases where a reset of a pitch occurs after downstep and does not necessarily indicate the beginning of a new phrase. This reset happens after a sequence of downstepped high tones usually just before the nuclear pitch accent. In narrow focused sentences for example the pitch height of a focused constituent can increase in comparison to the pitch of the preceding constituent. GToBI makes use of an upstep symbol "^" to indicate such cases. For German reset has been attested by Truckenbrodt (1998, 2002, 2007), Grabe (1998), Féry & Truckenbrodt (2005), Féry & Kügler (2008), Féry & Ishihara (2009), and Féry (2010) amongst others.[73] Truckenbrodt (2002) explains the difference between an upstepped high tone which indicates the beginning of a new phrase and an upstepped high tone within the same phrase by a complete and a partial return of pitch accents to a reference line. A new phrase is indicated by a complete reset of a high tone to the initial pitch height. Partial reset on the other side does not return to the initial height as shown in figure (5.1) below.

Fig. (5.1): Upstep in German (Truckenbrodt 2002: 88)



Since downstep and its reference to the scaling of pitch accents represents a prominence relation between pitch accents, it is interesting for the relation of prosodic prominence and information structure in German since the scaling may refer to different broad and narrow focus readings of a sentence. The impact of pitch prominence on pragmatic interpretation will be discussed in more detail in subchapter V.5 on the prosodic effects of information structure.

To summarize the differences in the tonal inventory of pitch accents, the table in (5.1) provides an overview of the different nuclear contours including the combination of pitch accents and boundary tones. On the right side the contours as proposed by GToBI (Grice & Baumann 2002) are represented. On the left side the contours as proposed by Féry (1993) are exemplarily outlined for the off-ramp analyses. This table is adapted from Grice & Baumann (2002:24).

[73] Similar proposals of downstep are made for other languages as well (e.g. Ladd 1990, Van den Berg, Gussenhoven & Rietfeld 1992).

Table (5.1): German nuclear contours (Grice & Baumann 2002:24)

	Féry	GToBI
Falling	H*L	H* L-%
		L+H* L-L%
Rising-falling	L*HL	L*+H L-L%
Rising	L*H	L*+(H) H-^H%
		L* L-H%
		(L+) H* H-^H%
Plateau	L*H	(L+)H* H-H%
Falling rising	H*L H%	(L+)H* L-H%
Early peak	H+H*L[74]	H+!H* L-%
		H+L* L-L%
Stylized downstep	H*M[75]	(L+)H* !H-H%

As shown in table (5.1) the GToBI analysis provides a broader inventory of nuclear contours for German due to the assumption of leading tones and boundary tones. Féry´s inventory, however, includes all relevant phonological categories for German without going into detail regarding the respective phonetic realization of the pitch accent categories. This difference between both intonation systems for German also refers to the general discussion in intonation research on the relevance of the inclusion of phonetic features into the description of phonological categories (cf. Peters 2014).

V.4.1.2 SUMMARY ON THE TONAL INVENTORY OF GERMAN

In the previous section the tonal inventory of two crucial AM- based approaches of German intonational phonology were outlined. The *off-ramp* analyses, which are basically departing from Féry´s (1993) model of German intonation, follow Gussenhoven´s approach for Dutch (ToDI)

[74] Note that the early peak in Féry`s inventory is not justified since she strictly follows Gussenhoven`s analyzes of left headed pitch accents. For a detailed discussion on the relevance of the early peak in Féry´s inventory consult Grabe (1998).
[75] Féry (1993) is already unsure about the existence of a mid-level tone in German. In later work it is rejected completely.

assuming two levels of tonal representation, a surface level and an underlying level. The second level-based intonation model presented here was GToBI, a surface oriented model, which is an example for the on-ramp models of intonational phonology based in Pierrehumbert’s (1980 and subsequent) analyses of American English intonation. Both models crucially differ in basic assumptions not only on the tonal inventory of German.

With respect to phrase formation, *off-ramp* analyses assume that a phonological phrase does not have to be obligatorily designated by a special phrase accent as proposed by Pierrehumbert (1980) and implemented in GToBI. Instead, the function of indicating a phrase boundary is taken over by trailing tones of pitch accents. GToBI on the other side proposes a variety of intermediate phrase tones: such as (L-) and (H-) and its phonetic variation (!H-). The only boundary and phrase delimiting tones included in the off-ramp analyses' tonal inventories are optional high and low boundary tones corresponding to a visible final *f0* lowering or rising. Grabe (1998) and Peters (2014) additionally assume a level boundary tone (0%) for the end of IP’s which are not explicitly indicated by a final drop or rise. In her original approach, Féry only assumes an optional high boundary tone. However, in her later descriptions of intonation contours she is more open to a binary distinction of intonation phrase boundaries motivated by tonal backwards spreading (Féry & Kügler 2008). The GToBI annotation in contrast distinguishes between two obligatory phrase final boundary tones (L%) and (H%) and optional phrase initial high and low boundary tones (%H, %L). Peters (2014) also assumes optional phrase initial boundary tones.

A further decisive difference between both models concerns the inventory of pitch accent categories. Both systems use distinct pitch accent categories in the modeling of intonation since *off-ramp* analyses exclusively assume trailing tones, whereas GToBI also counts for leading tones. To this effect, GToBI assumes 11 left and right headed nuclear contours, the *off-ramp* analyses only assume left headed pitch accents. With that, GToBI represents a model which includes phonetic variation into its inventory of tonal categories. Furthermore, in Féry (1993) an explicit distinction is made between the surface realization of nuclear and pre-nuclear pitch accents. Both are assumed to be underlying bitonal, however, only pre-nuclear pitch accents can experience a monotonal surface realization.

The phonetic oriented approach can be of advantage in intonation analyses whenever phonetic aspects of tonal realizations are under investigation, such as tonal alignment. By this means the phonetic realization of phonological categories can be meaningful. Bilingual studies on the realization of phonological categories have been able to trace back phonetic differences in the realization of tonal categories of bilingual speakers to interferences of other languages. One crucial study which traces alignment differences in bilingual speech is Mennen (2004) which was outlined in the preceding chapter on bilingualism.

V.5 PROSODIC MARKING OF INFORMATION STRUCTURE

As outlined in the general description of German prosody and its tonal inventory, German is an intonation-only language (Gussenhoven 2004) which implements lexical stress as well as post-lexical stress by means of pitch accent. It is uncontroversial that the variation of tonal contours on the sentence level causes a change in the pragmatic meaning of an utterance in German (cf. Gussenhoven 1984, Pierrehumbert & Hirschberg 1990). Peters (2014) provides a complex model for the form-meaning relationship in German, distinguishing between different reference areas, such as information structure or discourse structure. The crucial influence of information structure on the shape of intonation contours in German has been examined in a variety of studies (e.g. Féry 1993, Truckenbrodt 1999, 2002, Baumann et al. 2006, 2007, Féry & Kügler 2008, Féry & Ishihara 2009). Still, the relationship between prosody and information structure is controversial, especially when it comes to the description of tonal categories which may be related to certain pragmatic meanings. The respective differences are not at least related to the differences in the assumption of relevant tonal categories in the tonal inventory of German as outlined in the previous chapter.

V.5.1 DEFAULT PITCH ACCENT ASSIGNMENTIN ALL-NEW SENTENCES

Default sentence stress assignment as typically found in all-new sentences, has been examined extensively for German (e.g. Krifka 1984, von Stechow & Uhman 1986, Féry 1993; Büring 2000). Within that research special attention has been paid to the NSR (Nuclear Stress Rule) as originally formulated by Chomsky & Halle (1968) for English: Following Chomsky & Halle (1968) each sentence has a nuclear pitch accent which is typically assigned to the right most lexical category. The constituent, bearing the last pitch accent in a sentence is perceived as the most prominent representing the nuclear accent.

NSR is fulfilled in German in information structurally unmarked sentences as long as the argument is in a sentence final position. If the argument is in a non-final position which occurs regularly in German due to the verb final pattern of syntactically embedded clauses and less restrictions in the syntactical word order when compared to English, NSR is violated and would not make the right predictions with respect to phrasal stress (cf. Krifka 1984, Truckenbrodt 2006). As a solution to this problem Gussenhoven (1983, 1992) proposed SAAR stating that every predicate, argument, and modifier must be assigned a pitch accent with the exception of a predicate that stands next to a stressed argument.

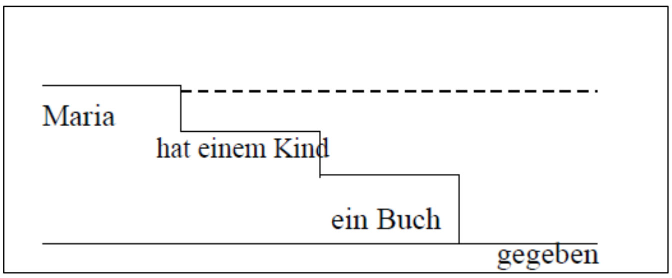
Schmerling (1976) already observes that the predicate-argument structure is much more important for German sentence stress assignment than NSR. Since then the same rule for sentence assignment in German has been claimed by different authors in different ways (amongst others Krifka 1984, von Stechow & Uhmann (1986), Féry (1993), Büring (2001) and can be formulated as in (5.3) :

(5.3) In information structurally unmarked sentences with predicate argument structures, pitch accents are assigned to the arguments.

However, cases have been reported where verbs are stressed although they are adjacent to their stressed argument (cf. Kügler & Féry 2008, Verhoven & Kügler 2015). Considering the relation of syntax and phonology, Truckenbrodt (1995) builds up on SAAR and proposes Stress XP stating that each XP is assigned a beat of phrasal stress. By that means verbs is assigned stress depending on the syntactic structure. Predicates next to an argument are heads which are not affected by Stress-XP. Where the argument of a verb is not stressed as in [*etwas lesen*]$_{VP}$ (to read something), the object rejects phrasal stress and stress within the VP falls on the verb fulfilling Stress-XP. Hence, in an all-new sentence, pitch accents are assigned to all arguments of a verb and verbs may be accented or not depending on their phrasal integration.

SAAR also makes predictions with respect to the strongest phrasal stress, the nuclear stress: A nuclear pitch accent is assigned to the prosodic head of the last XP. By that means the rightmost phrasal stress in an IP is strengthened to the strongest stress. A similar approach was provided previously for German by Uhmann (1991). Since subsequent pitch accents in German all-new sentences are usually in a downstep relation: *(…) the nuclear stress is generally the pitch accent with the lowest frequency, the smaller pitch range and the weakest acoustic energy* (Féry 2008:6). In the figure in (5.2) an example for a downstep relation in an all-new sentence is provided from Féry (2011:30): *Maria hat einem Kind ein Buch gegeben* (Maria has a kid a book given). The dotted line indicates the reference line for pitch accent assignment the solid line indicates the subsequent lowering of pitch accents. Each argument is realized with a lower pitch accent than the preceding one.

Fig. (5.2): Downstep in all-new sentences (Féry 2011:30)



Furthermore, in German the nuclear stress is typically assigned to the focused constituent of an IP. By that means the location of the nuclear pitch accent changes according to a modification of information structure.

V.5.2 FOCUS PROMINENCE AND FOCUS PROJECTION

The previously outlined default intonation contour in German all-new sentences changes as soon as pragmatic meanings change by a modification of IS. Two strategies have been reported in the literature: a restructuring of prosodic phrases and the scaling of pitch accents.

In the chapter on IS at the beginning of this dissertation it was mentioned that Selkirk (1984, 1995) proposes focus projection rules to describe changes in the general pitch accent assignment on the sentence level.[76] For German the changes in pitch accent assignment have been discussed by means of focus projection as well with a strong relation to the formation of prosodic phrases or accent domains (AD). Truckenbrodt (1999) and also Samek-Lodivici (2002) propose that a syntactic domain in German has to be included entirely in an (AD). In other words, if the semantic structure of a sentence changes due to a change in focus marking by implementing a nuclear pitch accent on a different constituent than in an all-new sentence, as shown in (711), a restructuring of prosodic phrases occurs. By that means information structure reduces or increases the number of prosodic phrasing. According to the prominence theory of focus (Truckenbrodt 1995) as also discussed in chapter I, focus needs to be maximally prominent which is achieved by a modification of the phrasing structure, either by swapping of pitch accents or by the introduction and/or deletion of prosodic phrase boundaries. Büring (2001:81ssq) who follows Truckenbrodt's (1995, 1999) general assumption provides an example from German for the restructuring of prosodic phrases under the influence of focus as shown in (5.4).

[76] Focus is projected to smaller or larger domains depending on where the pitch accent is realized. Pitch accents project to domains larger than themselves according to the syntactic structure of the sentence. If the head of a phrase is focus marked, focus is projected to the whole phrase. If an internal argument of a head of a phrase is focus marked, focus is projected to the head.

(5.4) Restructuring of prosodic phrases (Büring 2001: 81, 87)

(a)

…	x	$)_{IP}$
(x $)_{AD}$	(x	$)_{AD}$
(x $)_{PW}$	(x $)_{PW}$	(x $)_{PW}$
Dem KasSIErer	das GELD	geGEben
(The teller	the money	give)

(b)

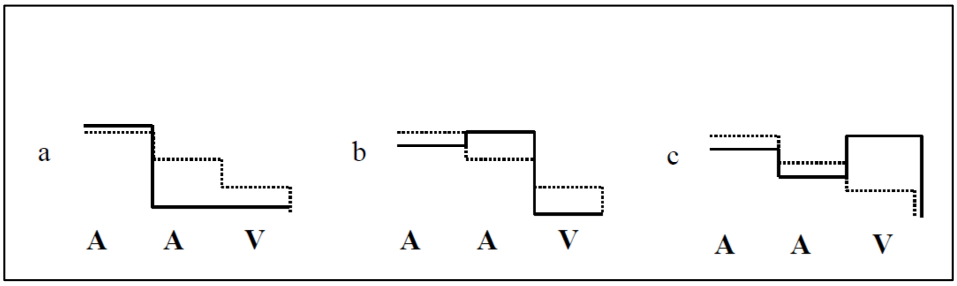
… x		$)_{IP}$
(x		$)_{AD}$
(x $)_{PW}$	(x $)_{PW}$	(x $)_{PW}$
(Dem KasSIErer $_{F}$)	das GELD	geGEben
(The teller	the money	give)

In the example in (5. 4) (a) from Büring (2001) the prosodic words *dem Kassierer* and *das Geld* are the prosodic heads of their prosodic phrase or accent domain and accordingly more prominent than the final verb *gegeben*. The prosodic head of the final AD receives main stress on the IP-level and is perceived as the most prominent element. Büring (2001) argues that the only way to make a non-final argument the most prominent of the IP is to make it the head of the final AD. This is done by boundary deletion in example (b). The prosodic boundaries and also the pitch accents of post-focal AD's are deleted. Consequently a prosodic restructuring takes place which subsumes all PW's into a single AD of which the rightmost element which bears a pitch accent becomes the head of the AD although it is a non-final argument. The same focus marking strategy by means of boundary deletion has been shown for monolingual Turkish in experiment 1. Focus projects to different constituents changing the focus domain, ergo the AD, and consequently the prosodic structure. A marked information structure (focus is not projected to the whole sentence) is represented by a marked prosodic structure. Marked syntactical structures (scrambling) are triggered by a marked information structure and thus are prosodically marked as well.

In addition to studies providing evidence for a restructuring of prosodic phrases due to a change of IS by means of narrowing or broadening the focus domain, other studies have pointed out that IS does not directly affect prosodic phrasing, but the scaling of pitch accents (e.g. Féry& Kügler 2008, Féry & Ishihara 2009, Féry 2010, Kügler 2011).

On the base of an experimental analysis of 2277 sentences Féry & Kügler (2008) provide crucial evidence that the shape of intonation contours in German largely depends on information structure in addition to some tonal dissimilatory effects.[77] Whereas a pitch accent rises under narrow focus in comparison to an all-new or broad focus baseline, a pitch accent in a pre-nuclear position is lowered and canceled out post-nuclearly. In figure (5.5) the effect of narrow focus and givenness is outlined for sentences containing two arguments and a verb (AAV) as used in Féry & Kügler's (2008) study. The figure demonstrates the rising the pitch accents on different constituents under focus, the lowering of pitch accents on pre-focal given constituents and their post-nuclear de-accentuation in comparison to the pitch accent scaling of all-new sentences.

Fig. (5.3): Pitch accent scaling in different in-situ focus conditions in Féry & Kügler (2008: 685)



In figure (5.3) the solid lines represent the focus realizations and the dotted lines the regular downstep pattern of all-new sentences. In (a), the focus on the initial argument is realized with a pitch accent and all following constituents are de-accented. In (b) the focus is on a non-initial argument, which experiences a boost in pitch. The pitch accent on the pre-focal argument is lowered and the postfocal verb is de-accented when compared with the baseline. In (c) the focus on the final constituent is also realized with a boost in pitch and the pre-focal constituents are compressed in pitch in comparison to the all-new condition.

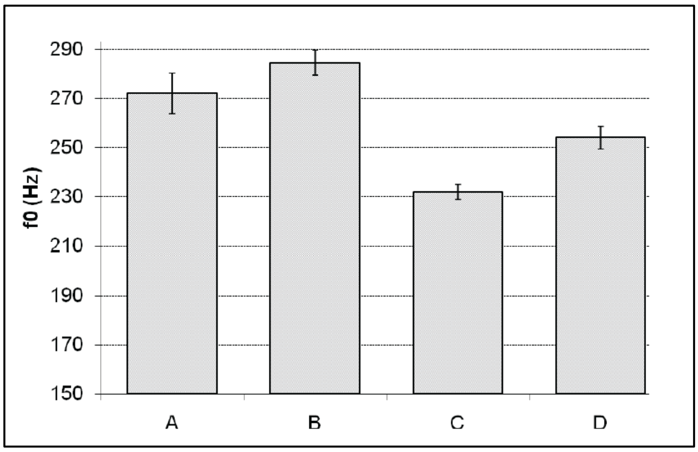
With respect to the post-nuclear area the concept of givenness plays a central role in German prosody since it restricts the number of pitch accents. Based on Schwarzschild´s (1999) assumptions for English, it has also been shown that postfocal given elements are de-accented in German. A crucial requirement for de-accentuation is that the de-accented constituent has been mentioned in the preceding context. According to Stress-XP as outlined in the previous section, Truckenbrodt (2006) proposes Destress-Given for postfocal given constituents. By that means a given constituent

[77] The dissimilatory tonal effects playing a role in the scaling of pitch accents as observed by Féry & Kügler (2008) are final *f0* drop, raising of a high tone before a low tone and lowering of a high tone before a raised high tone.

cannot contain phrasal stress. However, there are counter examples to this general rule (cf. Schwarzschild 1999, Büring 2008).

A similar process is observed for pre-focal given constituents. In Féry & Kügler (2008) it is shown that pre-focal givenness lowers the *f0* of pitch accents but does not delete them like in the post-focal position. Pre-focal arguments have pitch accents although they are lower than their focused equivalents. In figure (5.4) an example for pre-focal lowering of an initial given argument from Féry & Kügler (2008: 24) is provided.

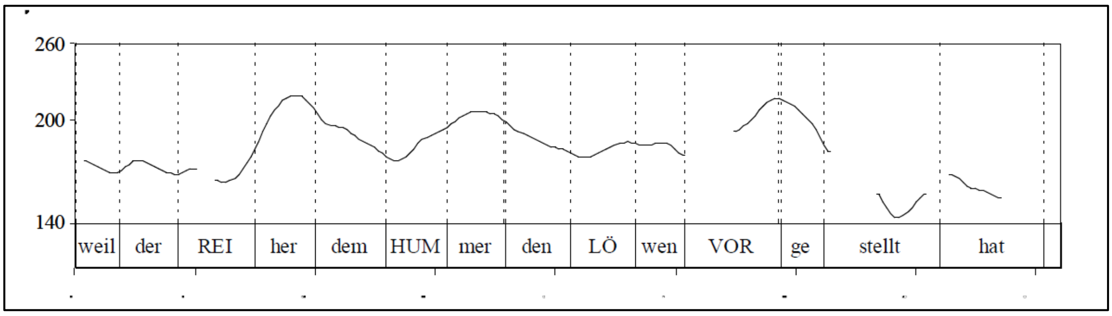
Fig. (5.4): Pre-focal lowering of pitch accents (Féry & Kügler 2008: 704)



(A: nominative in an all-new pattern. B: narrowly focused nominative. C: given nominative before a narrow focus. D: given nominative before a given argument.)

What can be seen in the bars in figure (5.4) is that a pre-focal given argument is lower than the same argument in an all-new sentence or in a focus condition. What becomes visible here is that pitch accent realization represents a prominence relation. Féry & Kügler (2008) show that focus prominence is determined by the concrete scaling of a pitch accent.

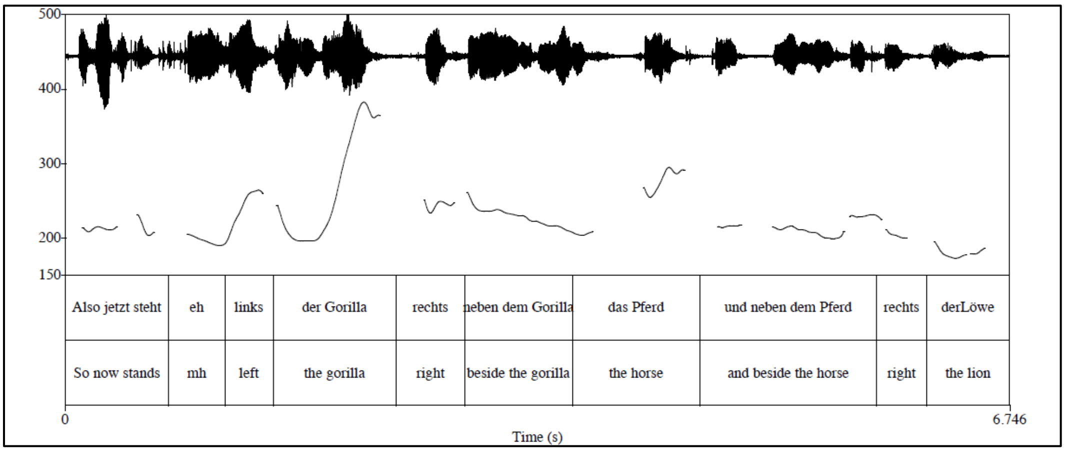
Fig. (5.5) Pitch track for narrow verb focus in Féry & Kügler (2008: 689)



(Because the heron introduced the lobster to the lion)

In figure (5.5) a pitch track is provided for narrow focus on the verb. The verb is the last constituent in the sentence and realized with the highest pitch accent. In contrast to figure (5.3), in all-new sentences the prominence of the nuclear pitch accent does not necessarily have to coincide with its actual phonetic realization. As described previously, Liberman & Pierrehumbert (1984) describe the relative scaling of pitch accents within a prosodic phrase as downstep. Ladd (1990), Truckenbrodt 2007, Féry (2008), Féry & Herbst (2004) amongst others assume that every prosodic phrase inside a larger prosodic phrase is also subject to downstep as demonstrated in figure (5.6).

Fig. (5.6): Downstep pattern between different phrases (Féry 2010: 6)



In the graph in figure (5.6) it can be seen that three PPh's are formed in a downstep relation to each other. Together they are organized in an IP where the prosodic phrases are scaled relative to another. In smaller domains the phrasal reference line is progressively downstepped, i.e. downstep between accents is embedded in the larger downstep domain of the whole intonation phrase. Hence, downstep is considered here as a tonal effect taking place across prosodic phrases by downstepping the prosodic reference lines relative to another instead of downstepping tones to another to modify prominence relationships with respect to information structure.

Correspondingly, Féry & Ishihara (2009) propose that the influence of information structure in German is mediated through *f0* registers corresponding to focus and givenness domains. To this effect information structure changes the pitch register of prosodic phrases. The register of prosodic phrases can be widened or narrowed in order to scale pitch accents higher or lower than in the unmarked situation, according to their focus or givenness status: If a sentence contains a narrowly focused element the *f0* register is manipulated in the way that its reference top line is raised, provoking a sudden boost of the pitch accent correlated with the focused word. The reference topline of phrases corresponding to given elements on the other side is compressed. In other words Féry & Ishihara (2009) assume that the height of individual pitch accents is the result of the transformation of the reference top lines rather than the result of directly boosting or lowering the individual tones associated with accents. The most important difference with models directly manipulating the pitch accents is that the relationship between different parts of the sentence is changed: information structure changes the scaling of the entire sentence, instead of targeting only the most prominent pitch accents.

Corresponding to Féry & Kügler (2008), who propose that the tonal scaling of high tones in German declarative sentences is the result of different influences coming from syntax, information structure and tonal dissimilation, Féry & Ishihara (2009) and more specifically Féry (2011) claim that the effects of information structure on the prosodic formation of an utterance and those effects corresponding to the syntax prosody interface have to be distinguished.

As shown above, Selkirk (1984) proposes that prosodic boundaries are defined by syntax, i.e. the edges of prosodic phrases correspond to syntactic phrases and that pitch accent assignment corresponds to the formation of prosodic heads (e.g. Gussenhoven 2004, Truckenbrodt 2006). Féry & Kügler (2008) show that the metrical heads of prosodic phrases are adjusted in their pitch height to the toplines of these domains. However, Féry (2011) reconsiders the former concept of prosodic phrase formation on the base of prosodic heads. She claims that some prosodic phrases are able to share their heads as a consequence of embedded prosodic domains. Pitch accents can even be scaled to different toplines at the same time when they are the head of more than one prosodic phrase. Without the need of a change in the syntactic and consequently in the prosodic structure focus can raise the topline of its domain causing a change of the default scaling of pitch accents represented by downstep. If an early constituent in a sentence is focused, as in the example in (5.5) taken from Féry (2011: 32), it bears the last pitch accent of the sentence and is the highest pitch accent represented by a pitch accent on the initial constituent. Postfocal material is de-accented due to postfocal givenness without any need for a restructuring of the prosodic phrases.

(5.5) Wer ist nach Berlin gefahren?

(Who went to Berlin?)

[MARIA]F_{ip} [ist [nach Berlin] gefahren]$_{ip}$

(Maria went to Berlin.)

In (5.5) the narrow focus is accompanied by given material, however the prosodic phrasing is the same as in an all-new context. A focus may raise the topline of its prosodic domain whereas givenness has the effect of lowering the topline of its domain. To this effect a modification of the default pitch accent scaling motivated by information structure does not have an effect on prosodic phrasing determined by syntactic phrasing.

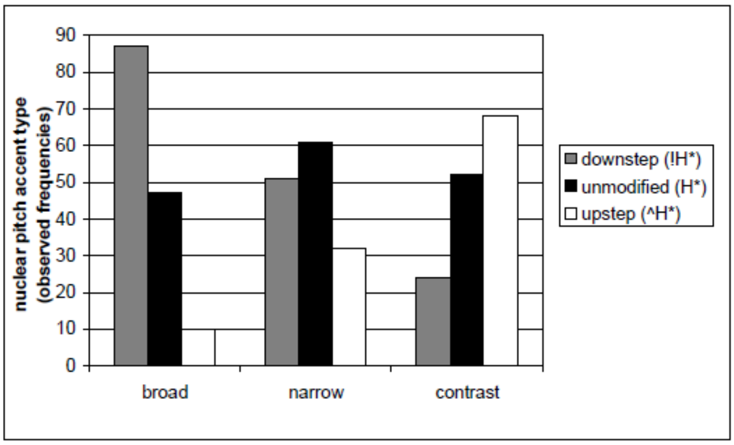
In contrast to the former approaches assuming a direct effect of IS on the formation of prosodic phrases, which would cause a deletion of phrase boundaries in the example in (5.5), in an approach which keeps the effects of syntax and IS apart a restructuring is unnecessary. IS only effects the pitch accent scaling by raising or lowering pitch even including their deletion. To this effect, the approach differs from models claiming that syntax and information structure have a similar power to shape prosodic phrasing (e.g. Gussenhoven 1983, 1992 for Dutch and English, and Truckenbrodt 1999,2002 and Büring 2000 for German).

V.5.3 INFORMATION STRUCTURE CATEGORIES AND PHONOLOGICAL CATEGORIES

In addition to the observed impact of IS on pitch accent scaling and/or prosodic phrase formation, further studies have been conducted trying to highlight the impact of IS on pitch accent categories. Certain pitch accent categories have been related to IS categories such as focus and givenness and contrastive and non-contrastive focus. Results here are controversial and correspond to general differences in the description of German intonation patterns as outlined in section V.4.1. Whereas production and perception studies (e.g. Féry 1993, Kügler & Gollrad 2015, Grabe 1998) do not find categorical distinctions in the prosodic marking of broad, narrow, and contrastive focus, further studies basically reveal gradient differences as the focus domain narrows (especially Baumann et al. 2006, 2007). Steedman (2006) furthermore provides a formal account of the meaning of tones in intonation languages related to IS. For German he argues that the kind of pitch accent chosen in a discourse indicates whether an information unit is part of the CG or not. Correspondingly, H* pitch accents are described to be related to indicate constituents that are part of the CG, whereas constituents that bear an L* pitch accent are not related to the CG.

With respect to contrastive focus which is under investigation in the present dissertation Baumann et al. (2006, 2007) show that on contrastively focused elements no downstep is produced at all, but an upstep pattern ^H* is implemented which is also of perceptual relevance. The figure in (5.7) also shows that in broad focus sentences a downstepped nuclear accent (!H*) is produced in 42% of the sentences whereas in narrower focus domains fewer downsteps occurs (between 17% and 25%) and instead (H*) is implemented.

Fig. (5.7): Frequency pattern of nuclear pitch accent type in relation to focus structure in Baumann et al. (2007:1030)



For contrastive focus also Braun (2005, 2006), Féry & Kügler (2008), Grice et al. (2010), Sudhoff (2010), Kügler & Gollrad (2015) find significantly higher pitch peaks (indicated as upstep in fig. 5.7) when compared to non-contrastive or broad focus. Higher peaks have been claimed to be the most reliable cue for contrastive focus by Bartels & Kingston (1994) and are associated with greater prominence according to (Ladd 1996). Scaling differences confirm by that means the observations of Féry & Kügler (2008) and Féry & Ishihara (2009) outlined previously. Focus in German causes a register change in the corresponding focus domain. The observed difference however is gradual.[78]

Furthermore differences in *f0* timing by means of a delayed peak (L+H*) are observed for contrastive focus in contrast to !H* in broad focus (Bauman et al. 2006, Kohler 1991, Kohler & Niebuhr 2004, Grabe 1998, Kügler & Gollrad 2015). However, the observation of the delayed peak in Baumann et al. (2006) is highly speaker dependent which is confirmed by Kügler & Gollrad (2015) and discrimination tests show that speakers do not perceive a difference and instead rely on the scaling of pitch accents. This is furthermore confirmed by Gussenhoven's (2004) observation that higher peaks are later aligned as a result of physical effort as well as by a study of Grice, Baumann & Jagdfeld (2009), who show that certain intonational meanings are expressed by a downstep relation rather than by particular accent types.

In sum, the question of whether distinct categories are involved in contrastive and non-contrastive marking of focus in German depends on the studies, their methodology, and the intonation model

[78] It remains unclear whether a downstepped pitch accent constitutes a phonological category or is a phonetic variation of the same pitch accent. As outlined above for the GToBI approach it is a separate category, whereas for the Féry based models (!H*) is a phonetic variation of (H*). For English it has been argued by Dainora (2001) that (H*) and (!H*) should not be treated as separate categories and downstep is considered a phonetic variation of an underlying (H*). So it actually depends on the research view if downstepped contours are taken to be categorical relevant or not and hence focus domains are taken to be indicated by categorical differences in German or not.

though results basically show a tendency in pointing out that differences between different focus types are gradient and not categorical.

V.5.4 SUMMARY INFORMATION STRUCTURE AND PROSODY

To summarize the outlined prosodic effects of information structure it has been shown that German default sentence accent assignment is generally determined by the verb-argument structure. Pitch accents are assigned to the arguments of a verb and pitch accents are more often scaled in a downstepped relation to each other in all-new sentences. The last pitch accent of a prosodic phrase is perceived as the most prominent accent and constitutes the nuclear accent though by concrete *f0* measurements it would not necessarily represent the highest pitch accent in a prosodic phrase. A modification of pitch accent assignment due to IS results either in a restructuring of prosodic phrases (Truckenbrodt 1995, Büring 2001) and/or a change in register scaling of prosodic phrases (Féry & Kügler 2008, Féry & Ishihara 2009). In information structurally modified contexts the reference lines of prosodic phrases corresponding to focus and givenness domains are modified by broadening or narrowing the top line of a corresponding register most commonly resulting in *f0* increase of focused elements, compression of pre-focal given elements and de-accentuation of postfocal given elements. Accordingly, Féry & Ishihara (2009) additionally propose to keep the effects of syntax and information structure apart. Truckenbrodt (1999),Büring (2001), Samek-Lodivici (2002) and others propose that a change in the semantic structure of a sentence due to a change in focus marking by implementing a nuclear pitch accent on a different constituent than in an all-new sentence requires a restructuring of prosodic phrases. A restructuring is necessary for the nuclear pitch accent to become the most prominent pitch accent of its accent domain.

In addition to the relation of prominence and information structure in the shape of prosody, the relevance of phonological categories in relation to information structure has been subject to research studies in German. However, the results are controversial and basically show gradual differences rather than categorical differences.

Finally, it has to be mentioned that the focus of this review was on *f0* as an acoustic correlate of IS as required for the following experiment. Other acoustic cues have also been identified, such as duration for which a study of Baumann et al. (2006) reveals an effect and also Kügler (2008) and Kügler & Genzel (2008) show a marginal effect of duration to which the reader is referred.

V.6 YES/NO QUESTIONS IN GERMAN

In the following subsection basic characteristics of German yes/no questions are outlined with focus on their prosodic structure. As for prosodic focus marking of IS certain knowledge about the prosodic marking of sentence type in German is essential in order to make predictions with respect to structural changes in bilingual varieties. Changes in bilingual varieties can only reliably be traced back to the influence of the contact language if the structures of the contact language are known.

In a first step, I will provide a short general description of German yes/no questions before describing their prosodic properties in contrast to declaratives. In an additional experimental study the prosodic structure of information structurally modified yes/no questions is outlined. This study was also conducted within the SFB 632 located at the University of Potsdam. The results show that simple in-situ contrastive focused yes/no questions with verb inversion (VSO) are realized with an (L*H) pitch accent on the focused constituent followed by a high de-accentuation pattern which is either continuously rising (H-H%) or upstepped (H-^H%).

V.6.1 GENERAL FEATURES OF GERMAN YES/NO QUESTIONS

From a syntactical point of view yes/no questions in German display of two different structures. Either interrogative marking is implemented by verb fronting resulting in a VSO structure or the structure of German declaratives SVO is maintained and prosodic cues are used. A morphological question marker like in Turkish is not used. In Truckenbrodt (2009:33ssq) examples for both structures are provided and repeated here in (5.6) and (5.7).

(5.6) German yes/no questions with verb inversion:

Hat Peter eine Katze?

(Has Peter a cat?)

(5.7) German yes/no question with declarative structure:

Peter hat eine Katze?

(Peter has a cat?)

In (5.6), the verb which would be in a final position in German declaratives is moved into the sentence initial position. In (5.7) on the other side the syntactical structure of a German declarative is resembled and ends with an obligatory high rising final contour (e.g. Essen 1964, Féry 1993, Grice & Baumann 2000). However, typical yes/no questions as demonstrated in (5.6) usually also show a final rising contour, although they are syntactically indicated as questions by verb fronting. According to Truckenbrodt (2009), a rising intonation contour generates a crucial difference in the interpretation of a yes/no questions, which is based in salient propositions. According to Bolinger`s (1957) classification of yes/no questions as lacking an assertive meaning, Bartels (1997) suggests for English that the nature of the proposition is not the literal meaning of the utterance, but a salient proposition. By that means the literal meaning of the interrogative in (5.7) is not the salient proposition that *Peter has a cat*, but that the speaker wants to know from the speaker weather this proposition is true or false. Within the taxonomy of Bolinger, the yes/no question in (5.7) therefore has a non-assertive meaning. This absence of an assertive meaning explains the typical use of a final rise in yes/no questions (cf. Truckenbrodt 2009). If a yes/no question with syntactical inversion like represented in (5.6) is realized with a final falling contour instead, the speaker indicates that the proposition holds one way or the other and the semantic meaning is asserative.

V.6.2 INTONATION CONTOUR OF GERMAN YES/NO QUESTIONS

It is widely acknowledged that yes/no questions in German mostly end in a rising contour (e.g. von Essen 1964, Pheby 1980, Féry 1993, Grice & Baumann 2000, Schneider & Lintfert 2003, Kohler 2004). Nonetheless, in some studies which are primarily conducted corpus studies of spoken interrogatives, this assumption is challenged, showing that a final low boundary tone is also possible (e.g. Kohler 1977, Selting 1995, Kügler 2003, 2007, Truckenbrodt 2009, Petrone & Niebuhr 2014).
According to Bolinger (1978) a question is intonationally accompanied with a certain question tune, usually categorized as a final rising high boundary tone (H%). For German von Essen (1964) states that yes/no questions are indicated by a final rise. Autosegmental metrical models of Standard German (Féry 1993, Grice & Baumann 2000) agree in characterizing yes/no questions by a final rise in pitch. In (5.8) a typical intonation contour is provided by Grice & Baumann (2000) within the GToBI approach.

(5.8) Rising final intonation contour (Grice & Baumann 2000: 287)

(L-)H* L- H%

Mögen Sie ROGGENbrötchen?

(Do you like rye bread rolls?)

In (5.8) a final rising intonation contour is shown which is preceded by a falling nuclear pitch accent. However, the preceding pitch accent can also exhibit the form of a rising pitch (L*H) as outlined in (5.9).

(5) Rising final intonation contour (Grice & Baumann 2000: 287)

L* H- H%

Tauschen Sie auch BRIEFMARken?

(Do you also exchange stamps?)

In Kügler (2003) it is stated that yes/no questions are usually realized with an L*H pitch accent on the nuclear constituent usually associated with the stressed syllable of the sentence´s argument like demonstrated in (5.10) representing broad focus in German yes/ no questions.

L*H H%

(5.10) Kennst du DespeRAdos? (Kügler 2003:17)

(Do you know Desperados?)

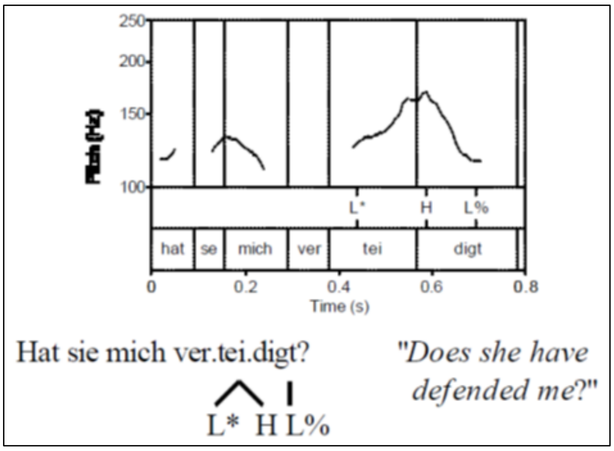
In contrast to these most typically observed intonation contours, studies on German yes/no questions with and without syntactical inversion have also shown that variation in the boundary tone implementation is possible (e.g. Selting 1995; Kügler 2003, 2007 for production and Petrone & Niebuhr 2014 for perception).

In a corpus study of spontaneous speech Selting (1995) observes 51 yes/no questions with a rising contour, but also 14 yes/no questions with a falling contour. In her aim to establish a holistic taxonomy of German intonation patterns taking into account the syntactic, pragmatic and prosodic structure of German sentences, Selting interprets the use of falling versus rising final patterns in yes/no questions as functional differentiations. Whereas a rising pattern contextualizes new-focusing topics, a falling pattern contextualizes the re-focusing of a conversational topic.

Similar observations are made in a corpus study based on several hours of free conversation and map task dialogs in Kügler (2003, 2007) for Upper Saxon and Swabian. For the variety of Upper Saxon

Kügler finds two distinct intonational patterns: a rising and a falling contour. Out of 47 yes/no questions, 13 are realized with a falling pattern. In the Swabian corpus, he also observes rising and falling patterns whereby the falling pattern is less frequent again. Out of 66 yes/no questions, 28 exhibit a final fall. In contrast to the data of the Saxonian study where only rising nuclear pitch accents are observed, the Swabian data also exhibit falling nuclear pitch accents (H*L). In the picture in figure (5.8) an example for a final falling contour of the Saxonian corpus is outlined.

Fig. (5.8): Final falling contour in yes/no questions (Kügler 2007: 4)



In the intonation contour outlined in figure (5.8) the nuclear pitch accent is realized by means of a rising tone (L*H). After the rise, the *f0* contour falls towards the final syllable of the phrase representing a low final boundary tone (L%). Kügler relates the use of the final boundary tone to the contextualization of speaker expectations. A final low boundary tone contextualizes that the speaker is biased with respect to the answer. He signals that he has an expectation of the answer and is asking for mutually known information representing a confirmation question (cf. Boilinger 1989). A high boundary tone on the other side signals a true information question in the sense of Boilinger (1989) where the speaker has no particular expectation with respect to the answer but needs to get new information. To this effect, and based on Gunlogson`s (2001) observations for English, Kügler concludes that the choice of intonation pattern is influenced by the mutual beliefs of a speaker on known information from the previous discourse.

In addition to the production studies showing that falling final contours also occur in German yes/no questions, a perception study of Petrone & Niebuhr (2014) shows that even in syntactically and lexically unmarked questions the implementation of a low final boundary tone can infer an interrogative meaning. In a study of Northern Standard German it is shown that utterances with a final falling contour can trigger question perception and that a final rise is not mandatory. 5 sentences were recorded with 5 different intonation contours and judged by 15 native speakers of

Northern Standard German from the regions of Berlin-Brandenburg and Hamburg. The results of their perception tests revealed that listeners were able to distinguish syntactically declarative questions from declaratives without referring to the nuclear accent and the edge tone. Solely by the differences in the shape, slope and alignment of pre-nuclear accents speakers perceived a difference between declaratives and unmarked yes/no questions. From their results Petrone & Niebuhr (2014) suggest that utterance final rises are not directly related to sentence modality, but represent a separate attitudinal meaning dimension.[79] They assume that utterance-final rises and falls convey attitudinal meanings which are not directly related to sentence mode. Final falls indicate the restriction and the expectation of a specific and mostly short answer. Final rises indicate activation of the dialogue partner and the expectation of a specific answer. The suggestion that a final rise does not necessarily indicate sentence type was already initiated by Kretschmer (1938). He states that yes/no question intonation by means of a final rise marks continuation as in other cases and is not related directly to sentence mode. [80] Despite, Petrone & Niebuhr nonetheless suggest that the rising pattern still contributes to the signaling of the sentence mode in addition to other syntactic, lexical and prosodic features.

V.6.3 INTONATION CONTOUR OF IS MODIFIED YES/NO QUESTIONS

In the following, the results of an experiment are outlined which concern the interplay of prosodic focus marking and sentence type marking in German yes/no questions. In order to have a baseline for a contrastive comparison between German and Turkish yes/no questions this study helps to provide additional knowledge about the concrete features under investigation in the following bilingual experiment. The experiment was conducted within the SFB 632 at the University of Potsdam. The results were first presented at the LAGB 14 conference at Oxford University in September 2014. In the following I will shortly summarize the main findings.

[79] Remember that a relation of attitudinal meaning and a final rising contour was also considered by Kawaguchi et al.'s (2006) study for Turkish interrogatives.
[80] Similar, Karttunen (1977) and Bolinger (1978) interpret yes/no questions with a final rise as the first part of a hidden alternative question. The high tone originally announced the continuation at the end of the first conjunct which is maintained although the second part of the alternative question is elided.

In the monolingual German experiment the same methodology as in the previous experiment of focus and sentence type marking conducted with monolingual Turkish speakers was used. However, there are slight differences due to the structural properties of both languages. Adapting the methodology of Xu (1999) to elicit focus on different constituents 10 monolingual speakers of German red out segmentally equal yes/no questions. 5 different target sentences representing typical verb inversion were designed. Verb inversion was chosen since it represents the unmarked case of yes/no questions in German. Furthermore Féry & Kügler (2008) report that word order has no impact on prosody. The sentences are represented in (5.11).

(5.11) **German target sentences**

(1) Malt Lena ein Lama?
(paint-3SG.PRS Lena INDEF Lama)
(Does Lena paint a Lama?)

(2) Wohnt Nele in Meißen?
(live-3SG.PRS Nele in Meißen)
(Does Nele live in Meißen?)

(3) Webt Nina das Leinen?
(weave-3SG.PRS Nina DET linen)
(Does Nina weave the linen?)

(4) Baut Heiner die Mühle?
(build-3SG.PRS Heiner DET mill)
(Does Heiner build the mill?)

(5) Liest Mira die Noten?.
(read-3SG.PRS Mira DET note-PL.)
(Does Mira read the notes?)

To elicit in-situ focus on different constituents target sentences were preceded by a context that should most naturally foster the production of a yes/ no question with either contrastive focus on the verb, the subject or the object or an all-new yes/no question in order to have a baseline for comparison. The target sentences were presented on a lap top by means of a power point presentation. In figure (5.9) an example of the elicitation method is provided. It represents how subject focus of target sentence 5 was elicited. The remaining sentences in their different focus conditions were elicited accordingly. All sentences and contexts are outlined in table (5.2).

Fig. (5.9): Elicitation of subject focus in a German yes/no question

Preceding context: Is it Mira or Clara reading the notes? You don´t know it. Ask!

Yes/no question: Is it Mira reading the notes?

Table (5.2): German target sentences in the different focus conditions and preceding contexts

Context	Target question
Broad focus/ all-new	
Bitte lies den Fragesatz vor!	Malt Lena ein Lama?
Please read the target sentence out!	Paints Lena a Lama?
Bitte lies den Fragesatz vor!	Wohnt Nele in Meißen?
Please read the target sentence out!	Lives Nele in Meißen?
Bitte lies den Fragesatz vor!	Webt Nina das Leinen?
Please read the target sentence out!	Weaves Nina the linen?
Bitte lies den Fragesatz vor!	Baut Heiner die Mühle?
Please read the target sentence out!	Builds Heiner the mill?
Bitte lies den Fragesatz vor!	Liest Mira die Noten?
Please read the target sentence out!	Reads Mira the notes?
Subject focus	
Malt Lena ein Lama oder Heike? Du weißt es nicht. Frage nach!	Malt Lena ein Lama?
Paints Lena a Lama or Heike? You know it not. Ask it!	Paints Lena a Lama?
Wohnt Nele in Meißen oder Suse? Du weißt es nicht. Frage nach!	Wohnt Nele in Meißen?
Lives Nele in Meißen or Suse? You know it not. Ask it!	Lives Nele in Meißen?
Webt Nina das Leinen oder Heike? Du weißt es nicht. Frage nach!	Webt Nina das Leinen?
Weaves Nina the linen or Heike? You know it not. Ask it!	Weaves Nina the linen?
Baut Heiner die Mühle oder Gustav? Du weißt es nicht. Frage nach!	Baut Heiner die Mühle?
Builds Heiner the mill or Gustav? You know it not. Ask it!	Builds Heiner the mill?
Liest Mira die Noten oder Klara? Du weißt es nicht. Frage nach!	Liest Mira die Noten?
Reads Mira the notes or Klara? You know it not. Ask it!	Reads Mira the notes?
Object focus	
Malt Lena ein Lama oder eine Katze? Du weißt es nicht. Frage nach!	Malt Lena ein Lama?
Paints Lena a Lama or a cat? You know it not. Ask it!	Paints Lena a Lama?
Wohnt Nele in Meißen oder in Potsdam? Du weißt es nicht. Frage nach!	Wohnt Nele in Meißen?
Lives Nele in Meißen or in Potsdam?You know it not. Ask it!	Lives Nele in Meißen?
Webt Nina das Leinen oder einen Teppich? Du weißt es nicht. Frage nach!	Webt Nina das Leinen?
Weaves Nina the linen or a carpet? You know it not. Ask it!	Weaves Nina the linen?
Baut Heiner die Mühle oder das Schloss? Du weißt es nicht. Frage nach!	Baut Heiner die Mühle?
Builds Heiner the mill or the castle? You know it not. Ask it!	Builds Heiner the mill?
Liest Mira die Noten oder ein Märchenbuch? Du weißt es nicht. Frage nach!	Liest Mira die Noten?
Reads Mira the notes or a storybook? You know it not. Ask it!	Reads Mira the notes?
Verb focus	
Malt Lena ein Lama oder fotografiert sie es? Du weißt es nicht. Frage nach!	Malt Lena ein Lama?
Paints Lena a Lama or fotographed she it? You know it not. Ask it!	Paints Lena a Lama?
Wohnt Nele in Meißen oder arbeitet sie dort? Du weißt es nicht. Frage nach!	Wohnt Nele in Meißen?
Lives Nele in Meißen or works she there? You know it not. Aski it!	Lives Nele in Meißen?
Webt Nina das Leinen oder bedruckt sie es? Du weißt es nicht! Frage nach!	Webt Nina das Leinen?
Weaves Nina the linen or imprints she it? You know it not. Ask it!	Weaves Nina the linen?
Baut Heiner die Mühle oder restauriert er sie? Du weißt es nicht. Frage nach!	Baut Heiner die Mühle?
Builds Heiner the mill or restores he it? You know it not.Ask it!	Builds Heiner the mill?
Liest Mira die Noten oder malt sie die Noten! Du weißt es nicht. Frage nach!	Liest Mira die Noten?
Reads Mira the notes or draws she the notes ? You know it not! Ask it!	Reads Mira the notes?

All target sentences were represented with underlining of the focused word in order to reduce errors with respect to the focus conditions. The experiment was part of a bigger data elicitation realized within the project B9 of the SFB 632 at the University of Potsdam. The data collection contained the elicitation of eight experiments mainly targeting the elicitation of prosodic marking of IS, prosodic phrasing and sentence type.[81] Each of the five sentences was presented subsequently in one focus condition before going over to the elicitation of the next focus condition. The recording session took place in a quiet room at the University of Potsdam or at the phonetic lab at the ZAS in Berlin. Speakers wore a headphone microphone which was connected to a digital recorder: Roland vers. 3.0/ R-09HR (24bit, 96 kHz). The data were recorded in an mp3-format and converted into wav. files. Speakers (9 female, 1 male) were all born and educated in the Berlin-Brandenburg area and university students of a non-linguistic subject.

V.6.3.2 ANALYSES

For the phonological analyses each target sentence was segmented manually on the syllable level in Praat[82]. *F0* extraction was carried out using the general purpose script Prosody Pro[83]. Tonal labeling was realized according to the GToBI conventions (Grice & Baumann 2000). A total of 200 yes/no questions per variety: 5 targets x 4 foci x 10 speakers were analyzed.

Comparisons were made for the type and number of pitch accents on pre-nuclear constituents (only arguments), nuclear constituents (including verbs) and post nuclear constituents across the 3 focus conditions (subject, object, verb) and the all-new baseline condition. Special attention was paid on de-accentuation of post-nuclear constituents and the category of the final boundary tone (L% vs H%). Furthermore the complex interplay between pitch accent, de-accentuation and boundary tone implementation according to focus was investigated.

V.6.3.3 RESULTS AND DISCUSSION

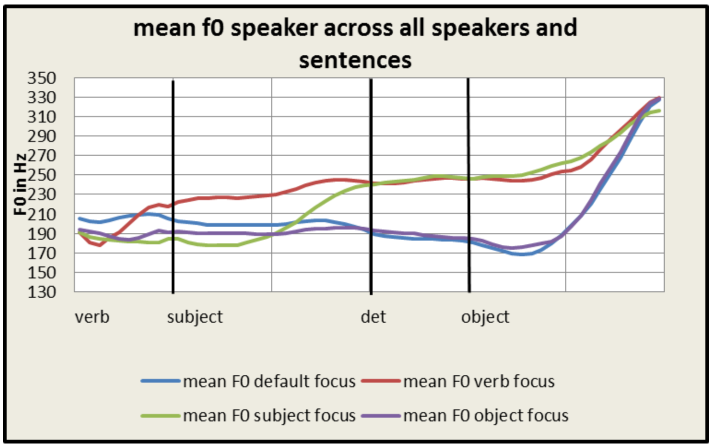
The results for the implementation of the final boundary tone repeat the assumptions for Standard German. All of the 200 sentences are realized with a high final boundary tone (H%) at the end of the IP independent of the focus condition and position.

With respect to pitch accent implementation the two different categories observed in Standard German (H*L and L*H) like mentioned above are observed in the monolingual yes/no questions. However, their distribution depends on the IS condition of a constituent. Whereas nuclear accents

[81] The Xu-replication study was elicited in two parts to avoid familiarization with the task. The first part corresponded to part eight of the elicitation questionnaire and concerned the elicitation of all-new and subject focus of all five target sentences. The second part corresponded to part 10 of the whole questionnaire and concerned the elicitation of object and verb focus.
[82] Boersma, Paul & Weenink, David: http://www.praat.org/
[83] Xu,Yi: http://www.homepages.ucl.ac.uk/~uclyyix/ProsodyPro/

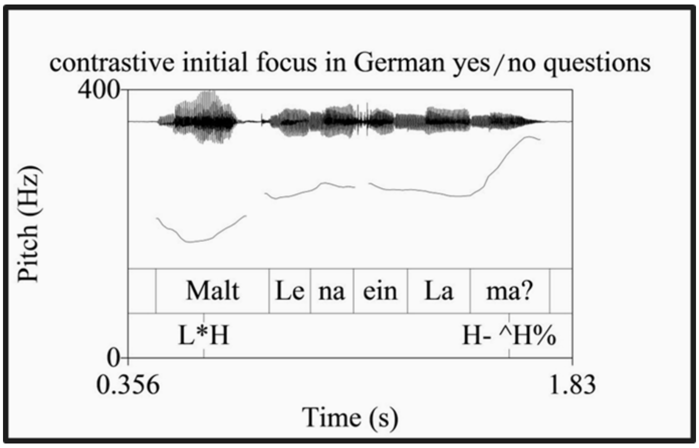
representing the focused constituent of a yes/no questions were realized with an (L*H) in 195 of the 200 sentences, pre-nuclear accents represent both pitch accents (L*H) and (H*L) without a clear preference. Post-nuclear constituents were systematically de-accented. Additionally the visual and auditory inspection of the tonal overall contour revealed relatively little *f0* movement up to the focused constituent, corresponding to pre-focal compression. Compared to post-focal constituents, pre-focal arguments showed pitch accents, although they were lower than the same constituents in a focal condition. The mean maximum *f0* across all speakers, sentences and focus conditions is outlined in figure (5.10).

Fig. (5.10): Time-normalized *f0*-contour in German yes/no questions in different focus conditions



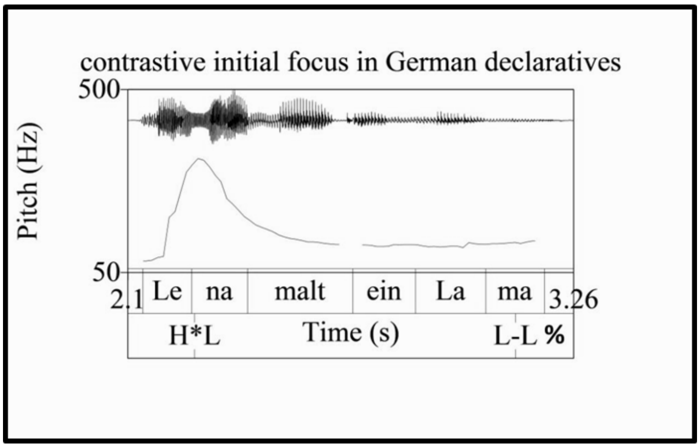
The mean *f0* graphs in figure (5.10) represent the three different focus conditions and the all-new baseline designated here as default contour. The vertical thin lines indicate syllable boundaries and the thick lines word boundaries. Each condition is indicated by a different color. The all-new contour corresponds to the blue graph, the verb focus contour to the red graph, green contour to the subject focus condition, and the purple contour corresponds to object focus. The visual inspection of the graphs reveals a modification of the *f0* according to focus confirming the results of the phonological annotation of each target sentence for each speaker and focus condition. All sentences end with a final rising contour, focused constituents are realized with a rising pitch accent, and pre-focal constituents are realized with compressed pitch accents. The almost equal distribution of (H*L) and (L*H) pitch accents on pre-nuclear arguments shows that they are not a distinctive cue in yes/no questions with syntactic inversion in contrast to Petrone & Niebuhr's (2013) observation that German speakers perceive interrogative meaning already by the shape of the pre-focal pitch accent when questions lack syntactic marking. Additionally the *f0* graphs in figure (5.10) indicate that post-nuclear constituents remain unaccented. The de-accenting pattern used in monolingual German yes/no questions ending with a high boundary tone is a high de-accenting pattern which is realized as a continuous rise (H-H%) or an upstepped rise (H-^H%). Both rises start after the nuclear pitch accent (L*H) on the focused constituent and either rise continuously until the IP final syllable or rise until the penultimate syllable of the final constituent and are followed by an additional upstep on the IP final syllable. The implementation appears to depend on the position of the focused constituent. If the focused constituent is in an initial position, the contours are more likely to be realized with an upstepped high final boundary tone. In figure (5.11) an upstepped contour is provided.

Fig. (5.11): Verb focus yes/no question with high de-accentuation and upstepped high boundary tone



In figure (5.11) representing verb focus, designated here as initial focus, the nuclear constituent is realized with an L*H pitch accent followed by a rise. The rise after the nuclear pitch accent remains almost plateau-like until the final syllable of the question where an upstepped high final boundary tone is implemented. Post-nuclear constituents are not aligned with additional pitch accents. However, the de-accentuation pattern of the rising contour differs from the de-accentuation pattern of declaratives where the *f0* contour of postfocal constituents remains flat and low until the final low boundary tone (L-L%). In figure (5.12) the declarative counterpart to the subject focus yes/no question in figure (5.11) is outlined indicating the difference in the de-accentuation pattern.

Fig. (5.12): Subject focused declarative with post-focal low de-accentuation



In figure (5.12) the declarative version of figure (5.11) is outlined. In contrast to the yes/no question verb-inversion is not used here, but a simple declarative syntactic structure: SOV. As in figure (5.11) the subject is associated with the nuclear accent. In contrast to the yes/no question the nuclear pitch accent is of the form (H*L) whereas the interrogative exhibits a (L*H). The post-nuclear constituents are realized with a continuing low flat *f0* until the final low boundary tone. What becomes visible in the comparison of both graphs is a complex tonal interplay in German intonation contours. The implementation of a final high boundary tone in yes/no questions causes a structural change of the de-accentuation pattern. According to van Heuven & Haan (2002) the observation of the structural change is a phonetic effect based on the implementation of (H%). Hence, the high de-accenting pattern is caused by the shape of the boundary tone and probably also influenced by the shape of the rising nuclear pitch accent. The lack of observations of a combination of a rising nuclear pitch accent (L*H) followed by a low de-accentuation pattern (L-) and a final boundary tone (H%) confirm the motivation of a phonetic effect of the high boundary tone.

V.6.3.4 CONCLUSION

The previously outlined results indicate that German uses a complex interplay of several tonal features to mark information structural modified yes/no questions. A structural change in one of the features causes a structural change in the following feature and vice versa. The contours observed for yes/no questions do not only differ in the implementation of the final boundary tone (H%) from the declarative contours but they also differ crucially in their de-accentuation pattern and the nuclear pitch accent. The 10 speakers of the 200 yes/no questions implement a rising nuclear pitch accent (L*H) and a high final boundary tone (H%). The interpolation between both pitches is realized via a high de-accentuation pattern (H-H%, H-^H%) in contrast to the low de-accentuation pattern (L-L%) typically found in German declaratives. Hence the structural change of the final boundary tone in yes/no questions has a phonetic effect causing a structural change in the de-accentuation pattern resulting in a high de-accentuation pattern. Declaratives with post-focal de-accentuation pattern are realized with a low final boundary tone which furthermore confirms the phonetic effect of the final boundary tone on the preceding de-accentuation pattern. However, the observed features used in the yes/no questions of the experiment are not exclusive to yes/no questions. The nuclear pitch accent (L*H) which is used by all speakers in all sentences in the data of this study is not exclusively used in German interrogatives and does therefore not represent a distinctive prosodic cue on its own. A high final boundary tone and probably also the high de-accenting pattern are also not distinctive in their own right. High final boundary tones in German are also observed in discourse structure to mark continuation. However, the complex interplay of the three tonal features is a crucial indicator in the prosodic-pragmatic interface of German yes/no questions with contrastive in-situ focus. Structural changes in IS and sentence type are connected to structural changes of sentence prosody. The nuclear pitch accent from German declaratives (H*L) changes to (L*H) in yes/no questions and the low boundary tone (L%) to a high one (H%). However, there is no one to one relation between pitch accents and IS category in the observed yes/no questions: L*H is not exclusively used for focused constituents, but also found in the pre-nuclear position in the data. Nonetheless, the structural property of the nuclear pitch is related to the structure of the de-accentuation pattern from (L-) to (H-) and the category of the final boundary tone (H%, ^H%).

The outlined tonal effects show that prosodic sentence type and IS-marking are additional cues to contextualize yes/no questions in German apart from the fact that they are already syntactically marked by verb fronting.

V.6.4 SUMMARY ON YES/NO QUESTIONS IN GERMAN

In this section I gave an overview of the most important aspects of German yes/no questions. A literature review showed that yes/no questions are either marked syntactically by syntactic inversion and/or marked prosodically. Generally yes/no questions are realized with a high final boundary tone (H%) in contrast to German declaratives which usually end with a final low boundary tone (L%). A production experiment with 10 German monolingual speakers confirmed that also syntactically marked yes/no questions with manipulated foci are realized with a high final boundary tone (H%). Furthermore the results showed a change in the de-accentuation pattern as a phonetic effect of the high final boundary tone. However some studies on the final intonation contour of German yes/no questions also showed that a low boundary tone (L%) is possible. The low boundary tone is primarily interpreted as a prosodic expression of attitudinal meanings. Kügler (2003, 2007) and Truckenbrodt agree on the fact that yes/no questions with a high boundary tone represent typical information questions, whereas yes/no questions with a low final boundary tone are biased with respect to the answer implying that the speaker presupposes that the answer is either yes or no due to shared common knowledge most probably induced by the previous conversation. The implementation of a low final boundary tone in syntactically unmarked yes/no questions is also confirmed by perception studies (Petrone & Niebuhr 2013). However they assume that even if utterance-final rises are not directly related to interrogativity, the attitudinal meaning of utterance-final rises adds to the nature of a question in that the speaker leaves the initiative to the dialogue partner. They suggest that questions with a final rising contour will always remain the more prototypical questions.

The differences in the implementation of the final boundary tone may potentially also be related to differences in the elicitation method. Whereas studies reporting on the existence of (L%) are most typically based on observations of spontaneous conversational speech, (H%) is most often reported in semi-spontaneous or read speech.

CHAPTER VI: EXPERIMENT 2
PROSODIC FOCUS AND SENTENCE TYPE MARKING IN BILINGUAL TURKISH

(…) I would suggest, then, that for language and for other forms of communication (culture), four questions arise: 1 Whether (and to what degree) something is formally possible; 2 Whether (and to what degree) something is feasible in virtue of the means of implementation available; 3 Whether (and to what degree) something is appropriate (adequate, happy, successful) in relation to a context in which it is used and evaluated; 4 Whether (and to what degree) something is in fact done, actually performed (…). (Beardsmore 1986: 44)

VI.1 INTRODUCTION

An aspect which still lacks attention in bilingual language change is not only contact-induced change on the supra-segmental level and within that aspect the impact of L2 on L1 but also the complex interaction of pragmatics and intonation in bilingual functional related prosody. With the investigation of prosodic marking of IS and sentence type in bilingual Turkish yes/no questions the present experiment will make a contribution to this facet of complexity on the prosodic-pragmatic interface in bilingual speech development and language change.

In experiment 2 the changes of functional related prosody in the heritage language of Turkish speakers from Germany will be investigated and compared to the monolingual realization of the same features as resulting from the previous experiment 1. Though research struggles to establish monolingual taxonomies of function and meaning of supra-segmentals theire availability and reliability is still very limited. German, is one of the best investigated languages in that sense as outlined before. Turkish on the other side does not even have a conventionalized description system for intonational phonology. To this effect, the results of experiment 1 not only constitute a contribution to the investigation of functional related prosody in Turkish, but also constitute the fundamental baseline for comparison with the results of the following experiment with bilingual Turkish. Departing from the previous literature review on bilingualism which revealed that bilingual varieties differ from monolingual varieties due to the fact that bilingual speakers have further language knowledge and competences enabling interaction and exchange between languages, this observation will be verified for the German-Turkish contact situation by means of the observation of changes in L1- Turkish. The results are surprising and challenge structurally-driven approaches of contact-induced language change. Functional related prosodic features from L2 German are used in L1 Turkish which cannot be derived by structural implications since they constitute the opposite of what structurally-based approaches would expect. The results of this study are discussed in a framework which understands structural interaction and contact induced change as based on functionally-driven choices and language activation. Through the activation of structural features from both languages pragmatic requirements are fulfilled which differ by nature from monolingual pragmatic concepts not only through differences in the cognitive representation and processing of language in mono-and bilingual speakers. By that means contribution to a compound approach is supplied and prefered to the reliance on a specific theory which can only be limiting.

VI.2 EXPECTATIONS

Based on the previous description of bilingual language acquisition with respect to structural, dimensional, cognitive, and functional aspects that may influence and motivate the development of linguistic changes in bilingual varieties, differences in the prosodic realization of focus and sentence type in bilingual Turkish are likely to occur. In the previously outlined approaches on bilingual language acquisition, cross linguistic differences are commonly considered as the most crucial motivator for structural changes. Additionally, an alternative approach was introduced which focuses on functional aspects that may motivate contact-induced linguistic changes in bilingual varieties. The baseline assumption of both approaches is established upon the cognitive representation of linguistic systems in a bilinguals mind. Rather than considering a bilingual as two monolinguals in one mind, linguistic systems are stored in a common space motivating interaction between both languages. This interaction is most commonly observed in transfer processes of language specific features from one language to another. Although transfer is mainly observed in studies focusing on the impact of L1 on L2, the reverse process has also been reported in bilingual language research. These findings motivate the premise that the transfer of structural features from German L2 into Turkish L1 will also be present in the investigation of bilingual prosodic focus and sentence type marking. Approaches from cognitive linguistics (e.g. Herdina & Jessner 2002) furthermore assume that linguistic systems that contain several languages are less stable than monolingual systems. By that means L2 is given a clear role in furthering language change. The premise of change is also strengthened within a structural approach of bilingual language change through the existing cross-linguistic differences between German and Turkish with respect to the prosodic marking of IS and sentence type. The literature review and experimental results with respect to the realization of functional related prosody by monolingual speakers of German and Turkish outlined previously indicate that both languages differ in the use of prosodic features to mark IS and sentence type by means of *f0*.

To establish a scheme of predictions with respect to the prosodic features which are likely to cause structural changes in the L1 output of bilingual speakers the core features of prosodic focus and sentence type marking in both monolingual varieties are summarized in table (6.1).

Table (6.1): Cross-linguistic differences in the prosodic marking of IS and sentence type in yes/no questions in monolingual Turkish and German

Language	**Pre-focal constituents**	**Focused constituents**	**Post-focal constituents**	**Sentence type marking**
Turkish	none	prosodic alignment	PFD	none (prefocal compression)
German	prefocal compression	pitch increase	PFD	high boundary tone (H%)

As demonstrated in table (6.1) Turkish and German differ to some extent in the use of prosodic features to mark IS and sentence type. All four prosodic features (pre-and postfocal de-accentuation, pitch increase, and high final boundary tone implementation) correspond to functional related prosody since they convey pragmatic meaning, namely IS and sentence type. By means of a markedness scale Zerbian (2015) proposes that functional related prosody is more marked than structural prosody with the consequence of causing difficulties in bilingual language acquisition. The multi-dimensional intonation learning model proposed by Mennen (2015) also emphasizes the difficult role that constitutes the acquisition of intonation contours that convey meaning.

With respect to the differences in functional prosody between both languages the results of experiment 1 conducted with monolingual Turkish speakers revealed that Turkish aligns focused constituents to the right most prosodic phrase boundary by the de-accentuation of postfocal constituents. German on the other hand increases the pitch accent on focused constituents, most commonly de-accents all following postfocal elements, and compresses pre-focal given elements. With respect to sentence type marking it was furthermore shown in the preceding experiments that Turkish does not use a distinctive final boundary tone or pre-focal compression (cf. Göksel et al. 2009) to mark yes/no questions prosodically. German on the other side typically uses a high final boundary tone at the end of yes/no questions even if they are already marked syntactically by verb inversion as confirmed by an additional experiment with monolingual German yes/no questions.

From a contrastive analysis it becomes evident that Turkish and German share the prosodic feature of PFD in correlation with IS. From a structural point of view PFD has been described as a marked

prosodic feature in the literature as outlined in chapter IV.2. As a marked prosodic feature it is reported to cause difficulties in situations of language contact where it easily disappears. However, within the framework off markedness theories as outlined in chapter IV.2 the constellation of sharing a marked prosodic feature provides a contact situation where the feature is likely to be maintained in the contact varieties. Accordingly, PFD would probably not disappear in the contact situation of German and Turkish, since both languages implement this prosodic feature in dependence of IS.
Pitch increase and pre-focal compression are also marked prosodic features by means of representing functional prosody and also by means of implicational relationships as proposed by Eckman (1977). The existence of pitch increase and compression requires the existence of pitch accents in a language. With respect to the final boundary tone the status of markedness is not as easily categorized. By representing functional prosody since it is an intonational cue to a pragmatic meaning it can be classified as marked. With respect to an implicational relationship it is not clear if the implementation of a high boundary tone requires the existence of a low final boundary tone or reverse. This theoretical question needs to be clarified in future empirical cross-linguistic studies. However, all three features are only distinctive prosodic features in German. Thus the transfer of those marked features is very unlikely since they only occur in the L2 of the respective German-Turkish bilingual speaker group. According to the predictions of bilingual acquisition approaches focusing on the structural-inherent properties those features that are not present in the L1 and structurally marked, but present in L2 should not have an impact on the realization of L1 of bilingual speakers.
Regardless of the predictions based on structurally-oriented approaches which propose the emergence of PFD, but not of pitch increase and pre-focal compression in bilingual Turkish yes/no questions, I still expect deviances in the Turkish L1 of German-Turkish bilinguals exactly with respect to the implementation of these functional prosodic features. Based on diverse and sometimes contradicting results of bilingual research, I expect that not all changes that will emerge in the present bilingual data can be explained in a satisfying way by structural implications, such as markedness. I assume that an additional functional-oriented approach based on cognitive processes is necessary in order to generate a holistic understanding of the freedoms and restrictions that motivate linguistic changes.
Based on the assumption of activation and interaction of both languages in a bilinguals' representation of phonologic categories as assumed in learning models such as Flege (1995) and Mennen (2015) in addition to cognitive and functional approaches such as Paradis (1993, 2004, 2008), Grosjean (2001, 2012) and Matras (2007, 2010), I assume that the complete phonological inventory of bilinguals can be activated and used in order to optimize the achievement of communicative goals in bilingual conversation. By means of functionally-driven choices the bilingual

speaker generates a linguistic output which is based on its full linguistic repertoire independent of the resource language. The choice is made on the base of accomplishing with communicative goals in a bilingual mind- set. As outlined in chapter IV.2.3.2. the languages of bilinguals are constantly activated whereat antagonistic mechanisms are working to draw a demarcation line between both languages at the moment of speaking. While the activation threshold of the language spoken is lowered, the activation threshold of the language not spoken is raised by inhibitory cognitive mechanisms. However, this demarcation line can be crossed and is crossed within a functional view if and only if it contributes to the success of communication. I assume that a bilingual pragmatic concept which differs from that of monolingual speakers needs to be given a correspondancy at the surface for which the use of a correspondancy which is simoultaniously activated in a bilinguals brain once the concept is recalled is an effective way of fulfilling with diverging pragmatic backgrounds in a bilingual mind. Based on Heine & Kuteva's (2003, 2005) assumption of a mental comparison between both languages resulting in the use of a feature from the model language in the replica language carrying the same meaning I assume that a mapping is established between different language inherent areas such as pragmatics and prosody and also between the different languages of a bilingual. According to Levelt`s (1989) language processing model for monolinguals, neurolinguistics approaches assume that also for bilinguals pragmatic concepts are generated in one common conceptualizer which works simoultaniously with but separated from the several linguistic linguistic system, traditionally summarized as grammar comprising amongst others as many phonological subsystems as a speaker speaks languages. By that means pragmatic informations such as IS are processed independent of the language spoken. By that means the pragmatic competence/knowledge differs in monolinguals and bilinguals as it comprises of different concepts. To give form to the pragmatic concepts bilinguals can make use of both linguistic subsystems whereat a direct mapping between concept and language spoken is fast and effortless, but sometimes without success. At this point the inhibitory mechanisms of the other language are blocked and the activation of the formal corespondancy to to pragmatic concept can be realized. Within that mapping process bilinguals select the most promising/ available output in order to contextualize a given message on the base of both languages optimizing with that over the full set of linguistic devices at hand. If one language of a bilingual speaker group disposes of linguistic means that contribute to the contextualization of a certain pragmatic meaning of which the other language of the bilinguals has no formal correspondence, bilinguals maximize the success of their output by using the feature from one language in the other. Hence, the transfer of features is motivated by their function to fulfill a pragmatic concept. By that means, the use or transfer of marked features can be an asset and is functionally-motivated in order to optimize bilingual conversation, since a bilingual mind-set differs from a monolingual mind-set. Accordingly, the use of prosodic features which are only used to indicate pragmatic meaning in German and for which monolingual Turkish has no devices are supposed to occur in bilingual Turkish within a functional view. By that means, the process of functionally-driven transfer is a process of fulfilling requirements of bilingual communication, which differ from that of monolingual communication. With optimization I refer to a process of bilingual language development and use where structures of both languages are implemented in bilingual speech modifying the underlying contact language in a way that the achievement of communication goals is maximized. Optimization facilitates the interpretation of a message since it contributes to the demarcation of pragmatic contrast to alternative meanings. To this effect optimization processes can favor the transfer of prosodic features related to pragmatic meanings especially in a primarily oral contact variety since it contributes to the process of the contextualization of a message.

Since the prosodic features under investigation in the bilingual experiment are at work on the pragmatic-prosody interface representing functional prosody, I assume the opposite of what markedness approaches would predict. Related to their pragmatic contribution I expect that pitch increase and pre-focal compression are likely to be transferred from German to the Turkish of bilinguals in order to optimize the understanding of a given message by means of fulfilling a pragmatic concept. Following Paradis' (1993) Activation Threshold Hypothesis (ATH) and Grosjeans' assumptions of language mode, German L2 should be activated in inter-bilingual Turkish conversations facilitating the transfer of the respective prosodic features to indicate pragmatic meanings to which monolingual Turkish has no correspondence. In German, prosodic cues such as pitch increase to indicate focus are highly active resulting in a very low activation threshold. In Turkish on the other side such phonological features are rarely used or not existing. Assuming that the pragmatic concepts of focus and givennessc marking is processed in a bilingual conversation independent of the language spoken the activation of the corresponding formal features –namely pitch increase and pre-and post-focal de-accentuation- is promoted. The conceptualization of a detailed classification between focus and givenness for which Turkish only uses a single category facilitates the activation of the corresponding structural devices from German to give form to those pragmatic concepts in bilingual Turkish. In other words I assume that implicit pragmatic competence is built independent of language. To this effect the pragmatic concepts existing in the bilingual brain need to be realized on the surface to which the constant activation and inhibiting processes of both language subsystems contribute. In light of the predominately spoken character of Turkish in Germany prosodic features are much more likely to undergo transfer processes as if Turkish would primarily be used in other domains such as written language where the use of prosodic features, especially the ones under investigation would not contribute or only marginally contribute to a process of bilingual language optimization.[84] The use of prosodic cues that differ from the monolingual variety and contribute to the contextualization of a certain pragmatic meaning in discourse is also observed for other Turkish varieties and the German variety of German-Turkish bilinguals (e.g. Cindark & Aslan 2004, Queen 2006, Selting & Kern 2008).

Although the transfer of marked prosodic features finds its origin in a functionally-motivated process based on language activation in a bilingual mind-set, I assume that the same process is subject to conditions. For the sake of the optimizing effect of functionally-motivated transfer which finds its base in the neural process of language activation and inhibition, I expect that transfer is not happening if a certain pragmatic feature is already contextualized by other devices in the L1 including syntactic and morphological devices. In favor of fast and effortless processing I assume that double markings are avoided. If a certain pragmatic meaning such as sentence type finds its structural correspondancy already in the activation of an L1 feature including syntax and morphology, there is no need to cross demarcation lines and interrupt inhibitory processes of L2. The transfer of an additional prosodic cue from the contact language would not contribute to the contextualization of the pragmatic meaning since the monolingual variety already has a contextualization cue. Further marking would be redundant and cause more effort by means of cognitive processing. In concrete I assume that in contrast to the use of phonological features from L2 German to indicate IS categories, the formal phonological feature of a high final boundary tone (H%) of L2 German will not be used to indicate sentence type in bilingual Turkish, since the concept is already realized on the surface by a genuine morpho-syntactic feature, namely the question particle –*mI*.

Nonetheless, I assume it to be possible that over the course of time and extensive activation of a formal feature, L2 features can substitute L1 features. In the Greek variety of Turkish, the morphological question marker to indicate sentence type indeed is substituted by a final high rising intonation which is typical for Greek interrogative marking (İmer & Çelebi 2006).

In sum, the experimental design of experiment 2, requires the bilingual speakers to contextualize several pragmatic meanings with IS and sentence type as the major pragmatic concepts. Both concepts have correspondancies in both of the languages of German-Turkish bilinguals. However, German distinguishes between explicit focus and givenness marking, whilst Turkish only makes use of one IS category comprising both focus and givenness. Based on neurolinguistics approaches implicit pragmatic competence is part of the verbal communication system but not language specific in a way that each language spoken by a multilingual comprises its own conceptualizer. To this effect a German-Turkish bilinguals should have implicit pragmatic knowledge of the detailed pragmatic categories of both languages existing in one common conceptualizer. Hence, all of these concepts

[84] The transfer of prosodic phrasing structures on the other side would probably have a marginal impact even on a written variety by means of indicating prosodic boundaries via the orthographic system by the use of commas and alike.

need to be given a formal correspondancy independent of the language spoken. By means of neural activation processes a mapping between pragmatic concept and formal feature is realized. If neural impulses cannot find a correspondancy in L1 activation spreads over to the correspondancy of L2 in order to fulfill pragmatic requirements which differ from the monolingual variety. For the contextualization of those pragmatic categories the bilingual speaker uncounsciously scans over his full linguistic toolbox and identifies structures or devices which will maximize his communicative goal in the most promising and effortless way. Based on this view contact-induced language change in bilingual varieties is assumed to be functionally-driven by the need to correspond to a pragmati reality which differs from that of monolingual speakers. The structure itself has only marginal impact. For the German-Turkish bilingual language contact situation and the specific features of the pragmatic prosodic interface of experiment 2, I expect the following features to arise:

(i) De-accentuation is expected to be used in bilingual Turkish to mark post-focal constituents despite its marked character, since it is used in both languages. It contextualizes the interpretation of the sentence with respect to its IS status and no further syntactic or morphological feature is implemented to mark a post-focal constituent in the design of the target sentences. A loss of PFD would result in the rise of a pragmatic gap which is supposed to be avoided.

(ii) I expect that pitch increase to indicate a focused constituent is transferred from monolingual German to bilingual Turkish in order to successfully optimize a given message although monolingual Turkish does not explicitly indicate focus. By that means a pragmatic concept, existing in the bilingual mind is given form on the surface.

(iii) With respect to the marking of pre-focal constituents I expect that the prosodic feature is also used in bilingual Turkish. However, the motivation is twofold. As experiment 1 reveals that the feature is not used in monolingual Turkish in order to mark pre-focal givenness, the feature is most likely transferred from German L2 to Turkish L1 in order to fulfill the explicit pragmatic concept of pre-focal givenness. An alternative motivation goes back to Göksel et al's (2009) observation of pre-focal compression as a sentence type distinctive cue in monolingual Turkish yes/no questions. Based on this observation a systematic use of the feature in bilingual Turkish can also constitute a contact-induced consolidation of an already existing feature. By that means the contact situation serves as an accelerator of internal development also contributing to the specification of a pragmatic meaning.

(iv) For sentence type marking on the other side which is prosodically represented by a high final boundary tone (H%) only in German, I do not expect the transfer of the high final boundary tone into bilingual Turkish. Although this feature is not present in Turkish, the transfer of this prosodic feature would not represent a case of optimization since the pragmatic meaning of sentence type is already morphologically indicated by the question particle *-mI* in the respective target sentences. A double marking in order to contextualize the massage as an interrogative is not necessary since the question particle already represents a contextualization cue for the respective pragmatic interpretation of the sentence. The activation of both forms would result in redundant and unnessesary cognitive effort.

VI.3 METHODOLOGY

The present experiment is designed in order to elicit data on the prosodic realization of IS and the prosodic marking of sentence type in in-situ contrastive focused yes/no questions in bilingual Turkish. In chapter III the same experiment is conducted with monolingual speakers serving as a baseline for comparison. Both experiments are carried out in the same fashion in order to generate data which enable a direct comparison between monolingual and bilingual speech allowing to systematically describe structural changes in the realization of the respective prosodic features. For an easier reading a brief summary of the methodology is provided. A detailed description of it is already provided in the corresponding section in the presentation of experiment 1 in chapter III.

VI.3.1 EXPERIMENTAL DESIGN AND SET UP

The experimental design and set up is a modified replication of İpek´s (2011) study based on Xu's (1999) methodology with focus as the manipulated factor. In order to test how information structure and sentence type is realized by means of *f0* some important changes in the target sentences design, in comparison to İpek's (2011) study are made. In contrast to İpek´s study sentence type is changed. Declaratives are changed to interrogatives representing typical Turkish yes/no questions containing a focus sensitive question particle.

Xu`s (1999) methodology to elicit in-situ focus on different constituents in a sentence is based on prompting in-situ focus by means of question answer pairs targeting different constituents as focused in the answer according to the question. Through the respective question either the initial, the medial or the final constituent is focused and should be marked prosodically in the subsequent answer if the language under observation obtains prosodic means to mark in-situ focus. Both, questions and answers are presented in writing and are read out aloud by the participants with the focused word underlined.

The question answer-pair elicitation method is changed here to correspond to the requirement of eliciting yes/no questions. Instead of providing a question which prompts an answer in which a certain constituent is focused, a context is provided which most naturally introduces the participant to ask a yes/no question. Both, the preceding context and the contrastive in-situ focused yes/no question, are provided in writing to the participants. They are visually presented in the form of a power point slide which in addition contains a picture that refers to the context and the question. In figure (6.1) an example for the elicitation of subject focus is exemplarily demonstrated. The translation of the context and the subsequent yes/no question into English is given below the picture.

Fig. (6.1): Elicitation of subject focus in experiment 2

Context: Melda mı, Meral mi elmacıyı seviyor? Bilmiyorsun. Sor!

(Is Melda or Meral in love with the apple trader? You do not know it. Ask for it!)

Question: Melda mı elmacıyı seviyor?

(Is it Melda who is in love with the apple trader?)

The presentation procedure for the 20 questions is the same for each participant. The experiment is part of the elicitation of a bigger data set recorded for the SFB 632 at the University of Potsdam/ Germany. This questionnaire contains 8 experiments which elicits general prosodic features as well as prosodic correlates of information structure of Turkish. Three of the experiments are divided into two parts in the elicitation process. The present experiment to elicit in-situ focus and sentence type in Turkish yes/no questions is divided into two parts as well. The first part is presented as the second experiment of the whole data elicitation, the second part of the experiment as the fifth part of the whole data elicitation. In the first part the all-new baseline and the subject focus conditions of all five target sentences are elicited. In the second part the object focus and the verb focus condition of all target sentences are elicited subsequently.

The experiment was conducted by two female German Turkish bilingual speakers, with a similar sociolinguistic background as the speakers. Both interviewers have a study background related to linguistics: one studied German linguistics and the other one psycholinguistics at the Potsdam University during the recording time. Both were explicitly instructed to only talk Turkish with the participants to avoid effects of code switching. The slides of the experiment were presented to each speaker on a laptop in a phonetic laboratory at Potsdam University or the ZAS in Berlin. Speakers wore a headphone microphone which was connected to a digital recorder: Roland vers. 3.0/ R-09HR (24bit, 96 kHz). Data were recorded in an mp3-format, converted into wav.files and analyzed in Praat.[85] The focused word of each sentence was underlined to reduce errors. The underlining should not have an effect on the prosodic structure of the utterances if bilinguals do not mark information structure in Turkish by prosodic means.

VI.3.2 STIMULI

All questions have a simple SOV structure. Either the subject, the object, or the verb is focused in the question. An all-new question is also elicited to serve as a baseline condition to be compared with the focus conditions. Due to the focus sensitivity of the Q-particle *–mI*, the position of it changes according to the elicited focus condition. In the all-new and the verb focus condition the particle attaches to the final constituent, i.e. the verb. In the subject focus condition it attaches to the subject, like demonstrated in the picture in figure (6.1). In the object focus condition the Q-particle attaches to the object. In table (6.2) the structural differences for each focus condition are summarized.

Table (6.2): Morpho-syntactic structure of the target sentences according to focus

f-condition	**ms-structure**
all-new:	S O V-mI
verb focus:	S O V-mI
subject focus:	S-mI O V
object focus:	S O-mI V

[85] Boersma, Paul & Weenink, David: http://www.praat.org/

In contrast to the elicitation method in Xu (1999) a total of five target sentences are designed. Repetitions of the same sentence are not used here due to time-normalized analyses. Furthermore sentence type corresponds to yes/no questions in the present experiment which is morphologically marked by the question particle -mI which attaches to the focused constituent. Identical to the Turkish declarative target sentences of İpek´s study all yes/no question target sentences of the present study consist of a simple transitive SOV structure. Five target sentences are designed, each containing an accusative object and the same number of syllables (10) whereas in İpek´s experiment the number of syllables differs across targets. The 5 target sentences are designed segmentally equal and whenever possible with a similar syllable structure. All subjects contain two syllables, all objects four syllables, and all verbs three syllables. The Q-particle consists of one syllable. The five target sentences are outlined in table (6.3).

Table (6.3): Target sentences of experiment 2 in the all-new representation

(1) Melda elmacıyı seviyor mu?
    (Melda apple.trader-ACC love-PRS Q)
    (Does Melda love the apple trader?)
(2) Nilsu eskiciyi üzüyor mu?
    (Nilsu second.hand.dealer-ACC sadden-PRS Q)
    (Does Nilsu sadden the second-hand dealer?)
(3) Merve annesini görüyor mu?
    Merve mother-POSS-ACC see-PRS Q)
    (Does Merve see her mother?)
(4) Necla amcasini özlüyor mu?
    (Necla oncle-POSS-ACC miss-PRS Q)
    (Does Necla miss her uncle?)
(5) Nazlı eltisini arıyor mu?
    (Nazlı sister.in.law.POSS-ACC search-PRS Q)
    (Does Nazlı search her sister-in-law?)

Each of the five target sentences contains the structural changes according to the elicited focus condition when represented in the different focus conditions as demonstrated in table (6.2).
In table (6.4) the five target sentences are presented in the different focus conditions.

Table (6.4): Target sentences of experiment 2 in subject-, object-, and verb focus and the all-new baseline

sentence	all-new/ verb focus	subject focus	object focus
1	Melda elmacıyı seviyor mu? (Melda apple.trader-ACC love-PRS Q)	Melda mı elmacıyı seviyor? (Melda Q apple.trader-ACC love-PRS)	Melda elmacıyı mı seviyor? (Melda apple.trader-ACC Q love-PRS)
2	Nilsu eskiciyi üzüyor mu? (Nilsu second.hand.dealer-ACC sadden-PRS Q)	Nilsu mu eskiciyi üzüyor? (Nilsu Q second.hand.dealer-ACC sadden-PRS)	Nilsu eskiciyi mi üzüyor? (Nilsu second.hand.dealer-ACC Q sadden-PRS)
3	Merve annesini görüyor mu? (Merve mother-POSS-ACC see-PRS Q)	Merve mı annesini görüyor? (Merve Q mother-POSS-ACC see-PRS)	Merve annesini mi görüyor? (Merve mother-POSS-ACC Q see-PRS)
4	Necla amcasini özlüyor mu? (Necla oncle-POSS-ACC miss-PRS Q)	Necla mı amcasini özlüyor? (Necla Q oncle-POSS-ACC miss-PRS)	Necla amcasini mi özlüyor? (Necla oncle-POSS-ACC Q miss-PRS)
5	Nazlı eltisini arıyor mu? (Nazlı sister-in-law-POSS-ACC search-PRS Q)	Nazlı mı eltisini arıyor? (Nazlı Q sister-in-law-POSS-ACC search-PRS)	Nazlı eltisini mi arıyor? (Nazlı sister-in-law-POSS-ACC Q search-PRS)

With respect to the word stress properties of the different constituents, the subject and the object have a stressed final syllable, the verb has penultimate stress. Since the verb exclusively occupies the sentence final position in the experiment its final syllable serves as an anchor point in subject and verb focus for the implementation of the final boundary tone (L% or H%). In all-new and verb focus questions the last syllable of the utterance is represented by the Q-particle in its function of a prosodic word adjoiner and aligned with the final boundary tone. The final boundary tone is crucial since the present experiment also considers the phonology of sentence type. All verbs have additional word stress on a non-final syllable, since all of them are designed within the -İyor-present which is a morphological marker attracting word stress, banding general final word stress and overriding the pre-stressing property of the question particle. The final syllable of subjects and objects is supposed to be the anchor point for the realization of a high phrase boundary tone (H-) as well as for pitch accents (H*). The stressed syllable in monolingual Turkish is aligned with an (H*L) pitch accent. In (1) the word stress properties of the verb in the different focus conditions is outlined exemplarily for sentence 1. The question particle -mI is morphologically aligned with the respective focus constituent of each focus condition, but from a prosodic perspective it represents a prosodic word adjoiner as analyzed by Kabak & Vogel (2001). The prosodic verb adjoiner has no impact on the word stressed syllable. Whereas in general word stress assignment word stress swaps over to the final syllable of a prosodic word when it is morphologically modified, in words which are aligned with a question particle word stress remains on the same syllable as in the unmodified case.

(1) Word stress in the different focus conditions of target sentence 1 (stressed syllables are indicated by capital letters)

All-new: MelDA elmaciYI seVIyor mu?
(Melda apple.trader-ACC love-PRS Q)

Subject focus: MelDA me elmaciYI seVIyor?
(Melda Q apple.trader-ACC love-PRS)

Object focus: MelDA elmaciY mi seVIyor?
(Melda apple.trader-ACC Q love-PRS)

Verb focus: MelDA elmaciYI seVIyor mu?
(Melda apple.trader-ACC love-PRS Q)

VI.3.3 SPEAKERS

20 bilingual speakers (14 female, 6 male) of Turkish as first language and German as their early second language were recorded in a phonetic laboratory at Potsdam University and the ZAS Berlin in 2014. All speakers were aged between 22 and 26 at recording time. They were all born in Berlin and mainly live in the area of Kreuzberg and Neukölln. Both their father and mother are working migrants from Turkey who acquired German skills after their arrival. They acquired Turkish as their L1 at home, whereas the acquisition of L2 German started mainly around the age of 3 in the German kinder garden. All were university students of non-linguistic subjects. Most of them have some basic knowledge of a second language, namely English as a foreign language learned in school. Speakers were elicited via internet, announcements in public areas and on university news boards. The different elicitation methods were supposed to guarantee diversity across speakers and exclude group effects, such as could be present in groups which are familiar to each other (e.g. friends, class mates, sports groups, colleagues, etc.), in order to explore pure cognitive effects in second language acquisition and factor out possible paralinguistic effects as far as possible such as present in peer groups. Nonetheless, the speakers represent a homogenous group with respect to the age of acquisition, education and sociolinguistic background to guarantee comparability of the production

data. The age of the speakers is chosen in demarcation to the numerous studies that are conducted with younger speakers considering their L2 German. Most of these studies are conducted with bilingual children or teenagers to describe aspects of language acquisition in bilingual children or youth speech varieties such as the famous *Kiezdeutsch* (cf. Wiese 2012). Since these aspects of language development are not considered in the present study, but the features of a stable bilingual variety, only adults participate in the study.

VI.4 ANALYSES AND RESULTS

The analyses of the information structure modified yes/no questions of bilingual Turkish include a combination of phonologic and additional phonetic analyses of all target sentences of all speakers in three in-situ focus conditions and the all-new baseline. With respect to the previously made expectations concerning the structural output of bilingual Turkish based on a contrastive analysis of German and Turkish and general considerations of bilingual language change, special attention is paid to the acoustic correlates of IS and sentence type used in both monolingual varieties. Turkish and German both use de-accentuation on post-focal constituents. Pitch increase on focused constituents and pre-focal compression on pre-focal given constituents in turn are only used in German to mark IS as well as a final high boundary tone to mark sentence type prosodically in simple yes/no questions. Centered on cognitive studies, the dynamic interaction of both languages is assumed to result in functionally-driven transfers of features across languages in order to optimize over the full linguistic repertoire of bilinguals. To this effect all acoustic correlates found in the monolingual varieties are analyzed in the bilingual varieties.
For both the phonological and the phonetic analysis, in a first step all target yes/no questions were cut from the whole audio file recording and saved separately in a wav.format. In a second step each file was generated in Praat using the script ProsodyPro as previously in experiment 1. With the help of the script a smoothed *f0* was computed automatically. Furthermore, local errors in the vocal pulses like sharp spikes or octave jumps were corrected manually. In a third step all sentences were segmented manually on the syllable level using ProsodyPro. The script allows users to label the intervals that shall be analyzed, and then it automatically generates a list of text files containing measurements such as time-normalized *f0* contours, time values corresponding to the time-normalized *f0* points, duration of labeled intervals, max*f0*, min*f0*, mean*f0*, mean intensity, etc. A crucial advantage of the script with respect to the *f0* analysis is that it takes ten measure points per

syllable computing a time-normalized *f0*. [86] A major advantage of time-normalization is that it allows to clearly see the locations and manners of the maximum differences between experimental conditions by plotting the mean *f0* contours in overlaid graphs. This in turn allows finding measurements that potentially best reflect the real differences between experimental conditions. To this effect time-normalized contours are generated only for the purpose of making graphical comparisons. The specific measurements also generated by ProsodyPro*,* such as max*f0*, are all taken from non-time-normalized contours in order to prevent loss when time-normalized contours are presented in addition to the specific measurements.

Going back to the different steps of the analyses, in a fourth step, the phonological description of the *f0* movement across the whole IP is done manually for all target yes/no questions of the different focus conditions for all speakers. The analyses include the distribution of pitch accents, pre-focal boundary tones, and final phrase tones for each sentence and compare the results for each focus condition with the all new baseline for each of the 20 speakers. By that means the analyses are based on 20 yes/no questions per speaker: 5 target sentences x 4 focus conditions. A total of 400 yes/no questions are phonologically annotated for experiment 2.

The tonal annotation is realized within the AM-framework and follows the same guidelines as established for the phonological analyses of the monolingual baseline study in experiment 1. Since this study does not focus on differences in the phonetic realizations of phonological categories a phonologically based model for description is preferred. For both languages previous studies have shown that variation in the realization of pitch accents have no categorical relevance (e.g. Kan (2009) for Turkish; Kügler & Gollrad (2015) for German). [87] The phonological inventory used for the description of the bilingual data is primarily based on a slightly simplified version of the phonological inventory proposed by Kan (2009) and additional observations mainly based on İpek & Jun (2013)0. The results of experiment 1 confirmed the use of the established categories. Kan´s (2009) tonal inventory of Turkish includes a variety of pitch accents and non-final phrase boundary tones that are modified by leading tones. These annotations are completely absent in following models such as Kamali (2011) or İpek & Jun`s (2013). Since Kan (2009) herself claims that leading tones do not modify the semantic meaning of an utterance on the interpretation level, leading tones are not included in the phonological inventory used in the present data analyses. The pitch accents that are used in the present data analyses are (H*) and (H*L) as first proposed by Levi (2005). Furthermore,

[86] As described in the methodology section, time-normalized measurements enable an analytic comparison between different sentences with segmentally equal structure and no repetitions of the same target sentences are necessary in the experimental design. Time-normalization allows the averaging of f0 contours across repetitions and even speakers, thus removing most of the random variations while retaining full details of continuous f0 contours. This elicitation method is favored here since repetitions train the speaker to produce sentences in a certain way. Using different target sentences motivate the speakers to produce the utterances in a more spontaneous and natural way.

[87] For a controversy view see Chapter V.5.

different categories of phrase boundary tones are assumed for Turkish similar to ToBI description models. Since leading tones are not assumed only monotonal non-final phrase boundary tones are used in the annotation of the Turkish data of the present study. The PPh-final boundary tones assumed for Turkish are (H-, L-) though (L-) is reduced to the last PPh and non-IP final PPh's are usually marked by (H-). According to the observations of İpek & Jun`s (2013) high PPh-final phrase boundary tones are implemented on the stressed syllable of the last constituent of pre-focal syntactic NPs and differ in their phonetic realization with respect to the realization of pitch accents. Furthermore, PPh-final tones are substituted by an IP final boundary tone (L% or H%) when they the same location.

For the present study, the analysis of bilingual Turkish is based on a monolingual model of Turkish intonational phonology in order to have a baseline for direct comparison. To this effect, the monolingual model has the advantage of providing orientation for linguistic comparisons in a first step. However, the analysis is not blind towards obvious differences and an amplification of the tonal inventory will be realized whenever the data will make it necessary. The labeling based on auditory perception and visual inspection of the *f0* contour ensures that unconventional *f0* movements in the bilingual data will be detected and documented whenever they arise. Moreover, not basing the bilingual analyses in a description model of monolingual Turkish would anticipate a difference between both varieties which is not verified yet.

As a visual support furthermore the mean *f0* graphs based on time-normalized maximum *f0* values as generated by the script are computed for all focus conditions for the speakers as group. The mean *f0* values for each focus condition are visually outlined in a diagram style. The realization of the mean graphs is described with respect to de-accentuation on pre-and post-focal constituents and pitch increase on focused constituents compared to the all-new baseline condition.

In the additional phonetic analyses concrete maximum *f0* measurements on word stressed syllables of subjects, objects, and verbs for each focus condition are conducted for each sentence for each speaker. The mean maximum *f0* value for each item in a focus condition is calculated from the *f0* values found in the five different target sentences for each focus condition that are recorded for each speaker. The mean max*f0* measurements are determined by the previous cross—linguistic comparison of German and Turkish and include the analyses of pitch increase on focused constituents, de-accentuation on post-focal constituents, and pre-focal compression.

- With respect to the analyses of pitch increase on focused constituents the mean maximum *f0* values of the stressed syllable of a focused word is compared to the mean maximum *f0* value of the same syllables in the all-new condition for each speaker. Subsequently the mean maximum *f0* of the stressed syllables on focused words are calculated for the whole group for each focus condition and compared to the mean maximum *f0* of the whole group of the same syllables in the all new condition.

- In order to analyze post-focal de-accentuation as a correlate of IS the mean maximum *f0* on the word stressed syllables of post-focal constituents is compared to the mean maximum *f0* value of the same syllable in the all-new condition for each speaker. The same measurement is subsequently conducted for the whole group.
- To analyze pre-focal compression as a possible prosodic correlate of sentence type (c.f. Göksel et al. 2009) or IS the mean maximum *f0* on the word stressed syllables on pre-focal constituents is compared to the mean maximum *f0* of the same syllables in the all-new condition for each speaker. After the speaker by speaker analyses an analyses of pre-focal compression is also conducted for the group as a whole.

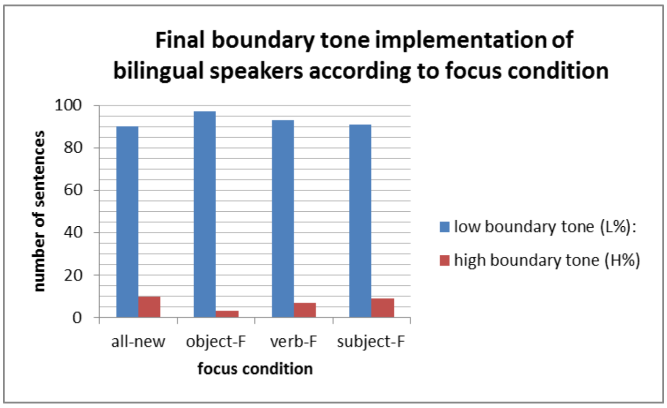
In a further step for each of the three phonetic analyses, i.e. pitch increase, PFD, and pre-focal de-accentuation a statistical test is conducted to test the significance of the results. Based on a similar study by Zerbian (2015) who also uses the methodology of Xu (1999) to measure post-focal de-accentuation and pitch increase on focused and post-focal constituents, linear mixed models are fit with maximum *f0* of the stressed syllable as the dependent variable, the focus condition as a fixed factor and speaker as a random factor. This is done in order to investigate whether the maximum *f0* differs when comparing focused, post-focal and pre-focal constituents to the baseline of all-new sentences. In order to account for gender-related differences in pitch among speakers, the *f0* values obtained for each speaker are converted to their logarithms (using the log () function in R). Afterwards the log values are calculated back to Hertz. For the statistical analyses of the present study each measure point of each stressed syllable is included. The statistic is not run on mean values but includes all data set values of all speakers.

VI.4.1 FINAL BOUNDARY TONE DISTRIBUTION

From a total of 400 contrastively focused yes/no questions realized by 20 bilingual speakers 371 sentences are realized with a low final boundary tone (L%). A total of 100 all-new yes/no questions are analyzed within the data set, of which 90 are aligned with (L%). Furthermore 97 of 100 object focus sentences end with a low final boundary tone. 93 of the analyzed 100 verb focus yes/no questions are also realized with a low final boundary tone. For the 100 subject focus yes/no questions 91 sentences end with a low boundary tone. The distribution of the final boundary tones implemented in the yes/no questions across the whole group of speakers is provided in table (6.4).

The respective tonal realizations (L%) vs (H%) are grouped for each focus condition and the all-new baseline.

Table (6.4): Bilingual implementation of FBT’s in contrastive focused yes/no questions



Despite a clear tendency to realize yes/no questions with a low final boundary tone (L%), as outlined in table (6.4), some speaker dependent implementations are observed. A high boundary tone (H%) is implemented in a total of 29 yes/no questions. Speaker 1 produces 15 of the 29 final high boundary tones. In all-new yes/no questions this speaker exclusively uses (H%). The same applies to the verb focus questions of this speaker. In the object focus yes/no questions realized by speaker 1, two sentences end with a final low boundary tone and three sentences end with a high final boundary tone. In subject focus yes/no questions speaker 1 uses a low final boundary tone in 3 sentences and a high final boundary tone in 2 sentences.

Speakers 7, 8, 9, 13, 15, 16, and 19 occasionally implement a high final boundary tone without any clear preference for a special focus condition. Figure (6.2) shows an all-new sample pitch track of speaker 1 realized with a high final boundary tone. Figure (6.3) shows the same all-new sentence uttered by speaker 5 with the typical low final boundary tone.

Fig. (6.2): High final boundary tone implementation in bilingual Turkish: female speaker 1

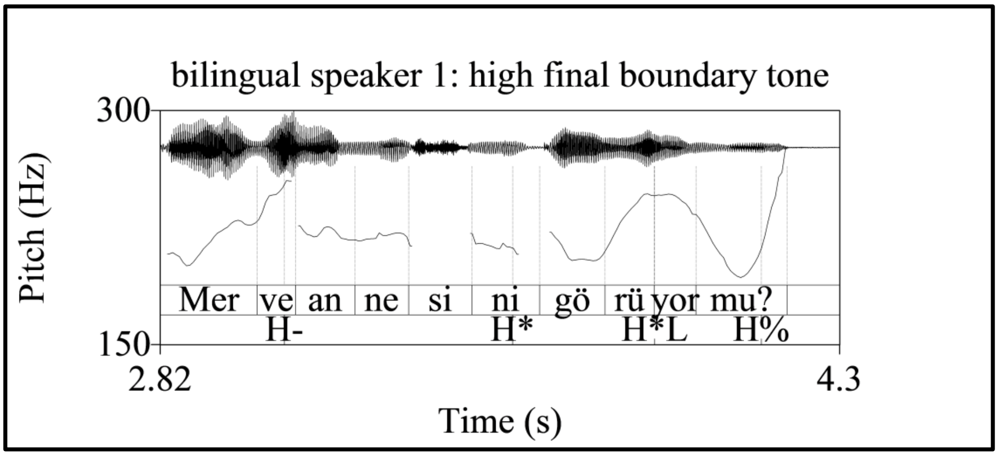
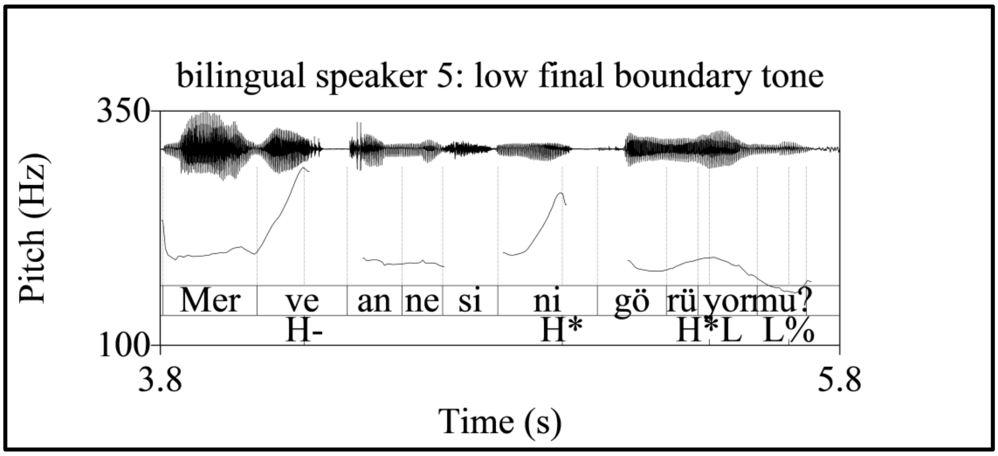


Fig. (6.3): Low final boundary tone implementation in bilingual Turkish: female speaker 5



Although in both figures both all-new sentences are realized with the same intonation contour with respect to the implementation of pitch accents and PPh-final boundary tones on each constituent, they differ with respect to the IP-final boundary tone.

VI.4.2 DISTRIBUTION OF PITCH ACCENTS AND PPH-FINAL BOUNDARY TONES

The analysis is structured in the following way. First a general analysis of pitch accents and non-final boundary tones realized on the different constituents of the yes/no questions is conducted and subsequently the distribution of tones according to the different focus conditions is analyzed for each speaker.

For the implementation of pitch accents, and PPh-final phrase boundary tones table (6.5) summarizes their distribution on the three constituents of the SOV yes/no questions for all speakers. Additionally the realizations are grouped by focus condition.

Table (6.5): Tonal distribution on different constituents in bilingual SOV yes/no questions

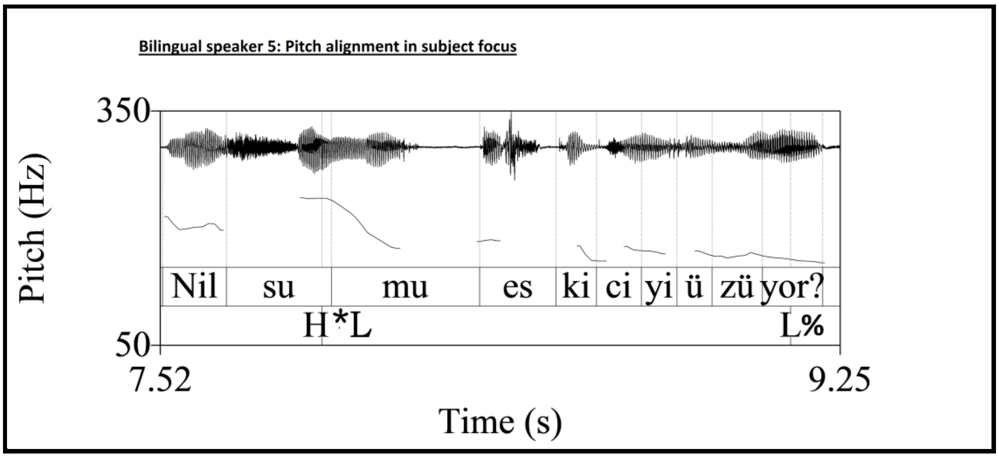
condition/ constituent	subject (H-/ H*L)	object (H*/H*L)	verb (H*L)
all-new	92	93	89
object-F	86	97	3
verb-F	82	80	88
subject-F	97	13	1
total	**357**	**283**	**181**

Table (6.5) demonstrates the number of pitch realization in 400 target sentences grouped by constituent and focus condition. Each constituent was realized 400 times in total. Each constituent was realized 100 times per focus condition and the all-new baseline in total. For each constituent: subject, object, and verb the number of realizations with a certain pitch accent or boundary tone is indicated.

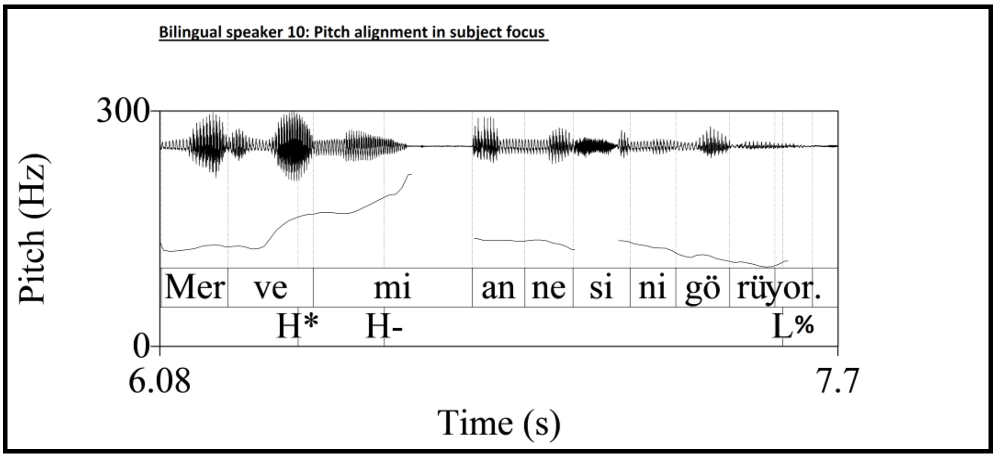
In a total of 357 yes/no questions with a simple SOV structure the subject is aligned with a high phrase tone (H-) or a high falling pitch accent (H*L). In 15 of the 357 sentences with a high tone on the subject, the tone is not aligned to the word stressed syllable of the subject, but to the following question particle. Since the question particle only attaches to the subject in the subject focus condition, this alignment difference is reduced to the subject focus condition of which 100 are included in the data analyses. In 12 of the 15 sentences where the high pitch on the subject is aligned to the question particle, the following object is not de-accented as expected for a monolingual-like production of subject focus. Furthermore, a few of these sentences show an additional pitch accent. This pitch accent is either aligned to the word stressed syllable or a non-word stressed syllable. The figures in (6.4) provide sample pitch tracks of the three different alignment realizations of the high pitch on the subject.

Fig. (6.4): Variation in bilingual pitch alignment on the subject

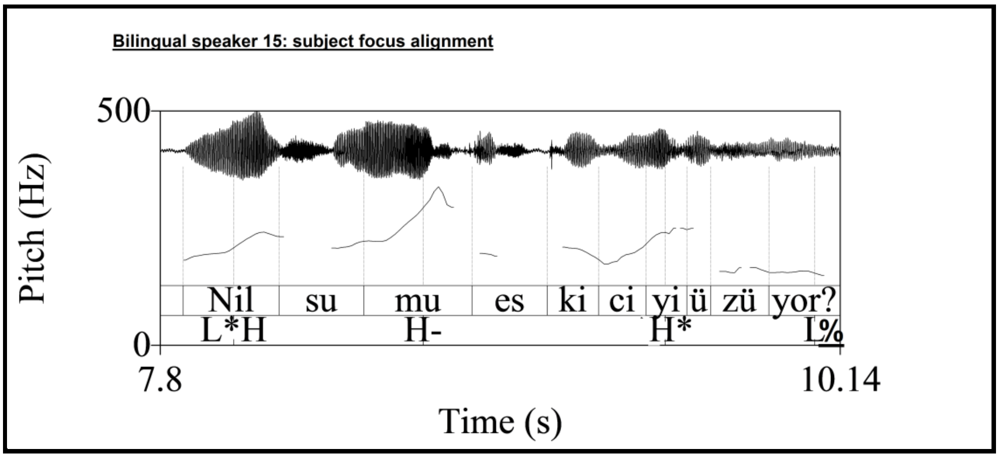
(a) Pitch accent alignment on the subject:



(b) Pitch accent realization on the word stressed syllable of the subject and additional high PPh-final boundary tone implementation on the Q-particle:



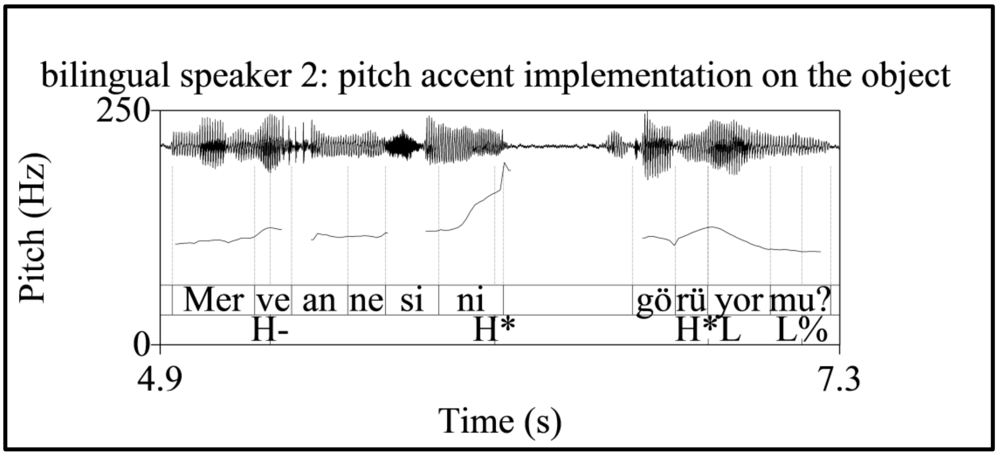
(c) Pitch accent implementation on a non-word stressed syllable of the subject and additional high PPh-final boundary tone implementation on the Q-particle:



In figure (6.4) (a) a pitch track is shown where speaker 5 realizes a rising-falling pitch on the word stressed syllable of the subject and the subsequent Q-particle is associated with the trailing tone of the bi-tonal pitch accent. This tonal alignment corresponds to the alignment strategy typically used by the monolingual speakers of preceding Experiment 1. In figure (6.4) (b) on the other side, a pitch track of speaker 10 is provided where an additional movement on the Q-particle is observed. This speaker realizes a tonal movement on the word stressed syllable of the subject like the preceding speaker 5. However, a further high tone is realized on the Q-particle which attaches to the subject. In the graph they are annotated as a pitch accent (H*) followed by a phrase boundary tone (H-). A further variation in the tonal alignment of the high phrase boundary tones on the subjects as observed in the data is demonstrated in figure (6.4) (c). Here speaker 15 uses both pitch accent and phrase boundary tone implementation on the subject similar to speaker 5. However, speaker 15 does not align the pitch accent with the regular word stressed syllable, i.e. the final syllable, but to the first syllable of the subject. Furthermore this speaker also aligns the high phrase boundary tone to the question particle and not to the word stressed syllable as the majority of the speakers.

Despite the tonal realization on the subject in the 400 target sentences, table (6.5) above also shows that 283 of the 400 objects included in the data corpus are aligned with a high pitch accent (H*) or (H*L) on the word stressed syllable. The pitch track in figure (6.5) demonstrates a sample pitch track of an all-new yes/no question where the object is aligned with a high pitch accent on the word stressed syllable. Some speakers also use a plateau contour on the object instead of a high rise which has also been described for monolingual Turkish.

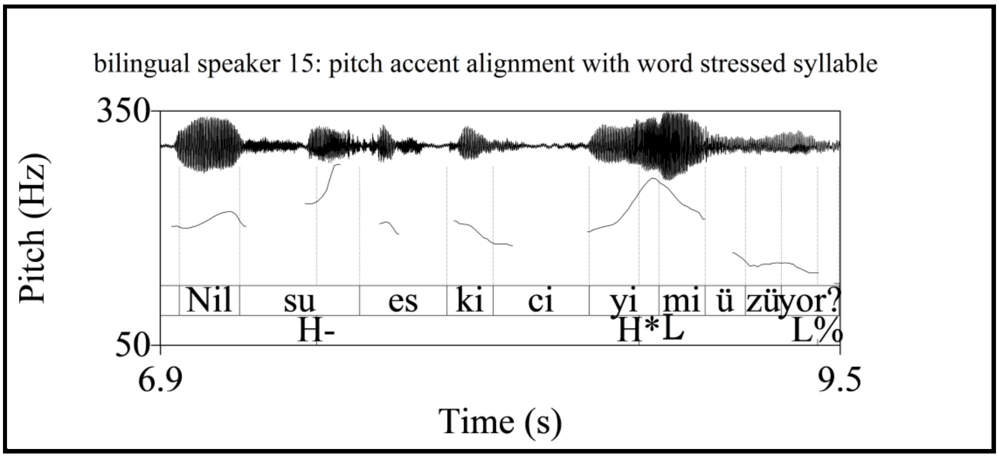
Fig. (6.5): Pitch accent implementation on the object



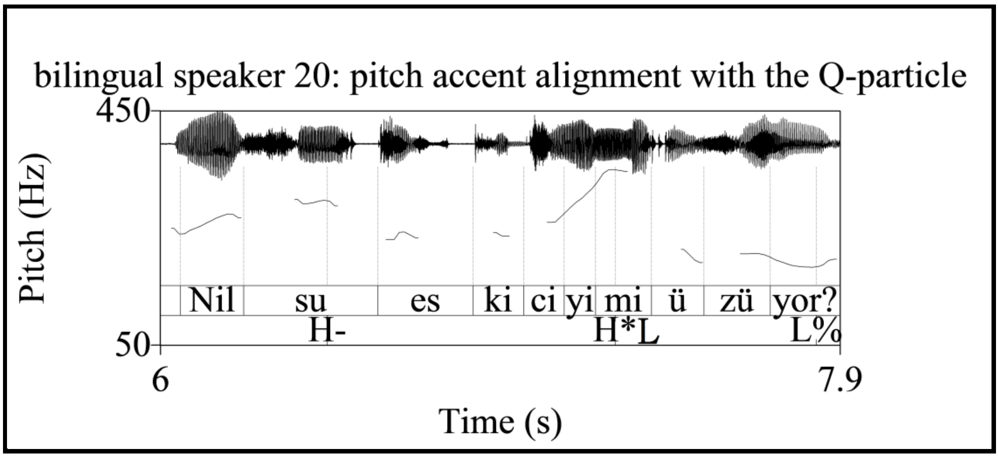
In object focus, similar to the observation for the subjects in subject focus outlined above, the tonal alignment of the pitch accent (H*L) varies occasionally. In these cases the pitch accent is not aligned to the word stressed syllable, but to the Q-particle. Both variations of the tonal alignment of the high tone on the object are outlined in figure (6.6).

Fig. (6.6): Variation in bilingual pitch accent alignment on the object

(a) Pitch accent alignment with the word stressed syllable



(b) Pitch accent alignment with the Q-particle

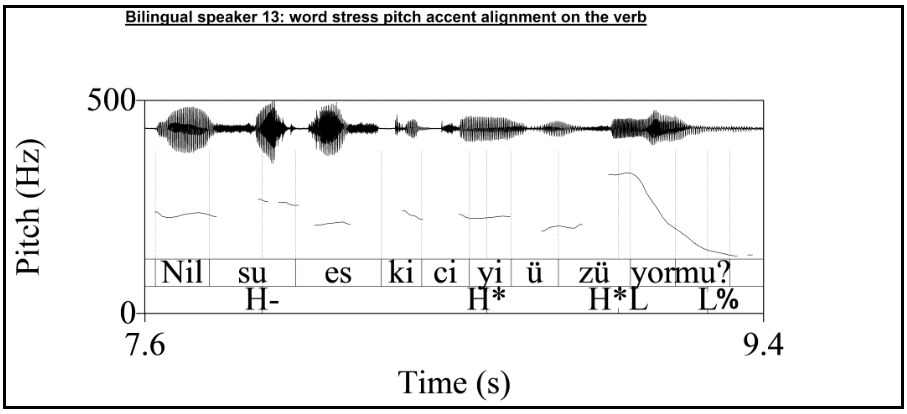


In figure (6.6) (a) female speaker 15 realizes the high pitch accent on the word stressed syllable of the object corresponding to its last syllable. In figure (6.6) (b) on the other side female speaker 20 aligns the high tone much later. Namely on the Q-particle which is adjacent to the object in the object focus conditions. However, this late alignment of the pitch accent on the following Q-particle is only observed in a total of 8 object focus sentences across all bilingual speakers. Despite the alignment differences in object focus with respect to the implementation of the pitch accent, table (6.5) above shows variation with respect to the focus condition. There is a clear tendency to align objects with a pitch accent in all-new, object- and verb focus, but not in subject focus. Only 13 objects out of the 100 objects in a subject focus condition are aligned with a pitch accent. The remaining 87 objects are de-accented.

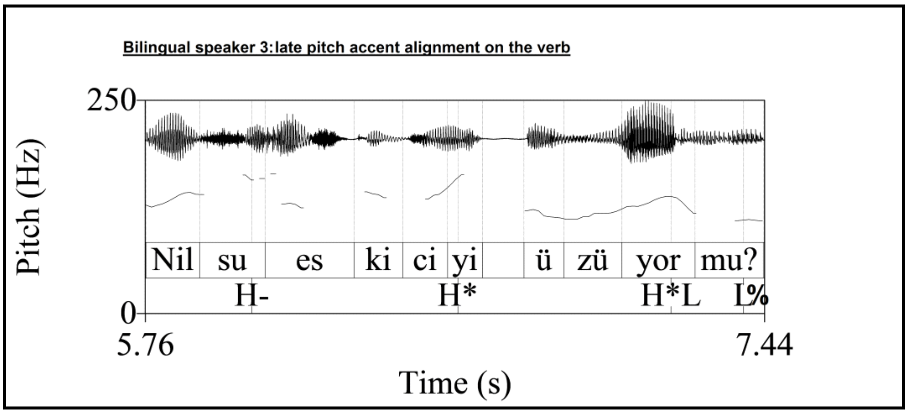
Furthermore, table (6.5) provides information about the tonal implementation on the verbs in the 400 target sentences. In a total of 181 yes/no questions the verbs are realized with a rise-fall pitch accent on the word stressed syllable corresponding to the penultimate syllable. Due to the stress properties of the progressive marker –Iyor the penultimate syllable is the bearer of the pitch accent and the ultimate syllable or the subsequent Q-particle (only in all-new and verb focus) are aligned with the low final boundary tone in 371 of the 400 sentences as outlined above. In the few sentences ending with a high boundary tone the word stressed syllable of the verb is still aligned with the pitch accent on the word stressed syllable. However, some speakers show variation in the tonal alignment of the pitch accent on the verb as well in form of late alignment of the pitch accent (H*L). In the late alignment, the peak of the pitch accent is aligned to the ultimate syllable instead of being realized on the word stressed penultimate syllable. In the figures in (6.7) the two different alignment strategies are exemplarily demonstrated for verb focus.

Fig. (6.7): Variation in bilingual pitch accent alignment on the verb

(a) Pitch accent alignment with the word stressed syllable



(b) Pitch accent alignment with the word final syllable



In figure (6.7) (a) a sample pitch track is provided in which speaker 13 aligns the peak of the H*L pitch accent with the word stressed syllable *zü* of the verb. In figure (6.7) (b) on the other side speaker 3 aligns the peak of the pitch accent later, i.e. to the final syllable *yor* of the verb. In both cases the contours end with a low final boundary tone and represent verb focus.

To summarize the results of the general observations with respect to the tonal distribution, as demonstrated in table (6.5), subjects are aligned with a non-final phrase boundary tone (H-) or a (H*L) pitch accent , objects are most often realized with a high or a high-falling pitch accent (H*) or (H*L), and on verbs most often a pitch accent of the form (H*L) is implemented followed by a low final boundary tone (L%). Variation in the alignment of pitch accents is observed on constituents adjacent to the Q-particle. What is essential with respect to the distribution of pitch accents and PPh-final boundary tones is that the distribution changes according to the different focus conditions.

VI.4.2.2 TONAL DISTRIBUTION ACCORDING TO IS

Subsequently each focus condition is analyzed with respect to changes in the tonal distribution on the different constituents. The all-new condition is analyzed first and serves as a baseline for comparison in addition to the results of the monolingual analyses of experiment 1.

VI.4.2.2.1 ALL-NEW YES/NO QUESTIONS

In table (6.6) below the distribution of high PPh-final boundary tones (H-), pitch accents (H*, H*L) and final low boundary tones (L%) is provided for the all-new condition for each of the 20 speakers realized in a total of 100 all-new yes/no questions. Each speaker realized a total number of 5 different yes/no questions in the all-new condition. By that means the number of realizations per focus condition per constituent cannot exceed 5.

In total, the bilingual speakers as a group realize an all new-intonation contour by associating a high PPh-final phrase boundary tone with the subject in 93 out of 100 sentences. The high tone on the subject is followed by a high pitch accent (H*) on the object in 93 of the 100 yes/no questions and by rising-falling pitch accent on the verb (H*L) in 89 of the all-new targets. Furthermore, table (6.6) shows that 90 sentences end with a low IP-final boundary tone in the all-new baseline condition as mentioned above.

Table (6.6): Tonal distribution in bilingual all-new yes/no questions

speaker	subject: H-	object:H*	verb: H*L	FTB: L%
1	5	5	4	0
2	5	5	5	5
3	5	5	5	5
4	5	5	2	5
5	5	5	5	5
6	4	3	4	5
7	5	5	5	5
8	5	5	4	5
9	5	5	5	2
10	4	5	5	5
11	3	3	5	5
12	5	5	5	5
13	5	5	5	3
14	5	4	5	5
15	5	5	2	5
16	5	5	4	5
17	5	5	5	5
18	5	5	5	5
19	5	4	5	5
20	2	4	4	5
total	93	93	89	90

Despite the tonal distribution for the whole group, the results summarized in table (6.6) show some speaker individual differences in the tonal implementation in all-new sentences. A speaker dependent analyses shows that speakers 2, 3, 5, 7, 9, 12, 13, 17 and 18 all use the same tonal pattern that has been shown the typical intonation contour for the all-new condition in the monolingual study of Experiment 1. These speakers implement a high PPh-final boundary tone (H-) on the subject, a high pitch accent (H*) on the object and a rising falling pitch accent (H*L) on the verb in each of the 5 target sentences that were presented in an all-new condition to each speaker.

Speakers 1, 4, 8, 15 and 16 basically produce the same intonation pattern for all-new questions as the previous speakers, unless showing some variation in the implementation of the pitch accent on the verb. Speakers 1, 8 and 16 do not implement a pitch accent on the verb in the all-new condition in one of the five target sentences. Instead, the verb is de-accented. Speakers 4 and 15 produce only two sentences of the respective condition where the verb is associated with a pitch accent. In the remaining three sentences of the all new-condition the verbs are realized without a pitch accent. Speaker 6 also de-accents the verb in one out of the five all-new conditions. Furthermore, he de-accents the subject in one of the sentences and the object in two of the five all-new target sentences. Speaker 10 de-accents the subject in one all-new sentence. Speaker 11 de-accents the subject and the object in two of the five sentences. Speaker 14 de-accents the object in one of the all-new sentences.

In table (6.7) below, the tonal distribution on each of the three constituents is provided for each of the 20 speakers for the subject focus condition. In total, the bilingual speakers as a group realize a subject focus intonation contour in yes/no questions by associating a rising-falling pitch accent (H*L) with the subject in 97 out of the 100 targets of this condition. The high tone on the subject is followed by post-focal de-accentuation on the object in 87 of the sentences and post-focal de-accentuation on the verb in 99 of the sentences. In 13 sentences the object is realized with a high pitch accent (H*) like in the all-new condition. In 1 sentence the verb is realized with a pitch accent (H*L) like in the all-new baseline condition. Furthermore, table (6.7) shows that the intonation contours of 91 subject focus sentences end with a low final boundary tone as mentioned above.

Table (6.7): Tonal distribution in bilingual subject focus yes/no questions

speaker	subject: H*L	object: H*	verb: H*L	FBT: L%
1	4	0	0	3
2	5	1	0	5
3	5	2	0	5
4	5	0	0	5
5	5	0	0	5
6	5	0	0	5
7	5	0	0	5
8	5	0	0	4
9	5	0	0	4
10	5	2	0	5
11	5	0	0	5
12	5	2	0	5
13	5	0	0	5
14	4	0	0	5
15	5	3	0	4
16	5	1	0	4
17	5	0	1	5
18	5	0	0	5
19	5	0	0	2
20	4	2	0	5
total	97	13	1	91

In table (6.7) also speaker dependent realizations are indicated. A speaker by speaker analyses shows that speakers 4, 5, 6, 7, 8, 9, 11, 13, 18 and 19 use the same tonal pattern in the subject focus realization as it has been shown for the monolingual speakers in the same condition. These speakers implement a rising-falling pitch accent (H*L) with the subject which represents the focused constituent. All further constituents are de-accented. The high pitch accent (H*) on the object and a rising falling pitch accent (H*L) on the verb as implemented in the all-new condition are not implemented in the subject focus condition by these speakers.

Speakers 3, 10 and 12 also implement a high tone on the subject in the subject focus condition and de-accent the verb in all target sentences of the subject focus condition, but in contrast to the previous speakers, they use a further pitch accent on the word stressed syllable of the object in two of the five subject focus conditions instead. Speaker 15 also implements a high tone on the subject and de-accents the verb in all target sentences with a subject focus condition, but uses a pitch accent on the object in three of the five yes/no questions instead of de-accentuation. Speaker 2 and speaker 16 align all subjects with a high tone and de-accent all verbs in subject focus. In one of the five sentences they do not de-accent the post-focal object, but associate it with a pitch accent. Speaker 1 and 14 show a similar pattern in their tonal distribution. Like the first speaker group they de-accent objects and verbs in the subject focus condition. In contrast however the subject is aligned with a pitch accent in four out of the five corresponding yes/no questions only. Both speakers de-accent the subject in subject focus in one of the five sentences realized by each speaker. Speaker 20 also de-accents one subject out of the five subject focus sentences and de-accents the verb in all of them. The object on the other side is only de-accented in three sentences. In two subject focus sentences this speaker implements a high pitch accent on the object. Speaker 17 aligns all subjects with a high tone and de-accents all subjects in the five subject focus questions. However, he is the only speaker that uses a pitch accent on the verb in one of the subject focus sentences.

VI.4.2.2.3 OBJECT FOCUS YES/NO QUESTIONS

In table (6.8) below the distribution of high PPh-final boundary tones, pitch accents and final low boundary tones is provided for the object focus yes/no questions of the data set for each of the 20 speakers. In total, the bilingual speakers as a group realize the object focus intonation contours in yes/no questions by the implementation of a high PPh-final phrase boundary tone (H-) on 86 subjects out of the 100 possibilities provided by the targets of this condition. The high tone on the subject is followed by a rising-falling pitch accent on the focused constituent in 97 of the 100 object focus yes/no questions. Post-focal de-accentuation on the verb is realized in 97 of the sentences. In three object focus sentences of three different speakers the verb is realized with a pitch accent on the word stressed syllable. Furthermore, table (6.8) shows that the intonation contours of 97 object focus sentences end with a low final boundary tone as mentioned above. All of the sentences ending with a high IP-final boundary tone are spoken by speaker 1.

Table (6.8): Tonal distribution in bilingual object focus yes/no questions

speaker	subject:H-	object: H*L	verb: H*L	FBT: L%
1	5	5	0	2
2	5	5	1	5
3	4	5	0	5
4	4	5	0	5
5	5	5	0	5
6	5	5	0	5
7	4	5	0	5
8	2	5	0	5
9	4	5	0	5
10	5	5	0	5
11	2	5	0	5
12	4	5	0	5
13	4	5	0	5
14	5	2	0	5
15	5	5	1	5
16	5	5	0	5
17	5	5	1	5
18	5	5	0	5
19	3	5	0	5
20	5	5	0	5
total	86	97	3	97

In addition to the tonal distribution in yes/no questions with object focus, the results in table (6.8) show the results for the individual speakers. A speaker dependent analysis shows that speakers 1, 5, 6, 10, 16, 18 and 20 use the same tonal pattern that was established as the most conventional pattern for this condition in the monolingual speakers group of experiment 1. In the object focus condition these speakers implement a high PPh-final boundary tone (H-) with the subject, a high pitch accent (H*) with the object and de-accent the verb in each of the five target sentences.

Speakers 2, 15 and 17 produce the same intonation pattern as the previous speakers, unless using a pitch accent on the verb in one of the five target sentences. They also use a high tone on each subject, a high tone on each object but verbs are only de-accented in four of the five object focus sentences. Speaker 14 uses de-accentuation on all verbs and implements a high tone on the object. However, he contrasts from the other speakers by de-accenting the focused constituent in three of the five corresponding object focus yes/no questions. In the remaining two sentences the object is realized with a rising-falling pitch accent, like realized by all other bilingual speakers. Speakers 3, 4, 7, 9, 12, and 13 use a high tone on the subject only in four out of the five object focus target questions. Each of these speakers de-accents the pre-focal subject in one object focus sentence. The object is always aligned with a high pitch accent (H*) by these speakers and all verbs are de-accented in the object focus condition. Speakers 8, 11, and 19 show a similar pattern. They use a high pitch accent on the focused constituent and de-accent the verb corresponding to the post-focal constituent in each of the five target sentences. The subject is aligned with a high pre-focal boundary tone only in two of the object focus sentences for speaker 8 and 11 and in three sentences for speaker 19. In the remaining sentences these speakers also show a pre-focal de-accenting pattern. Pre-focal de-accentuation of the subject in the object focus condition is observed to different extents for 3, 4, 7, 8, 9, 11, 12, 13, and 19. For those sentences which do not show a complete de-accentuation of the pre-focal constituents a compressed realization of the subject in comparison to the subsequent pitch accent on the focused object is observed. The same lowering is observed for those speakers that do not de-accent pre-focal subjects at all. The observation of pre-focal compression will be outlined in much more detail in the subsequent phonetic analyses.

VI.4.2.2.4 VERB FOCUS YES/NO QUESTIONS

In table (6.9) below the distribution of high PPh-final boundary tones, pitch accents and IP final low boundary tones is provided for the verb focus yes/no questions of the data set for each of the 20 speakers. In total, the bilingual speakers as a group realize the verb focus intonation contours in yes/no questions by the implementation of a high PPh-final boundary tone (H-) on 82 subjects out of the 100 possibilities provided by the targets of this condition. In the remaining 18 subjects, speakers use pre-focal de-accentuation in the verb focus condition. The high tone on the subject is followed by a high pitch accent (H*) on the object in 80 of the 100 object focus yes/no questions. Pre-focal de-accentuation is observed on the objects in the remaining 20 sentences. The focused verb is realized with a pitch accent (H*L) in 88 of the 100 verb focus sentences. Verbs are de-accented in 12 of the verb focus sentences. Furthermore, table (6.9) shows that the intonation contours of 93 verb focus sentences end with a low final boundary tone as mentioned above. For speaker 1, all sentences in the verb focus condition end with a high IP-final boundary tone (H%). The same observation was made for the same speaker for the all-new sentences. Two further sentences with a high IP-final boundary tone are realized by speakers 7 and 9.

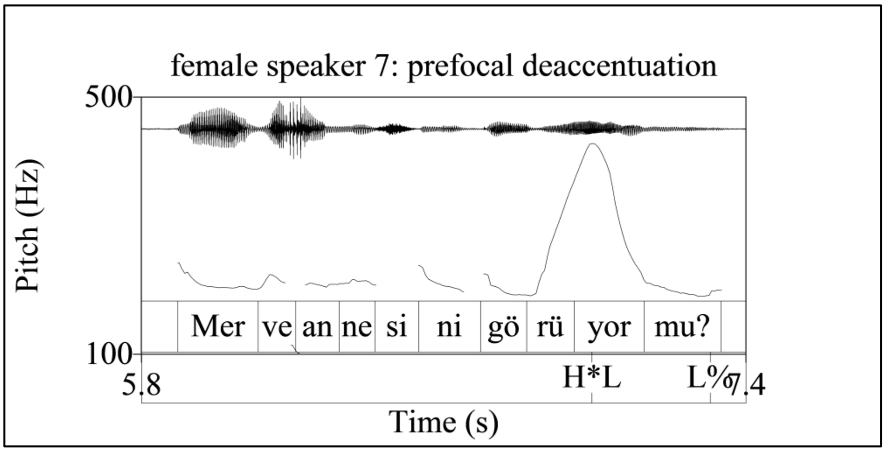
Table (6.9): Tonal distribution in bilingual verb focus yes/no questions

speaker	subject: H-	object: H*	verb: H*L	FBT: L%
1	3	3	5	0
2	5	5	4	5
3	5	5	5	5
4	5	5	4	5
5	5	5	5	5
6	4	4	4	5
7	3	2	4	4
8	2	2	5	5
9	5	4	5	4
10	5	4	5	5
11	3	2	5	5
12	5	5	2	5
13	5	5	5	5
14	5	3	4	5
15	4	5	1	5
16	4	4	5	5
17	5	5	5	5
18	4	4	5	5
19	3	3	5	5
20	2	5	5	5
total	82	80	88	93

Compared with the all-new baseline and the previous focus conditions, the results in table (6.9) indicate that the bilingual speakers show the most variation in the production of intonation patterns in verb focus. A speaker by speaker analysis of the tonal distribution shows that speaker 3, 5, 13 and 17 make systematic use of the tonal pattern which was used by the monolingual speakers in the same condition as shown in experiment 1. These speakers implement a high PPh-final phrase boundary tone (H-) on the subject, a high pitch accent (H*) on the object and a rise-fall pitch accent (H*L) on the focused verb in each of the five target sentences. This tonal pattern is phonologically ambiguous to the tonal pattern typically used by mono-and bilingual speakers in an all-new question.
Speakers 2, 4 and 12 produce the same intonation pattern as the previous speakers, unless missing a pitch accent on the verb in one of the five target sentences for speaker 2 and 4 and in three of the five sentences for speaker 12. All of them use a high tone on each subject, a high tone on each object, but the verb is de-accented in one to three of the five verb focus sentences. Speaker 6 also realizes the subject with a high pre-focal boundary tone, the object with a high pitch accent and the verb with a rising-falling pitch accent. However, this pattern is not constant throughout the five sentences for the verb focus condition. Each constituent is de-accented in one of the five sentences. The de-accentuation of the different constituents occurs in different sentences. Speakers 9 and 10 realize all verb focus questions with a high tone on the subject and a pitch accent on the verb. The object is realized with a pitch accent in four of the five target sentences. In one verb focus sentence the immediately pre-focal constituent is de-accented. Speaker 14 realizes all subjects of the verb focus target sentences with a high PPh-final phrase boundary tone on the final syllable. He uses a

high pitch accent on the object in three of the five sentences. In the remaining two sentences the pre-focal objects are de-accented. The verb is realized with a pitch accent in four of the five sentences in a verb focus condition. Speaker 15 implements a high tone on four of the five subjects in the verb focus condition. One subject is de-accented. The following object is realized with a high pitch accent in all of the verb focus target sentences, but the focused verb is de-accented in four sentences by speaker 15. Speaker 20 de-accents three of the five subjects in a verb focus condition. The remaining subjects are realized with a high PPh-final phrase boundary tone. The object and the verb are aligned with a pitch accent in each of the five verb focus sentences. Speaker 16 and 18 de-accent the pre-focal subject and the object in one of the five verb focus sentences. On the focused verb a pitch accent is used in all verb focus sentences by these two speakers. Speaker 7, 11 and 19 produce a high PPh-final boundary tone on the subject in only three of the five sentences. In the remaining sentences the subject is de-accented. Furthermore, speakers 7 and 11 use a high pitch accent on the object in only two of the five yes/no questions of the verb focus condition. Three objects are de-accented in the verb focus realizations of these speakers. Speaker 19 uses a high pitch accent on the object in only two of the verb focus sentences. In three sentences the pre-focal object is also de-accented in addition to the de-accented subject. The focused verb on the other side is realized with an H*L pitch accent in five sentences by speaker 7 and 19 and in four sentences by speaker 11. A similar contour in verb focus is observed in the target yes/no questions of speaker 1. Subjects are realized with a high tone in three verb focus sentences. The subjects of the remaining sentences are de-accented by this speaker. Accordingly, a pitch accent on the pre-focal object is used in only three of the verb focus sentences. In two sentences the object is de-accented following a de-accented subject. The verbs of all verb focus sentences are aligned with a pitch accent by speaker 1. For speaker 8 the de-accentuation pattern of pre-focal constituents is even more obvious. He de-accents the subject and the object in three of the five verb focus sentences. The verb is realized with a pitch accent on the stressed syllable in all of the verb focus target sentences. Figure (6.8) provides an example for the intonation contour of verb focus as realized by these speakers. It shows pre-focal de-accentuation on the subject and the object and a pitch accent on the word stressed syllable of the focused verb.

Fig. (6.8): Pre-focal de-accentuation on subject and object in verb focus: female speaker 7



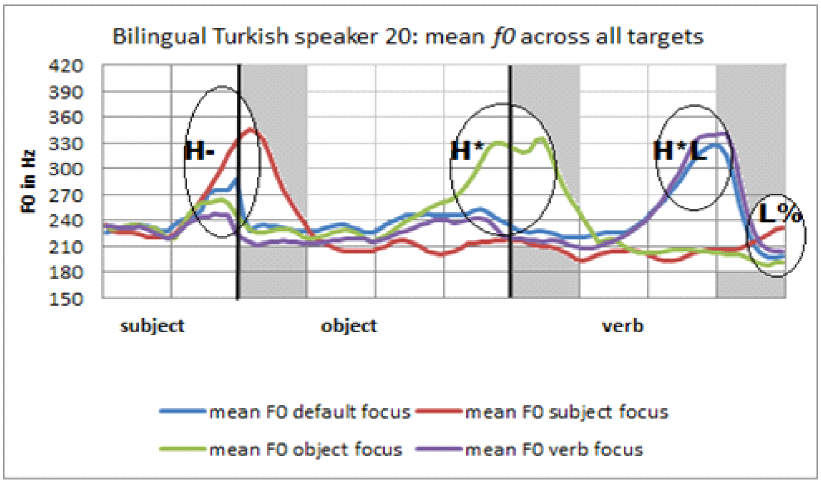
The de-accentuation of pre-focal constituents in the verb focus condition occurs to different extents for all speakers unless for speakers 2, 3, 4, 5, 13 and 17. However, pre-focal constituents which are not completely de-accented frequently show a compressed contour in the realization of verb focus by these speakers. The compression of pre-focal constituents is also observed for the sentences where tones are implemented on pre-focal constituents by those speakers which partly use de-accentuation as outlined above. The observation of pre-focal de-accentuation will be outlined in more detail in the subsequent phonetic analyses.

VI.4.2.2.5 MEAN F0 CONTOUR ANALYZES ACCORDING TO FOCUS

In addition to the distribution of tones in the sentences of all speakers in all focus conditions, a visual inspection of the sample mean graphs based on time-normalized *f0* values generated by the script indicate that the *f0* contours change according to IS.

First, in figure (6.9) the overall *f0* contour of one speaker is analyzed exemplarily before providing the results of the visual inspection of the time-normalized *f0* contours calculated across all bilingual speakers demonstrating the systematic *f0* changes according to IS. The time-normalized contours provide an overview for the previously described association of tones and syntactic constituents in the different focus condition and the all-new baseline. The four graphs show the mean *f0* across the 5 sentences of each focus condition for all focus condition and the baseline condition for speaker 20 or all speakers respectively in figure (6.10).The different tonal categories indicated in figure (6.9) are based on the observations of the all-new condition and represent a high PPh-final phrase boundary tone (H-) on subjects, a pitch accent (H*) on objects, a further pitch accent on verbs (H*L), and a final low boundary tone (L%). As described earlier, some speakers use a different tonal alignment (late alignment of H*L), which does not have an effect of the phonological categories described here, but is a speaker dependent phonetic difference. The double peak on the object in the object focus condition in figure (6.9) is an indicator of the alignment variation. Speaker 20 aligns the peak of the high tone only in three object focus yes/no questions to the word stressed syllable, in the remaining two sentences of the same focus condition the peak is realized on the object adjacent question particle. In the mean graphs in figures (6.9) and (6.10) the horizontal line indicates the syllables. Each word is separated by a black vertical line. Syllables one and two represent the subject, syllables three to six represent the object, syllables 7, 8, and 9 the verb and the last syllable the Q-particle in the all-new baseline and the verb focus condition. In subject focus the Q-particle is adjacent to the subject and occupies the third syllable. Hence, the object starts with the first syllable and the following verb only with the eighth syllable. In object focus the Q-particle is adjacent to the object and occupies the seventh syllable. Consequently, the verb starts again only with the eighth syllable.

Fig. (6.9): Time-normalized *f0* contour in different focus conditions for speaker 20

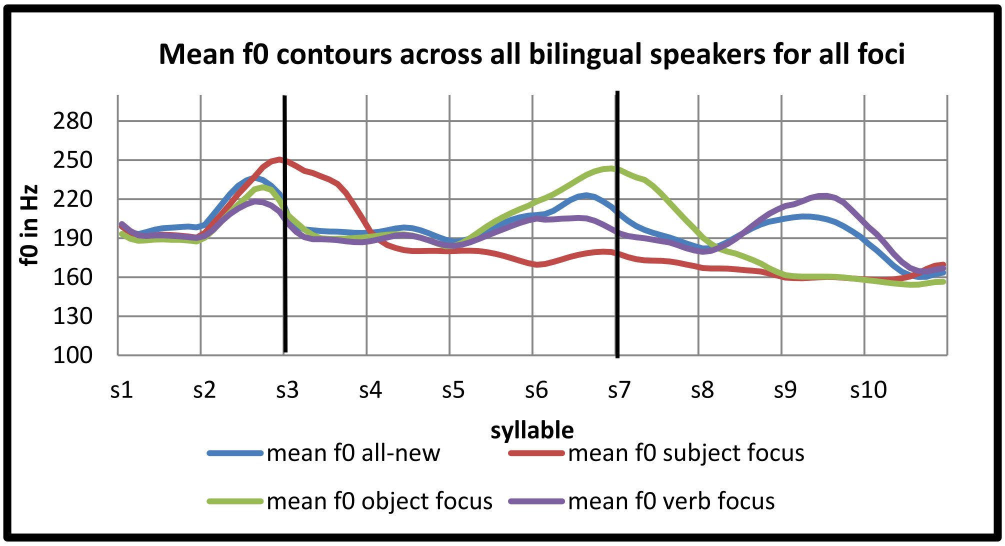


(Thin lines in the grid indicate syllable boundaries, thick lines indicate word boundaries. In the focus condition each constituent has an additional syllable corresponding to the focus sensitive question particle indicated by the grey shadowing)

As can be seen in the mean graph in figure (6.9) speaker 20 produces an all-new yes/no question with a high tone on the subject a high tone on the object and a rise-fall on the verb. In the graph the all-new contour is represented by the blue line. The same mean *f0* contour is used in the verb focus condition, represented by the purple line in the picture. Again a high tone (H-) is implemented on the subjects, a high pitch accent (H*) on the objects and a (H*L) pitch accent on the verbs. Phonologically spoken, speaker 20 uses an ambiguous contour for verb focus and the all-new baseline. In subject focus on the other side speaker 20 only implements the high phrase tone on the subject in the mean graph represented by the red line. The objects and verbs are realized without a pitch accent and remain de-accented. The same post-focal de-accentuation pattern is observed for object focus represented by the green line in the mean graphs in figure (6.9). This time the subject and the object are aligned with a high tone (H-) and (H*) respectively. The verb on the other side is not realized with the typical (H*L) pitch accent of the verb focus condition and the all-new baseline, but remains unrealized like in the subject focus condition. De-accentuation on a post-focal constituent is realized here as well, just like in the subject focus condition. Furthermore a pitch increase on the focused constituent can be observed in the graphs in figure (6.9). Speaker 20 realizes a higher *f0* on the subject compared to the baseline and the other focus conditions when the subject is focused (red graph). He also implements a higher *f0* on the object in comparison to the baseline and the remaining focus condition when the object is focused (green graph). The comparison between the graph corresponding to the all-new condition and the graph corresponding to the verb focus condition also reveals a slight increase on the verb in verb focus. However, if this pitch increase of the high tones (pitch accents and phrase boundary tones) on focused constituents will be discussed in the phonetic analyses. Still, de-accentuation as a correlate of IS seems to be a crucial phonologic property in the realization of the target sentences and their different IS structure for speaker 20.

According to the *f0* modification outlined for speaker 20, the speakers as a group also modify the *f0* contour depending on the focus condition. In figure (6.10) the overall *f0* contour of the 20 speakers is provided, indicating the changes of the *f0* contour according to IS including the time-normalized *f0* values of all speakers. It gives an overview for the previously described association of tonal movements on the different syllables of the syntactic constituents in the different focus condition and the all-new baseline. The four graphs show the mean *f0* across the 5 sentences of each focus condition for all focus conditions and the baseline calculated across all speakers. The vertical line indicates the Hertz values. The values are not calculated into semi-tones to reduce gender specific differences, but demonstrated in Hz for the reason to not lose true realization variations by leveling the *f0* contour.

Fig. (6.10): Time-normalized *f0* contours across all bilingual speakers and focus conditions



As can be seen in the mean graph in figure (6.10) the 20 bilingual speakers as a group modify the *f0* contours according to the different focus conditions. With respect to the movement on each of the three constituents, it can be seen that the subject is always aligned with a high non-final phrase boundary tone (H-) or a high-falling pitch accent (H*L) in all focus conditions and the all-new baseline, the object is aligned with a high pitch accent (H*) or (H*L) only in object- and verb focus and in the all-new condition, but not in subject focus. Furthermore, the verb is realized with a pitch accent (H*L) only in verb focus and the all-new baseline, but not in subject and object focus.

With respect to differences in the contours according to focus, the all-new yes/no questions (represented by the blue graph) shown that speakers associate a high tone to the final syllable of the subject, a further high tone to the object's final syllable, a rise fall on the verb and a following low final boundary tone[88]. The contours for verb focus and the all-new baseline are phonologically ambiguous. In verb focus (represented by the purple graph), speakers also realize a high tone on the final syllable of the subject, a further high tone on the object's final syllable, a rise-fall on the verb and a following low final boundary. In subject focus on the other side the red mean graph shows that speakers only implement a high tone on the subject. The object and the verb are realized without a

[88] As described previously, especially in the case of the tonal association on the verb a late alignment is observed in the bilingual realization. The high peak of the pitch accent is often aligned to the final syllable of the verb instead of being aligned to the penultimate word stressed syllable. In the graph of the all-new contour the peak of the high pitch accent is realized on the ninth syllable corresponding to the verb final syllable in the all-new sentence. Syllable ten is occupied by the Q-particle. The high tones associated to the different syntactic constituents can be described like in the preceding phonological description of the tonal distribution. The high tone implemented on the subjects corresponds to the high non-final phrase boundary tone (H-) or (H*L) pitch accent depending on the focus condition, the high tone on the objects corresponds to the high pitch accent (H*) or (H*L), and the rise-fall on the verb corresponds to the (H*L) pitch accent. For verb focus the mean graph in figure (10) shows a very similar movement to the all-new graph. The verb focus graph is represented by the purple line.

pitch accent. Instead, they are de-accented until the sentence final low boundary. A similar post-focal de-accentuation pattern is observed for object focus represented by the green line in the mean graphs in figure (6.10). This time the subject and the object are aligned with a high tone (H-) and (H*) respectively. The verb on the other side is not realized with the typical (H*L) pitch accent of the verb focus condition and the all-new baseline but remains unrealized like in the subject focus condition. Despite the de-accentuation on post-focal constituents, the graphs in figure (6.10) also show that pitch increases on the focused constituents. The speakers on average realize a higher *f0* on the subject compared to the all-new baseline and the other focus conditions when the subject is focused. They also implement a higher *f0* on the object in comparison to the baseline and the remaining focus conditions when the object is focused. The comparison between the graph corresponding to the all-new condition and the graph corresponding to the verb focus condition also reveals a slight increase on the verb in verb focus. However, pitch increase of the high tones on focused constituents will be discussed in the phonetic analyses. A further aspect that will be discussed in the phonetic analyses is pre-focal compression. Pre-focal compression, as previously mentioned with respect to the tonal distribution across the target sentences, is visible in the mean graphs in figure (6.10) as well. In verb focus the pre-focal constituents are realized with a lower *f0* than the baseline and the following focused verb shows the highest *f0* of the sentence although it corresponds to the final constituent. A similar pre-focal compression pattern is visible in the object focus graph corresponding to the green line. Here the pre-focal subject is realized with a lower *f0* than the following focused object.
The visual inspections of the time-normalized *f0* contours repeat the results of the phonological analyses of pitch distribution with respect to de-accentuation of post-focal constituents. Additionally, it confirms the use of pre-focal compression in bilingual contrastive in-situ focused yes/no questions. Deviations from that pattern occur sporadically across speakers and are mainly related to pre-focal de-accentuation and post-focal accentuation. All remaining realizations can be summarized under the patterns demonstrated in (2) for each focus condition and the all-new.

(2) Tonal pattern of bilingual yes/no questions in different contrastive in-situ foci:

1. All-new question:

S	O	V	final boundary tone
H-	H*	H*L	L%

2. Subject focus yes/no question:

S	O	V	final boundary tone
H-			L%

3. Object focus yes/no question:

S	O	V	final boundary tone
H-	H*		L%

4. Verb focus yes/no question:

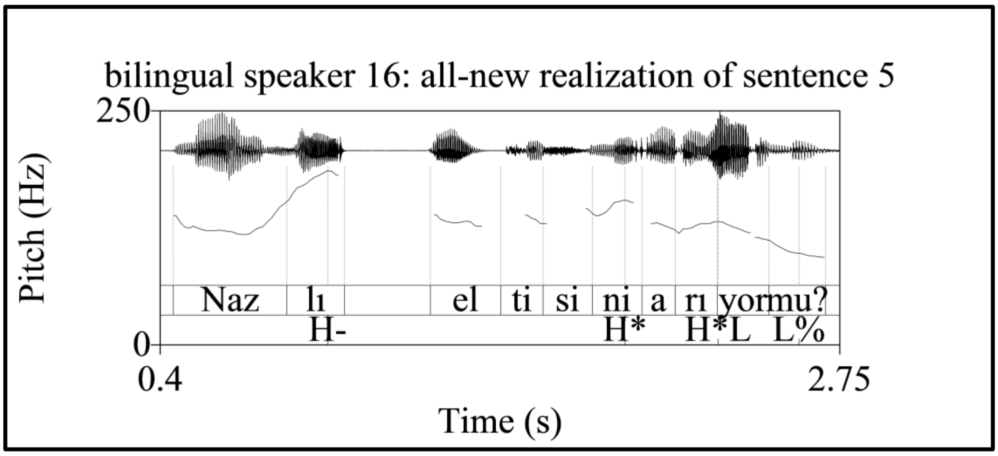
S	O	V	final boundary tone
H-	H*	H*L	L%

VI.4.3 DE-ACCENTUATION ON POST-FOCAL CONSTITUENTS

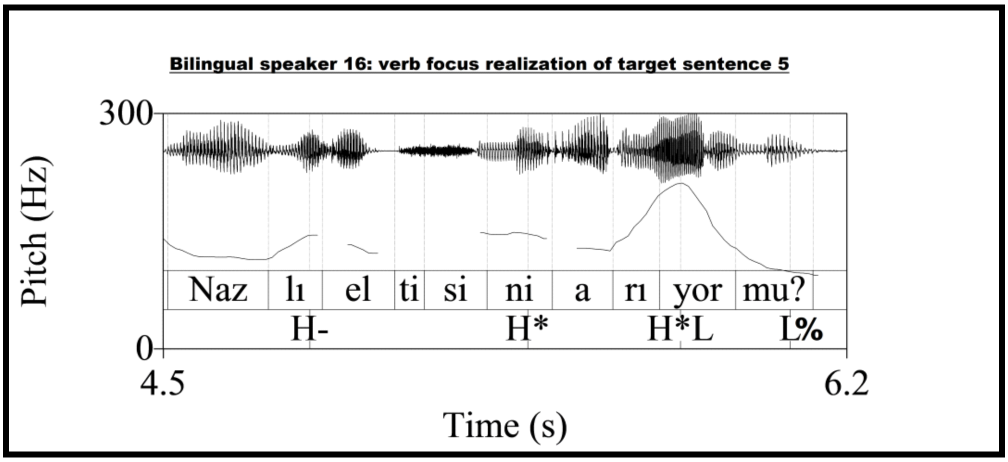
As demonstrated in the preceding analyses of the distribution of pitch accents and phrase boundary tones, the tonal implementation of tones is not realized in the same way for each focus condition. Whereas in all-new and verb focus questions the bilingual speaker instantiate pitch accents and/or phrase boundary tones on each constituent of the simple SOV questions, pitch accents are not implemented in subject and object focus on constituents that occur post-focally. Instead, these constituents are de-accented. De-accentuation is analyzed in the following by providing sample pitch tracks of an exemplarily speaker followed by an analyses of the numbers of de-accentuations that all speakers use on postfocal constituents. Subsequently the phonetic analysis of mean max *f0* measurements on post-focal constituents in comparison to the same constituents in an all-new condition is represented for all speakers amplified by statistical analyses of post-focal de-accentuation in bilingual yes/no questions.
The figures in (6.11) provide sample pitch tracks of target sentence (5) in the different focus conditions and the all-new baseline realized by male speaker 16. Comparing the tracks reveals that he uses de-accentuation on postfocal constituents, and that he accents pre-focal and focal constituents. Additionally, but not focused at this point of the analyses, the compression of pre-focal elements as described earlier in the analyses can be seen in the tracks as well.

Fig. (6.11): Sample pitch tracks of target sentence five in different focus conditions and the all-new baseline realized by speaker 16

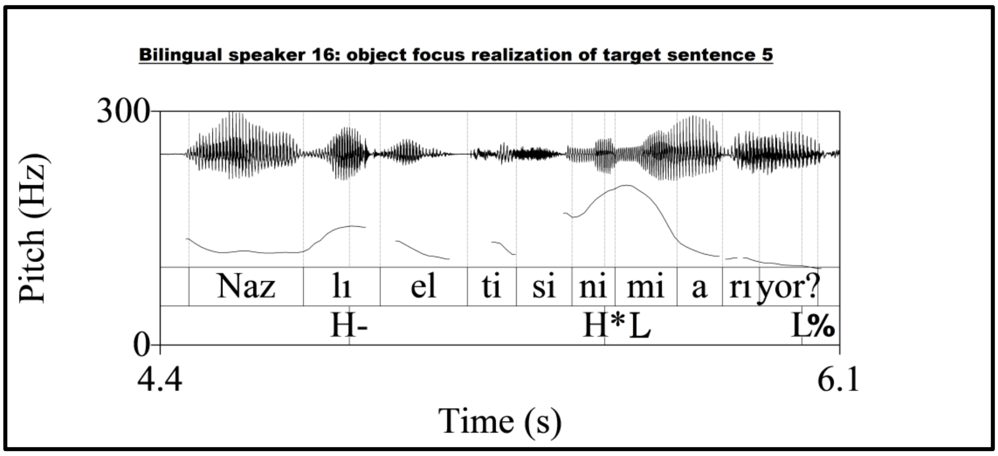
(a) Pitch implementation in target sentence 5 in the all-new condition



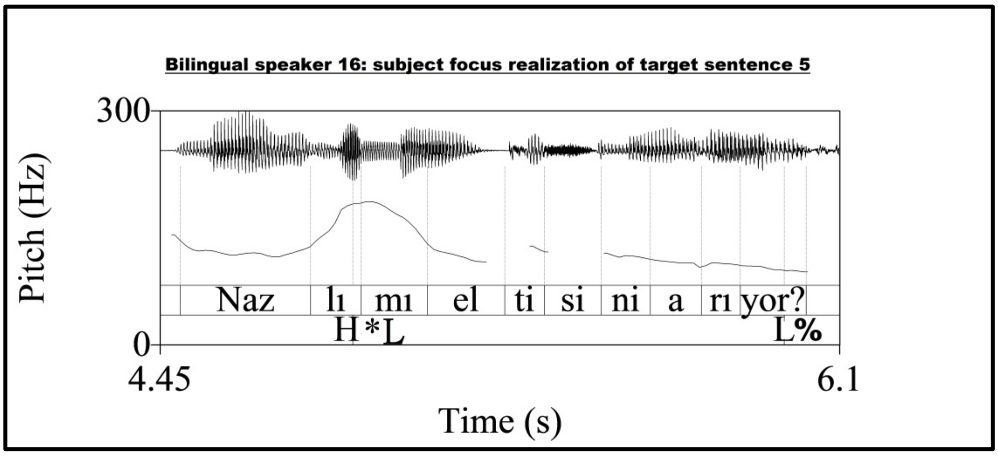
(b) Pitch implementation in target sentence 5 in the verb focus condition



(c) Post-focal de-accentuation in the object focus condition



(d) Post-focal de-accentuation in the subject focus condition



The pitch track in (6.11) (a) shows that speaker 16 associates each constituent of the simple SOV yes/no question *Nazlı eltisini arıyor mu?* with a pitch on the word stressed syllable. The subject is marked by a (H-), the object is realized by (H*) and the verb realized with an (H*L) pitch accent followed by a low final boundary tone (L%). The same pattern is realized in (b) which is the realization of the verb focus condition of the same sentence by the same speaker. In both realizations, the all-new condition and the verb focus condition no post-focal constituents occur since the focus sensitive Q-particle attaches to the final constituent of both utterances. Additionally, the all-new contour in figure (a) reveals a natural declination pattern where each constituent is realized with a lower *f0* than the preceding one. In figure (b), the verb focus contour, the subject and the object are realized with a lower *f0* than the following focused verb. The focused verb in this case is realized with the highest *f0* of the sentence although it corresponds to the final constituent. The pre-focal constituents on the other side show lower *f0* in comparison with the all-new baseline outlined in picture (8b) and in comparison with the focused constituent of the verb focus condition.

In the pitch track in (c) on the other side, which is the realization of object focus of sentence 5, the pitch accent on the verb is not implemented. The verb follows the focused constituent in this sentence and is de-accented. The focused object and the pre-focal subject on the other side are realized with a pitch; (H*) and (H-) respectively.

In the pitch track in (d) post-focal de-accentuation becomes even more evident. In (d) the subject focus realization of target sentence 5, the focused subject is realized with a rising-falling pitch accent (H*L) on its word stressed syllable. This contrasts with the implementation of a high PPh-final boundary tone in de remaining conditions. The following object and the verb show no considerable tonal movement. Both constituents represent post-focal elements and are de-accented.

The same de-accentuation pattern for subject focus and object focus as shown in the preceding figures in (6.11) for speaker 16 is observed across speakers and target sentences with very few exceptions. The number of de-accentuations across speakers indicated in table (6.10) reveals that de-accentuation is strongly related to different focus conditions. Whereas post-focal de-accentuation is not observed in the all-new baseline and the verb focus conditions post-focal elements are clearly de-accented in the remaining focus conditions. In subject focus the post-focal object and the following post-focal verb are de-accented. In object focus the verb represents the post-focal constituent and is most often de-accented as well. The all-new and verb focus sentences of the experiment have no post-focal constituents due to design of the target sentences. In both conditions the Q-particle is attached to the final constituent leaving no possibility for post-focal de-accentuation.

Table (6.10): Number of de-accentuations on post-focal constituents

	subject focus		object focus
speaker	object	verb	verb
1	5	5	5
2	4	5	4
3	3	5	5
4	5	5	5
5	5	5	5
6	5	5	5
7	5	5	5
8	5	5	5
9	5	5	5
10	3	5	5
11	5	5	5
12	3	5	5
13	5	5	5
14	5	5	5
15	2	5	4
16	4	5	5
17	5	4	4
18	5	5	5
19	5	5	5
20	3	5	5
total	87	99	97

Table (6.10) outlines the numbers of de-accentuations on post-focal constituents for all speakers and across the 5 target sentences for each subject and object focus. In subject focus two constituents in a post-focal position are indicated in the table, namely the object and the verb. As for object focus, only the verb is in a post-focal position and outlined in the table. Each constituent is realized by each speaker by a maximum number of 5 realizations per focus condition due to the number of target sentence in the experimental design. The results in table (6.10) show a systematic de-accentuation of post-focal constituents across speakers. Deviations to this pattern are only found for 13 objects and 1 verb in the subject focus condition where they were realized with a pitch accent. In object focus 3 of a total of 100 verbs where realized with a post-focal pitch accent.

A speaker by speaker analysis shows that speakers 1, 4, 5, 6, 7, 8, 9, 11, 13, 14, 17, 18, and 19 de-accent the object and the verb in each of the 5 target sentences in the subject focus condition. Speakers 2, 3, 10, 12, 15, 16, and 20 on the other side, do occasionally not de-accent the objects in subject focus. Furthermore, only one speaker (speaker 17) produced a pitch accent on the verb in 1 of the 5 subject focus target sentences.

In object focus the post-focal verb is de-accented in each of the five target sentences by speaker 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 19, 20. Speakers 2, 15, and 17 on the other side, do implement a pitch accent on the post-focal verb in one of the five object focus conditions.

An additional phonetic analysis repeats the observation of a systematic de-accentuation of post-focal constituents. In order to test whether PFD is a prosodic feature of IS in bilingual Turkish, the mean maximum *f0* of the word stressed syllable of a focused constituent is compared with the mean maximum *f0* value of the same syllable of the same constituent in an all-new condition. Mean maximum *f0* values are analyzed for subject-, and object focus for all speakers, but not for verb focus which lacks post-focal constituents in the target design. The mean values of the constituents are calculated on the base of the 5 sentences for each speaker and focus condition.

In table (6.11) the results of post-focal de-accentuation in subject focus are shown. The table outlines the mean *f0* values for each speaker on the object and the verb in the all-new condition the subject focus condition. The individual boxes indicate the calculation of the mean values for each constituent in both conditions in Hz. Additionally, the difference between them is indicated in the dark grey row.

Table (6.11): Mean max*f0* values on objects and verbs in the all-new and in the post-focal condition

PFD- in subject focus: mean Hz values for all speakers						
speaker	object all-new	object subjF	difference	verb all-new	verb subjectF	difference
1	233,0144981	198,5912258	-34,42327226	236,7017981	189,4245027	-47,27729542
2	172,2576976	114,8423511	-57,4153465	172,2576976	114,8423511	-57,4153465
3	139,1659003	106,4858349	-32,68006541	121,2160403	93,20978665	-28,00625365
4	205,998545	117,8184563	-88,18008874	134,9007557	110,4743728	-24,42638292
5	267,7772552	189,1796706	-78,59758463	202,4616831	173,8682565	-28,59342651
6	200,4530259	173,8161189	-26,63690693	197,5670862	157,47273	-40,09435618
7	337,5712194	214,5837688	-122,9874506	228,7262012	190,0106112	-38,71559
8	257,8982765	218,2111306	-39,68714588	242,2972928	206,6807967	-35,61649611
9	256,5779507	186,4963572	-70,08159347	279,1286964	173,6770124	-105,451684
10	175,6169443	130,1650822	-45,45186212	145,9380565	113,2468855	-32,691171
11	247,7995857	213,6930589	-34,10652681	271,5554744	194,0164834	-77,53899092
12	202,1787485	178,3649667	-23,8137818	188,2265663	172,137033	-16,0895333
13	260,352877	170,8801409	-89,47273602	331,8541073	165,9986834	-165,8554239
14	261,987277	188,380195	-73,60708193	222,1983656	201,0623819	-21,13598369
15	265,9107463	191,7413476	-74,16939864	186,8845572	149,6435343	-37,2410229
16	159,8062422	120,9447787	-38,86146352	141,3186786	110,8283423	-30,49033627
17	319,3270218	284,7446069	-34,58241496	233,7174119	207,7292038	-25,98820813
18	274,0906577	250,9332939	-23,15736383	255,2804301	228,723175	-26,55725505
19	284,2410373	217,8855316	-66,3555057	217,2112382	191,178458	-26,03278015
20	262,9551916	226,853565	-36,10162661	248,4565201	210,9617204	-37,49479971
mean	239,2490349	184,7305741	-54,51846082	212,8949329	167,7593161	-45,13561681

The mean max*f0* values for each speaker outlined in table (6.11) show that all 20 speakers use a lower mean *f0* on the word stressed syllable of the object in subject focus than in the all-new condition. For the analysis of PFD in subject focus, the speakers as a group show a mean maximum *f0* of 239,24Hz on the object in the all-new condition and a mean maximum *f0* of 184,73Hz on the object in the post-focal position. The object is on average 54,51Hz lower in the subject focus condition. Considering the individual lowering on the object between both conditions, it is located between 23,15 Hz for speaker 18 and 122,98 Hz for speaker 7. For most speakers the lowering is between 30 and 60 Hz.

For the realization of the verb in subject focus, all 20 speakers also use a lower mean *f0* on the word stressed syllable of the verb in the subject focus condition than in the all-new condition. The mean maximum *f0* values on the verb in subject focus indicate a mean max*f0* value of 212,89Hz across all speakers in the all-new condition and of only 167,75Hz in the subject focus condition. The mean maximum *f0* on the verb is on average 45,13Hz lower in the post-focal position in subject focus. The lowering on the verb between both conditions is located between 16,08 Hz for female speaker 12 and 165,85 Hz for female speaker 13. For most of the speakers the lowering is between 25 and 50 Hz.

For the analysis of PFD in object focus the mean *f0* values are outlined in table (6.12). The mean *f0* values for each speaker for the verb in the all-new condition and the verb in the post-focal position are outlined in Hz.

Table (6.12): Mean max*f0* values on verbs in the all-new and in the post-focal condition

PFD- in object focus: mean Hz values for all speakers			
speaker	verb all-new	verb objectF	difference
1	236,7017981	197,1976456	-39,50415255
2	172,2576976	109,2510209	-63,00667673
3	121,2160403	93,88860956	-27,32743074
4	134,9007557	127,1635265	-7,737229266
5	202,4616831	171,1779917	-31,28369135
6	197,5670862	156,2678488	-41,29923736
7	228,7262012	190,5108691	-38,21533214
8	242,2972928	200,3376504	-41,95964248
9	279,1286964	242,6368361	-36,49186032
10	145,9380565	120,0183736	-25,91968294
11	271,5554744	209,837495	-61,71797934
12	188,2265663	167,1989672	-21,0275991
13	331,8541073	165,2211257	-166,6329816
14	222,1983656	159,0936532	-63,1047124
15	186,8845572	156,2682713	-30,61628597
16	141,3186786	110,6040929	-30,71458567
17	233,7174119	201,981851	-31,73556096
18	255,2804301	235,505018	-19,77541204
19	217,2112382	196,1803321	-21,03090611
20	248,4565201	208,93865	-39,5178701
mean	212,8949329	170,9639914	-41,93094146

The mean *f0* values outlined in the first row in table (6.12) represent the mean values on the word stressed syllable of the verb in the all-new condition. The second row shows the mean *f0* values on the verb in the object focus condition and the third row the difference between both realizations. Like in subject focus, all of the twenty speakers use on average a lower *f0* on the verb when it is in a post-focal position. In object focus the mean maximum *f0* on the verb is on average 170,96 Hz across all speakers, whereas the *f0* value on the verb in the all-new condition is 212,89 Hz. With that it is on average 41,93Hz lower in the post-focal position than in the all-new position. The lowering on the verb between both conditions is located between 7,73 Hz for male speaker 4 and 166,63 Hz for female speaker 13. Most of the speakers show a lowering between 20 and 40 Hz on the verb in the post-focal position. None of the twenty bilingual speakers uses a higher *f0* on the post-focal verb in object focus.

Post-focal de-accentuation by concrete maximum *f0* measurements is also significant in the additional statistical analyses. In addition to the results of the mean value based phonetic measurements a statistical analyzes by means of a linear mixed model analyses was conducted including all measure points of all sentences of all speakers. The linear mixed model was fit to compare the maximum *f0* values of a post-focal constituent with the same constituent in the all-new baseline. To this reason the maximum *f0* of the stressed syllable is the dependent variable, the focus condition is the fixed factor and speaker is the random factor. To account for gender-related differences in pitch among speakers, the *f0* values obtained for each speaker are converted to their logarithms and afterwards calculated back to Hertz like realized before for the analyzes of the acoustic parameters in experiment 1. The analysis is done with semi-tones as the input data. In the following the analyses of the significance of PFD is outlined for each post-focal constituent separately. In table (6.13) the results of the linear mixed model analysis for PFD on the object in subject focus is summarized. In the following a detailed description of the table is provided exemplarily for all following tables representing the results of the linear mixed model analyses (LMMA). All following analyses are based on semi-tones. Hertz values are indicated for a better awareness of the difference.

Table (6.13): LMMA-results for PFD on the object in subject focus

object	t	p	max *f0* (Hz) (st)	confidence intervals (Hz) (st)
all-new (Hz) log			238.510 5.446/ 231.894	216.594 - 260.426 5.342 - 5.550/ 209.033 - 257.256
subjectF (Hz) log	 **-12.016**	 **<0.001**	**183.266** **5.174/ 176.662**	151.787 - 216.744 5.026 - 5.322/ 152.335 - 204.876

In table (6.13) the maximum *f0* of the word stressed syllable of the object is calculated in R for the all-new condition as the intercept. It is 238,510 in the Hertz analyses corresponding to 5,446 semi-tones on the logarithmic scale. The semi-tone value calculated back into Hertz corresponds to 231,894 Hz. The confidence interval for the all-new condition is 216,594 Hz to 260,426 Hz which corresponds to 5,342 to 5,550 semi-tones. The semi-tone values calculated back to Hertz correspond to 209,033 Hz to 257,256 Hz. Furthermore, the maximum *f0* of the word stressed syllable of the object is calculated in R for the subject focus condition and outlined in the table to indicate the difference between both conditions of the sample. The maximum *f0* on the object in the subject focus condition is 183,266 Hz. This corresponds to 5,174 semitones. The confidence interval for the subject focus condition is 151,787 Hz to 216,744 Hz which corresponds to 5,026 to 5,322 semitones.

The semi tone values calculated back into Hertz correspond to 152,335 Hz to 204,876 Hz. In the subject focus condition the maximum *f0* on the object is 0.27204 semi tones (55.232 Hz) lower than the intercept (the all-new condition). The calculation of the difference between both conditions results in a t-value of -12.016 and a p-value of <0,001 in the semi tone analyses. By that means the statistical analysis reveals a highly significant difference between the maximum *f0* on the object in an all-new condition and the subject focus condition in the present bilingual data set.

The same analysis is conducted for the verb in the all-new and the subject focus condition where it occurs post-focally. In table (6.14) the results of the linear mixed model analysis for PFD on the verb in subject focus is summarized. Values are indicated in Hertz and semi-tones whereas the calculations are based on semitones.

Table (6.14): LMMA-results for PFD on the verb in subject focus

verb	t	p	max *f0* (Hz) (st)	confidence intervals (Hz) (st)
all-new (Hz) log			211.256 5.313/ 202.995	190.005 - 232.508 5.196 - 5.430/ 180.569 - 228.206
subjectF (Hz) log	 **-10.921**	 **<0.001**	**168.164** **5.088/ 162.093**	137.996 - 232.508 4.931 - 5.246/ 138.479 - 189.734

In table (6.14) the maximum *f0* of the word stressed syllable of the verb is calculated in R for the all-new condition as the intercept. It is 211,256 in the Hertz analyses corresponding to 5,313 semitones on the logarithmic scale. The confidence interval for the all-new condition corresponds to 5,196 to 5,430 semitones. Furthermore the maximum *f0* of the word stressed syllable of the verb is calculated in R. It is 168,164 Hz corresponding to 5,088 semitones. The confidence interval for the subject focus condition is 4,931 to 5,246 semitones. In the subject focus condition the maximum *f0* on the verb is 0.22501 semi tones (40 Hz) lower than in the all-new condition. The calculation of the linear mixed model results in a t-value of -10.921 and a p-value of <0,001 in the semi-tone analyses. To this effect the analysis also shows a highly significant difference between the maximum *f0* on the object in an all-new condition and the subject focus condition. Objects are realized with a lower *f0* in the subject focus conditions of this sample.

In addition to the preceding statistical analyses for the postfocal constituents in subject focus a linear mixed model analyses is also run post-focal de-accentuation in object focus. In table (6.15) the results of the linear mixed model analysis for PFD on the verb in object focus are summarized.

Table (6.15): LMMA-results for PFD on the verb in object focus

verb	t	p	max *f0* (Hz) (st)	confidence intervals (Hz) (st)
all-new (Hz) log			211.256 5.313/ 202.995	190.005 - 232.508 5.196 - 5.430/ 180.569 - 228.206
objectF (Hz) log	 **-11.089**	 **<0.001**	**167.117** **5.083/ 161.325**	136.898 - 197.336 4.922 - 5.241/ 137.34 - 188.878

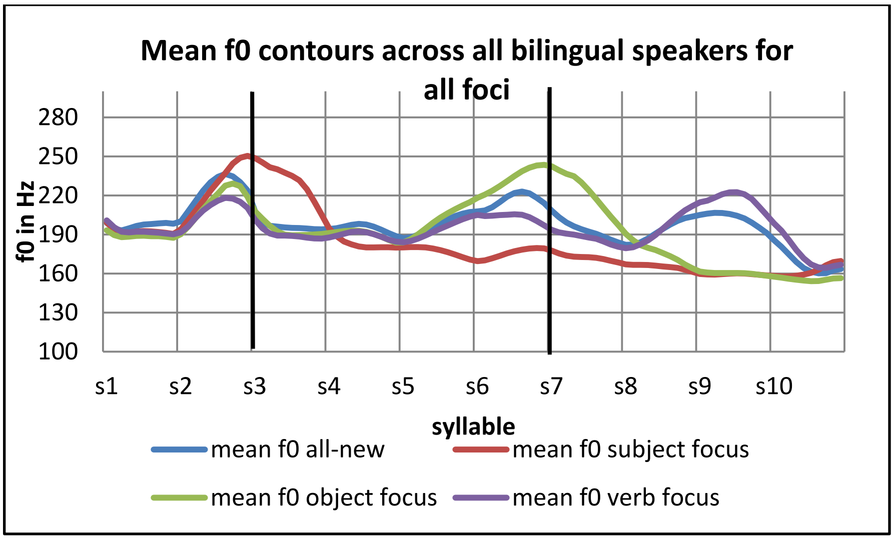
In table (6.15) the maximum *f0* of the word stressed syllable of the verb is represented as calculated in R for the all-new condition as the intercept. It is 211,256 in the Hertz analyses corresponding to 5,313 semi-tones in the logarithmic scale. The confidence interval for the all-new condition is 5,196 to 5,430 semi-tones. Furthermore, this time the maximum *f0* of the word stressed syllable of the verb is calculated in R for the object focus condition and also outlined in the table. The maximum *f0* on the verb in its post-focal position in object focus is 5,083 semi-tones. The confidence interval for the object focus condition corresponds to 4,922 to 5,241 semi-tones. In the object focus condition the maximum *f0* on the verb is 0.22976 semi-tones (41,67 Hz) lower than in the intercept. The calculation in the linear mixed model analyses results in a t-value of -11.089 and a p-value of <0,001 in the semi-tone analyses. The analysis shows a highly significant difference between the *f0* implementation on the verb in the all-new condition and the subject focus condition. The verb has a lower *f0* when it occurs post-focally in the sample of this study.

The analyzes of the mean maximum *f0* values on post-focal constituents in comparison to the mean maximum *f0* values on the same constituents in an all-new condition brings to light that post-focal constituents are implemented with a lower *f0* by the bilingual speakers in all focus conditions. The difference between the *f0* values on post-focal constituents and the values on the same constituents in all-new sentence is of statistical significance. Speakers use a significantly lower *f0* on post-focal constituents for all post-focal constituents.

VI.4.4 PITCH INCREASE

Based the cross-linguistic comparison of Turkish and German which revealed a difference in the use of pitch increase as a feature of focus marking ,which was not observed in the results of experiment 1 in monolingual Turkish, but is a central part of German prosody, bilingual data are also analyzed by concrete phonetic measurements with respect to the use of this prominence indicator. In the preceding visual analyses of f0 contours outlined in 4.2, it came to light that speakers tend to associate a focused constituent with a higher pitch than the same constituent in an unfocused condition. In the following figure the mean *f0* graph based on the time-normalized mean *f0* values across all target sentences and all speakers is repeated here from figure (6.10).[89] The blue graph represents the all-new condition where the final syllables of the subject and the object and the penultimate syllable of the verb are aligned with a high tone. The same tonal structure is used for the verb focus condition represented by the purple line where the pitch accent on the focused verb experiences a boost in *f0* compared to the all-new contour. Subject focus is represented by the red line where the high tone on the subject experiences a boost in *f0* when compared to the all-new condition. Object focus is represented by the green line where the final syllable of the object also experiences a boost in *f0* when compared to the all-new contour.

Fig (6.10): Time-normalized *f0* contours across all bilingual speakers and focus conditions



To test if the observations of on-focus pitch increase of the visual analysis find their respective phonetic expression in concrete *f0* measurements, the mean maximum *f0* values of the stressed syllables of focused words were compared to the mean maximum *f0* values on the same syllables in the all-new condition. In table (6.16) the mean *f0* values of the respective syllables are demonstrated for each speaker. The *f0* values are mean values calculated from the measurements of each of the five target sentences of a focus condition and the all-new condition. All values are taken from the

[89] The first two syllables indicate the subject, syllables three to six indicate the object, syllables seven to nine indicate the verb and syllable ten represents the question particle -mI for the all-new and the verb focus condition. In the subject focus condition the Q-particle is associated with the third syllable already and for the object focus condition the seventh syllable is associated with the Q-particle.

stressed syllables of the constituents.[90] Measurements are listed according to each constituent (SOV). The first row for each constituent indicates the mean maximum *f0* on the stressed syllable of the respective constituent in the all-new condition, the second row indicates the mean max*f0* of the same syllable in the focus condition, and the third row calculates the difference between the focused and unfocused syllable. All values are calculated in Hz.

Table (6.16): Mean maximum *f0* in Hz on constituents in a focused and all-new condition

speaker	subj-all-new	subj-F	difference	obj-all-new	obj-F	difference	verb-all-new	verb-F	difference
1	247	261	14	233	257	24	238	256	18
2	129	145	16	172	152	-20	124	133	9
3	195	148	-47	139	181	42	119	156	37
4	221	218	-3	206	219	13	134	187	53
5	290	241	-49	268	203	-65	209	179	-30
6	220	215	-5	200	209	9	207	185	-22
7	345	374	29	338	370	32	223	340	116
8	273	305	32	258	306	48	254	326	72
9	304	373	31	257	379	122	277	361	84
10	205	183	-22	176	193	17	155	174	19
11	316	339	23	248	366	118	325	360	35
12	220	210	-10	202	194	-8	187	174	-13
13	303	355	52	260	333	73	326	357	31
14	288	280	-8	262	229	-33	198	247	49
15	283	217	-65	266	245	-21	179	143	-36
16	175	173	-2	160	180	20	149	178	29
17	345	327	-18	319	249	-70	273	247	-26
18	323	339	7	274	336	62	307	333	26
19	242	272	30	284	241	-43	202	225	23
20	305	180	-125	181	124	-57	133	152	19

The mean maximum *f0* values in table (6.16) indicate that some speakers systematically use an increase of the pitch accent in a focus condition when compared to the value of the all-new condition. In the table the realization of increase is marked by the dark grey boxes in the columns that show the difference between each focus condition and the baseline.

When analyzing the pitch increase by the number of, table (6.16) indicates that a total of 7 speakers use a systematic pitch increase on the focused constituent for all focus conditions when compared to the baseline. Additionally, 5 speakers only use on-focus pitch increase for object and verb focus, but not for subject focus. Moreover, 2 speakers show pitch increase only for subject and verb focus, but not for object focus. Another 2 speaker use pitch increase only for verb focus and a further speaker only for object focus. Only 4 speakers do not use pitch increase at all. Contrastingly, they showed a

[90] In cases of late alignment which most often occurs on focused constituents which are adjacent to the Q-particle which provides more segmental space for tonal realization including the higher realization of a pitch accent, the maximum f0 on a focused item is occasionally slightly higher than indicated in the table. However, most of the speakers realize the peak of the high tone on the word stressed syllable which is presented in the table.

lower *f0* on the focused syllable than in the unfocused condition. Hence, 16 of the 20 speakers use pitch increase to some extend in the data based on mean value analyses.

A speaker by speaker analysis reveals that speakers 1, 7, 8, 9, 11, 13, and 18 use a higher pitch on a focused constituent than in an all-new condition in each focus condition. They use a higher *f0* on the word stressed syllable of the subject in subject focus when compared to all-new, they use a higher *f0* on the word stressed syllable of the object in object focus when compared to all-new and they also use a higher *f0* on the word stressed syllable of the verb when the verb is focused. However, the concrete increase differs for each speaker and even within a speaker with respect to the different focus conditions. The difference ranges from an increase of 7 Hz in subject focus for speaker 18 to 122 Hz in object focus for speaker 9. A pitch accent in this analysis is considered as increased when the difference between the focus condition and the all-new condition is bigger than 0 Hz. Perceptual relevance is not considered here.

Apart from the 7 speakers that systematically increase pitch on a focused constituent in comparison with the pitch peak value in the all-new baseline some speakers use pitch increase only in certain focus conditions. Speakers 3, 4, 10, and 16 implement a higher pitch on the focused word in object- and verb focus but not in subject focus when compared to the all-new condition. Again the concrete increase varies from speaker to speaker and the focus condition. The lowest increase counts 13 Hz on object focus for speaker 4. The highest increase for this group is realized in verb focus by the same speaker and counts 53 Hz. Speakers 2 and 19 increase the pitch on focused constituents only in subject- and verb focus when compared to all-new but not in object focus. The concrete increase difference for both speakers is 9 and 16 Hz for speaker 2 and 23 and 30 Hz for speaker 19. Speaker 6 on the other side uses a pitch increase only in object focus but not in subject and verb focus when compared to the all-new baseline condition. He uses an increase of 9 Hz in object focus but decreases *f0* on the focused constituents in subject- and verb focus.

Furthermore, some speakers do not use a pitch increase at all. Speakers 5, 12, 15, and 17 instead systematically use a lower pitch on the word stressed syllable of a focused constituent than on the same syllable in an all-new condition.

When considering the constituents, a total of 9 speakers show a higher *f0* on the subject in the focused than in the unfocused condition, whereby the increase shows a range from 7 to 52 Hz, depending on the speaker. As for the object, 12 speakers show a pitch increase in the focus condition with a pitch increase between 9 to 122 Hz, and for verb focus 15 speakers show a higher *f0* on the verb when it is focused with a pitch increase between 9 to 116 Hz.

By that means the phonologic ambiguity between all-new and verb focus as observed in the preceding analyses of tonal distribution is repealed by phonetic means in the bilingual data set.

Phonologic ambiguity between all-new and verb focus sentences was also observed in the monolingual data set. In contrast, the ambiguity was not repealed by pitch increase.

To test if the observed pitch increase on focused constituents is also of statistically significance for the bilingual group, a further linear mixed model analysis was conducted. This time considering pitch increase on focused constituents. As in the preceding analyses the statistical calculation is based on each concrete *f0* value for each sentence and each speaker and does not rely on mean values. The linear mixed model is fit to compare the maximum *f0* values of a focused constituent with the same constituent in the all-new baseline. Within the model the maximum *f0* of the stressed syllable is the dependent variable, the focus condition is the fixed factor and speaker is the random factor. To account for gender-related differences in pitch among speakers, again the *f0* values obtained for each speaker were converted to their logarithms and afterward calculated back to Hertz. The results for on-focus pitch increase are outlined for each constituent separately. In table (6.17) the results of the linear mixed model analyses for on-focus pitch increase on the subject is summarized.

Table (6.17): LMMA- results for pitch increase on the subject in subject focus

subject	t	p	max *f0* (Hz) (st)	confidence intervals (Hz) (st)
all-new (Hz) log/ Hz			261.984 5.530/ 252.216	236.312 - 287.656 5.419 - 5.642 / 225.64 - 281.922
subjectF (Hz) log	 0.362	 0.7179	266.566 5.542 / 255.123	227.741 - 270.233 5.38 - 5.584 216.929 - 266.263

In table (6.17) the maximum *f0* of the word stressed syllable of the subject is calculated in R for the all-new condition as the intercept. It is 261,984 in the Hertz scale corresponding to 5,530 semi-tones on the logarithmic scale. The semi-tone value calculated back to Hertz corresponds to 252,216 Hz. The confidence interval for the all-new condition is 5,419 to 5,642 semi-tones. Furthermore the maximum *f0* of the word stressed syllable of the subject is calculated in R for the subject focus condition and indicated in the table. The maximum *f0* on the subject in the subject focus condition is 266,566 Hz. This corresponds to 5,542 semi-tones. The confidence interval for the subject focus condition is 5,38 to 5,584 semi-tones. In the subject focus condition the maximum *f0* on the subject is 0,008905 semi-tones (2,907 Hz) higher than in the all-new condition. This corresponds to a t-value of 0,362 and a p-value of 0,7179 for the semi-tone analyses. From this data set analyses no significant difference with respect to the *f0* implementation on a subject in the all-new condition and the *f0* implementation on a subject in a subject focus condition can be found.

The same analyzes is done for the object in the object focus condition and the all-new condition to test on-focus pitch increase on the object. In table (6.18) the results of the linear mixed model analyses for on-focus pitch increase on the subject are summarized. They are represented again indicating the Hertz and the semitone values. The calculations though are based on the semitone analyses only.

Table (6.18): LMMA- results for pitch increase on the object in object focus

object	t	p	max *f0* (Hz) (st)	confidence intervals (Hz) (st)
all-new (Hz) log			238.510 5.446/ 231.894	216.594 - 260.426 5.342 - 5.550/ 209.033 - 257.256
object (Hz) log	 **3.569**	 **<0.001**	262.787 **5.528/ 251.524**	230.249 - 295.325 5.3791 - 5.676/ 216.833 - 291.765

In table (6.18) the maximum *f0* of the word stressed syllable of the object is calculated in R for the all-new condition as the intercept. It is 238,510 in the Hertz analyses corresponding to 5,446 semi-tones on the logarithmic scale. The confidence interval for the all-new condition is 5,342 to 5,550 semi-tones. Furthermore the maximum *f0* of the word stressed syllable of the object is calculated in R for the object focus condition corresponding to 5,528 semitones. The confidence interval for the object focus condition is 5,3791 to 5,676 semi-tones. In the object focus condition the maximum *f0* on the subject is 0,08126 semi-tones (19,63 Hz) higher than in the all-new condition. This corresponds to a t-value of 3,569 and a p-value of <0,001 in the semi-tone analysis. The analysis indicates a highly significant difference between the *f0* implementation on the object in an all-new condition and the object in the object focus condition.

Furthermore the analysis includes pitch increase in the verb focus condition. In table (6.19) the results of the linear mixed model analysis for on-focus pitch increase on the verb is summarized. The calculations are once again based on semi-tones as the input data.

Table (6.19): LMMA- results for pitch increase on the verb in verb focus

verb	t	p	max *f0* (Hz) (st)	confidence intervals (Hz) (st)
all-new (Hz) log			211.256 5.313/ 202.995	190.005 - 232.508 5.196 - 5.430/ 180.569 - 228.206
verbF (Hz) log	 **2.467**	 **<0.001**	223.761 **5.364/ 213.49**	193.667 - 253.857 5.430 - 5.521/ 228.206 - 249.811

In table (6.19) the maximum *f0* of the word stressed syllable of the verb is calculated in R for the all-new condition as the intercept. It is 211,256 in the Hertz analyses corresponding to 5,313 semitones on the logarithmic scale. The confidence interval for the all-new condition corresponds to 5,196 to 5,430 semi-tones. Furthermore, the maximum *f0* of the word stressed syllable of the object is calculated in R for the verb focus condition corresponding to 5,364 semitones. The confidence interval for the object focus condition is 5,430 to 5,521 semi-tones. In the verb focus condition the maximum *f0* on the verb is 0.05041 semi-tones (10,495 Hz) higher than in the all-new condition. This corresponds to a t-value of 2,772 and a p-value of <0,001 in the semitone analyses. The calculations in R reveal a highly significant difference for the *f0* implementation on the verb in an all-new condition and the verb in the verb focus condition for the present bilingual sample.

To summarize the results of the measurements of the max*f0* on focused constituents and their comparison with the corresponding values of the same constituent in the all-new conditions the data reveal a difference in the phonetic analyses conducted with mean values and also in the statistic including all measure point. Additionally, also the preceding visual analysis based on a comparison of time-normalized *f0* contours showed pitch increase on a focused constituent. Although the analysis based on mean values shows some speaker dependent variation with respect to pitch increase, the statistical analyzes, including all measure points, confirms a significant pitch increase for the bilinguals as a group for the realization of pitch on focused constituents in object focus and for verb focus but not for subject focus.

VI.4.5 PRE-FOCAL COMPRESSION

In the preceding phonologic description of intonation contours and their modification according to different focus condition it was already reported of some observations of pre-focal compression. Furthermore, the analyses revealed some cases of complete pre-focal de-accentuation. The contour remained flat in these cases and no pitch implementation was observed on pre-focal constituent. In the pre-focal compressed contours, the assignment of pitch accents on pre-focal constituents was still traceable but lower than on the following focused constituent.

The phonologic analyses revealed a complete de-accentuation of 13 pre-focal subjects in 100 object focus sentences. In verb focus 15 pre-focal subjects and 17 pre-focal objects were de-accented.

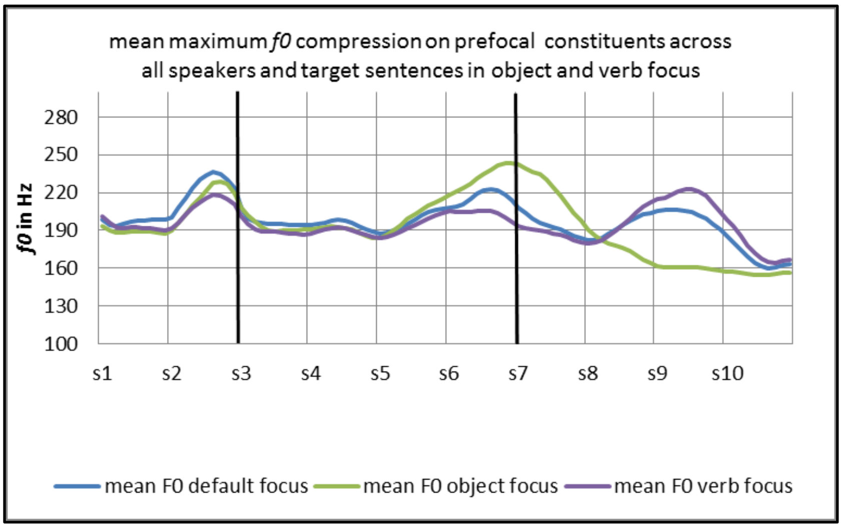
Pre-focal compression was mainly observed in the comparison of time-normalized mean *f0* graphs calculated across all speakers for the three different focus conditions and the all-new baseline, as outlined above in figure (6.10). A further visual impression of pre-focal compression in the bilingual data set is provided in figure (6.12). Here, solely the contours of object focus and verb focus which contain pre-focal constituents are compared to the baseline all-new condition.[91]

The blue graph represents the all-new condition where the final syllables of the subject and the object and the penultimate syllable of the verb are aligned with a high tone.

The same tonal structure is used for the verb focus condition represented by the purple line. However, the high tones on the subject and the object in verb focus are lower than in the all-new condition and they are also lower than the following focused verb. The verb is realized with the highest *f0* movement of the whole verb focus target sentence.

Object focus is represented by the green line where the high tone on the pre-focal subject is realized with a lower *f0* than in the all-new condition. Furthermore, the high tone on the focused object is realized with the highest *f0* movement of the whole object target sentence.

Fig. (6.12): Compression of pre-focal constituents in object and verb focus



[91] As in the preceding mean graph presentation the first two syllables indicate the subject, syllables three to six indicate the object, syllables seven to nine indicate the verb and syllable ten represents the question particle -mI for the all-new and the verb focus condition. In the subject focus condition the Q-particle is associated with the third syllable already and for the object focus condition the seventh syllable is associated with the Q-particle.

To base the visual observations on solid grounds, a further phonetic analysis with respect to pre-focal compression is presented here. This is of particular interest since the previous cross-linguistic comparison revealed no clarity about the use of pre-focal compression in Turkish. Whereas the results of the phonetic analysis of the feature in the monolingual Turkish experiment 1 give no evidence for pre-focal compression as a prosodic correlate in yes/no questions, a former study of Göksel et al. (2009) describe pre-focal compression as a correlate to indicate sentence type in Turkish yes/no questions. German however, is reported to use pre-focal compression as a correlate of IS.

To analyze pre-focal compression as a possible prosodic correlate of either IS or sentence type (as stated by Göksel et al. 2009), the mean maximum *f0* on the word stressed syllables on pre-focal constituents was compared to the mean maximum *f0* of the same syllables in the all-new condition for each speaker. Since subject focus lacks pre-focal constituents in simple SOV yes/no questions the analyses is reduced to object- and verb focus. The mean values are calculated from the five target sentences for each condition for each speaker. For the analysis of compression in object focus, the mean maximum *f0* values are calculated for the subject in object focus and compared to the mean maximum *f0* values of the subject in the all-new condition. For the analyzes of compression in verb focus the mean maximum *f0* values of the subject and the object are calculated and compared to the mean maximum *f0* values of the same constituents in the all-new condition. In the following, the results are presented for each focus condition separately.

In table (6.20) the values for the subject in the object focus and the all-new condition are outlined for each of the twenty speakers.

Table (6.20): Mean maximum *f0* values on the word stressed syllables of the subject in the object focus condition and the all-new condition

Prefocal compression in object focus: mean Hz values			
speaker	subject in all-new	subject in objectF	difference
1	246,8317581	255,8050685	8,973310368
2	129,3339943	138,9982318	9,664237503
3	194,9989609	189,0771869	-5,921773976
4	221,3281577	246,2323494	24,90419177
5	290,2580244	247,262854	-42,99517039
6	220,1503755	199,7324664	-20,41790908
7	345,2504778	297,4113074	-47,83917048
8	272,8393722	250,1215126	-22,71785958
9	303,9236968	239,3390632	-64,58463362
10	205,2920194	212,158252	6,866232657
11	315,5459181	267,3348913	-48,21102676
12	219,7108749	213,9243963	-5,786478627
13	303,0924697	299,7504047	-3,342065027
14	287,6376846	323,7850396	36,14735499
15	282,4858158	259,0372357	-23,44858004
16	175,0755782	154,6641743	-20,41140388
17	345,0618546	286,3384337	-58,7234209
18	322,5744988	289,7825043	-32,79199454
19	241,6375871	336,5591225	94,92153542
20	314,3891574	274,6792773	-39,70988005

The mean maximum *f0* measurements in table (6.20) indicate the mean maximum *f0* on the subject in the all-new baseline in the first row. In the second row, the mean maximum *f0* for the same constituent in the pre-focal position in object focus is indicated. In the third row, the difference between the mean values in both conditions is calculated.

For pre-focal compression on the subject in object focus the values in table (6.20) reveal that 15 speakers use a lower mean *f0* value on the pre-focal constituent than in the all-new condition. Five speakers do not.

For speakers 1, 2, 4, 14 and 19 the mean maximum *f0* on the subject experiences a boost when it occurs pre-focally in comparison to the all-new baseline. These speakers on average use a higher mean *f0* on the subject in the all-new condition than in the pre-focal position of object focus. The difference ranges between 6,68 Hz for speaker 10 and 94,92 Hz for speaker 19.

The remaining 15 speakers on the other hand realize the subject in its pre-focal position in the object focus condition with a lower mean maximum *f0* than in the all-new condition. The lowering of the *f0* on the subject ranges between 3,34 Hz for speaker 13 and 64,58 Hz for speaker 9. For most of these speakers the lowering is settled between 20 and 50 Hz.

In addition to the mean maximum *f0* analyses for object focus, in table (6.21) the mean maximum *f0* values on the pre-focal constituents in the verb focus condition and the all-new condition are outlined for each of the twenty speakers.

Table (6.21): Mean maximum *f0* values on the word stressed syllables of the subject and the object in verb focus and the all-new condition

Prefocal compression in verb focus: mean Hz values						
speaker	subject in all-new	subject in verbF	difference	object in all-new	object in verbF	difference
1	246,8317581	224,5696396	-22,26211857	233,0144981	226,7980756	-6,216422474
2	129,3339943	143,9721587	14,63816437	172,2576976	144,671188	-27,58650955
3	194,9989609	151,8313948	-43,16756604	139,1659003	201,456241	62,29034073
4	221,3281577	221,8119098	0,483752155	205,998545	179,1058816	-26,89266346
5	290,2580244	224,7949399	-65,46308445	267,7772552	232,2222877	-35,55496745
6	220,1503755	189,747747	-30,40262843	200,4530259	192,6641791	-7,788846789
7	345,2504778	291,2672919	-53,9831859	337,5712194	234,63515	-102,9360694
8	272,8393722	236,8663219	-35,97305024	257,8982765	237,3926304	-20,50564606
9	303,9236968	268,869569	-35,0541278	256,5779507	217,0766141	-39,50133659
10	205,2920194	184,6196449	-20,67237451	175,6169443	152,8566607	-22,76028367
11	315,5459181	267,8813121	-47,66460596	247,7995857	249,762202	1,962616288
12	219,7108749	233,9444271	14,23355216	202,1787485	192,2534357	-9,92531287
13	303,0924697	311,0628466	7,970376833	260,352877	250,6581854	-9,694691513
14	287,6376846	266,9538137	-20,68387089	261,987277	255,4817433	-6,505533654
15	282,4858158	204,2166498	-78,26916593	265,9107463	213,4384036	-52,47234269
16	175,0755782	157,7294634	-17,34611478	159,8062422	153,6485902	-6,157652029
17	345,0618546	325,0937867	-19,96806797	319,3270218	285,3435256	-33,98349627
18	322,5744988	276,4755383	-46,0989605	274,0906577	256,7733557	-17,31730206
19	241,6375871	257,5217045	15,88411736	284,2410373	268,4328082	-15,80822904
20	314,3891574	253,2766664	-61,11249103	262,9551916	244,0306709	-18,92452069

The first row in table (6.21) indicates the mean maximum *f0* in Hertz on the subject in the all-new baseline condition. The second row indicates the mean maximum *f0* on the pre-focal subject in the verb focus condition. In the third row the difference between the mean values in both conditions is calculated. In the fourth row the mean maximum *f0* on the object in the all-new condition is indicated. The fifth row shows the mean maximum *f0* on the pre-focal object in the verb focus condition. The sixth row again indicates the difference between the mean maximum *f0* values of the object in the all new and the pre-focal condition.

With respect to the realization of the subject in the all-new and verb focus condition the table reveals that 15 speakers use a lower mean maximum *f0* on the subject in the pre-focal condition. Only five speakers do not compress the pitch on pre-focal subjects in verb focus.

Speakers 2, 4, 12, 13 and 19 use a higher mean maximum *f0* on the subject when it occurs pre-focally than when it occurs in an all-new sentence. These speakers on average use a lower mean maximum *f0* on the subject in the all-new condition than in the pre-focal position of verb focus. The difference ranges between 0,48 Hz for speaker 4 and 15,88 Hz for speaker 19.

The remaining 15 speakers on the other side realize the subject in the pre-focal position in the verb focus condition with a lower mean maximum *f0* than in the all-new condition. The pre-focal lowering of the *f0* on the subject ranges between 17,34 Hz for speaker 16 and 78,62 Hz for speaker 15. For most of these speakers the lowering is located at around 20 to 50 Hz.

With respect to the comparison max*f0* values on the object in verb focus and the all-new condition, the results in table (6.21) also reveal a difference. The mean maximum *f0* analysis reveals that 18 speakers use a lower mean max*f0*on the object in the pre-focal position. [92] Only 2 speakers do not compress the pre-focal constituent.

For speakers 3 and 11 the mean maximum *f0* on the object is higher in the pre-focal position than on objects in the all-new condition.

For the remaining 18 speakers the lowering of the *f0* on the object in the pre-focal position ranges between 6,21 Hz for speaker 1 and 102,93 Hz for speaker 7. For most of these speakers the lowering is located around 10 and 30 Hz.

The phonetic analyses of the mean maximum *f0* values of constituents that are in a pre-focal position and their comparison with the mean maximum *f0* values of the same constituent in an all-new condition reveal that majority of the speakers of the bilingual sample use a lower *f0* on a pre-focal constituent. Pre-focal compression is implemented by 15 speakers for subjects in object focus, by 15 speakers for subjects in verb focus and by 18 speakers for objects in the verb focus condition.

In addition to the phonetic analyses of the mean maximum *f0* values on pre-focal constituents, statistical analyses by means of further linear mixed model analyses are conducted for the speakers as a group. The analyses are based on each single measure point for each single speaker and not calculated with the mean values of each speaker. The analyses are run to compare the maximum *f0* values on the same constituents in different focus conditions. The model was fit with the maximum *f0* of the stressed syllable as the dependent variable, the focus condition as the fixed factor and speaker as the random factor. To account for gender-related differences in pitch among speakers, the *f0* values obtained for each speaker were converted to their logarithms and afterwards calculated back to Hertz like for the preceding statistical analyses of pitch increase and PFD. The analyses for pre-focal compression are also realized with semi-tones as the input data. In the following, the LMMA-results are outlined for each pre-focal constituent separately.

[92] Note that the study of Ipek (2011) observes the contrary for monolingual speakers of Turkish declaratives. She observes a boost in pitch on the object in the immediately prefocal position.

In table (6.22) the results of the linear mixed model analysis for pre-focal compression on the subject in object focus are summarized.

Table (6.22): LMMA-results for pre-focal compression on the subject in object focus

subject	t	p	max *f0* (Hz) (st)	confidence intervals (Hz) (st)
all-new (Hz) log			261.984 5.530 (252.216)	236.312 - 287.656 5.419 - 5.642 (225.64- 281.922)
objectF (Hz) log	 **-2.239**	 **0.0258**	248.136 **5.475 (238.608)**	209.551 - 286.721 5.315 - 5.635 (203.351 - 279.978)

In table (6.22) the maximum *f0* of the word stressed syllable of the subject is calculated in R for the all-new condition as the intercept. It is 261,984 in the Hertz analyses which corresponds to 5,530 semi-tones on the logarithmic scale. The confidence interval for the all-new condition is 5,419 to 5,642 semi-tones. Furthermore, the maximum *f0* of the word stressed syllable of the subject is calculated in R for the object focus condition and outlined in the table to indicate the difference between both conditions of the sample. The maximum *f0* on the subject in the object focus condition is 5,475 semi-tones. The confidence interval for the subject focus condition is 5,315 to 5,635 semi-tones. In the object focus condition the maximum *f0* on the subject is 0.055463 semitones (13.848 Hz) lower than in the intercept (the all-new condition). The calculations in the linear mixed model analysis provide a t-value of -2.239 and a p-value of 0.0258 in the semi-tone analyses. To this effect, the analysis shows a significant difference in the *f0* implementation on the subject in the all-new condition and the object focus condition for the tested sample. The bilingual speaker of the data set use a significant lower *f0* on the word stressed syllable of a pre-focal subject than on a subject in an all-new condition.

The same mixed model analysis is run for the pre-focal constituents in the verb focus condition. In table (6.23) the results of the analysis for pre-focal compression on the subject in verb focus is summarized.

Table (6.23): LMMA-results of pre-focal compression on the subject in verb focus

subject	t	p	max *f0* (Hz) (st)	confidence intervals (Hz) (st)
all-new (Hz) log			261.984 5.530 (252.216)	236.312 - 287.656 5.419 - 5.642 (225.64 - 281.922)
verbF (Hz) **log**	**-4.135**	**<0.001**	235.935 **5.429 (227.985)**	197.529 - 274.343 5.270 - 5.588 (194.427 - 267.334)

In table (6.23) the maximum *f0* of the word stressed syllable of the subject is represented once again as calculated in R for the all-new condition as the intercept. It is 5,530 semi-tones on the logarithmic scale. The confidence interval for the all-new condition corresponds to 5,419 to 5,642 semi-tones. Furthermore, this time the maximum *f0* of the word stressed syllable of the subject is calculated in R for the verb focus corresponding to 5.429 semitones (227,985Hz). The confidence interval for the subject focus condition is 5.270 - 5.588 semi-tones. In the verb focus condition the maximum *f0* on the subject is 0,101006 semitones (24,231 Hz) lower than in the intercept. The calculations in the linear mixed model analyses indicate a t-value of -4.135 and a p-value of <0.001 in the semi-tone analysis. In this regard, the analysis shows a highly significant difference in the *f0* implementation on the subject in the all-new condition and the verb focus condition for the present bilingual sample. The bilingual speakers of experiment 2 use a significant lower *f0* on the word stressed syllables of subjects when they occur pre-focally than on subjects in an all-new condition.

Finally the analysis is also run for pre-focal compression on the object in the verb focus condition. In table (6.24) the results of the statistic calculations for the object in verb focus are summarized.

Table (6.24): LMMA-results for pre-focal compression on the object in verb focus

object	t	p	max *f0* (Hz) (st)	confidence intervals (Hz) (st)
all-new (Hz) log			238.510 5.446 (231.894)	216.594 - 260.426 5.342 - 5.550 (209.033 - 257.256)
verbF (Hz) **log**	**-3.551**	**<0.001**	218.905 **5.367 (214.125)**	186.513 - 251.296 5.219 - 5.515 (184.705 - 248.229)

In table (6.24) the maximum *f0* of the word stressed syllable of the object is represented as calculated in R for the all-new condition as the intercept. It is 5.446 semi-tones on the logarithmic scale. The confidence interval for the all-new condition is 5.342 to 5.550 semi-tones. Furthermore, the maximum *f0* of the word stressed syllable of the object is calculated in R for the verb focus condition corresponding to 5.367 semi-tones. The confidence interval for the verb focus condition is 5.219 - 5.515 semi-tones. In the verb focus condition the maximum *f0* on the object is 0.07972 semi-tones (17.769 Hz) lower than in the intercept (the all-new condition). The calculations in the linear mixed model analysis result in a t-value of -3.551 and a p-value of <0.001 in the semi-tone analyses. The p- and the t-value indicate a highly significant difference in the *f0* implementation between the object in the all-new condition and the verb focus condition in the present bilingual sample.

The phonetic analyzes of the mean maximum *f0* values on pre-focal constituents in comparison to the mean maximum *f0* values on the same constituents in an all-new condition brings to light that pre-focal constituents are implemented with a lower *f0* by the majority of the speakers. The difference between the *f0* values on pre-focal constituents and the values on the same constituents in all-new sentence is also of statistical significance in the data set of experiment 2. Speakers as a group use a significantly lower *f0* on pre-focal constituents confirming the impression conveyed from the phonological analyses.

VI.5 DISCUSSION

In experiment 2, different information structural modified yes/no questions were elicited for 20 bilingual Turkish speakers with Turkish L1 and German as their early L2. In each of the 5 different target sentences containing a simple SOV structure and the morphological question marker –mI either the subject, the object, or the verb was contrastively in-situ focused. An all-new condition was also elicited as a baseline for comparison. All target sentences were analyzed with respect to the marking of IS and sentence type by prosodic means, concentrating solely on *f0*. Special attention was paid to the distribution of pitch on pre-focused, focused, and post-focal elements and the implementation of the final boundary tone with respect to their function of marking IS and sentence type. An additional phonetic analysis was conducted with respect to PFD on post-focal elements, pitch increase on focused elements, and pre-focal compression on pre-focal elements according to the cross-linguistic differences in the realization of IS between German and Turkish as developed in the preceding chapters. Due to the complex analyses, the discussion will be structured in the following way: First, I will discuss the results of the general and IS specific implementation of tones in bilingual yes/no questions including the final boundary tone analysis. Subsequently, the discussion will focus on de-accentuation, pitch increase and pre-focal compression. Finally, the implementation of the final boundary tone to mark sentence type will be discussed.

VI.5.1 GENERAL TONAL DISTRIBUTION AND TONAL DISTRIBUTION ACCORDING TO IS

The results of the overall distribution of tones on different constituents including all 400 target sentences revealed that word stressed syllables of subjects are either aligned with a pre-focal phrase boundary tone (H-) or a high-falling pitch accent (H*L). The word stressed syllables of the objects are most often realized with a high pitch accent (H*, H*L) and the word stressed syllables of the verbs are most often realized with a pitch accent (H*L).The IP-final syllable was low (L%) in nearly all sentences. The same general tonal distribution was found in experiment 1 realized with monolingual Turkish speakers.

Within the analysis of tonal distribution on the different constituents of the SOV target questions, variation in the alignment of pitch accents on different constituents was observed. The same variation in the alignment of pitch accents on word stressed syllables was observed in the monolingual data of experiment 1. On constituents that are adjacent to the Q-particle, which changes its position according to the focus condition in experiment 2, the pitch accent was occasionally aligned to the Q-particle, instead of being realized on the word stressed syllable of the corresponding constituent. In 15 out of the 100 sentences with subject focus the high tone of the bitonal pitch accent (H*L) was not implemented on the final syllable of the subject but only on the adjacent Q-particle. Also in object focus, the alignment of the pitch accent (H*L) on the focused object varied occasionally for some of the speakers. In object focus the Q-particle was adjacent to the focused object and occasionally associated with the high pitch accent. A late peak alignment is also observed in verb focus for some speakers. In the late alignment the peak of the (H*L) pitch accent is aligned to the ultimate syllable of the verb although the word stressed syllable corresponds to the preceding penultimate syllable. The few alignment differences in the data across the different focus conditions reveal that those speakers who use a late alignment tend to align the nucleus of the bitonal pitch accent on the Q-particle which was analyzed as prosodic word adjoiner (PWA) in Kabak & Vogel (2003). Since all alignment differences exclusively occur on focused constituents in monolingual and bilingual speech, I assume that the Q-particle is related to the late alignment for those speakers. I assume that the Q-particle is considered as an integrate part of the PW it attaches to and the general final word stress rule is implemented on the constituents associated with the Q-particle. In (2) the variation in the pitch accent alignment is outlined schematically.

(2): Variation in the representation of a PW and consequences for the stress pattern

(a) regular stress pattern

H*L

((syllable 1) (syllable 2))$_{PW}$ (Q-particle)$_{PWadjoiner}$

(b) exceptional stress pattern

H*L

((syllable 1) (syllable 2) (Q-particle))PW

The exceptional stress pattern outlined in (2) (b) is only found in subject and object focus. For verb focus the regular word stress on the penultimate syllable (-Iyor) is transposed to the final syllable of the verb which is followed by the Q-particle. The Q-particle itself is aligned with a low final boundary tone (L%).

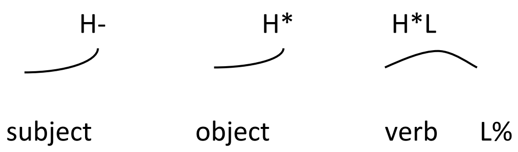
Still, the observed variation in the regular stress pattern concerns mono-and bilingual speakers. To this effect the variation observed in the bilingual data cannot be traced back to the influence of the contact language, but seems to correspond to language-internal variation. By this means, the observation provides new insights with respect to variation in the pre-stressing quality of the Q-particle outlined in chapter II.2. Further monolingual studies can hopefully build up on this observation. Variation in the stress pattern of Turkish is not in the focus of this study for which I will not go further into detail with the discussion of it.

A further difference in the realization of pitch accents in bilingual Turkish compared to monolingual Turkish was observed. Some of the subjects are realized with an additional pitch accent either on the first syllable of the subject in addition to the PPh-final boundary tone realized on the final syllable of subjects in non-subject focus conditions. In a subject focus condition bilingual speakers occasionally realized a pitch accent on the word stressed syllable in addition to a high PPh-final boundary tone on the focused subject which would usually be abandoned in subject focus conditions due to a change in phrasing by means of aligning the focused constituent to the rightmost prosodic boundary. This further pitch accent realization was not observed in the monolingual data. It is quite possible that the additional pitch accent implementation on a non word final syllable results from the language contact with German which most typically uses penultimate stress. As for the observation of variance in pitch accent alignment described above, the observation of additional pitch accent needs to be further investigated in future bilingual studies. The experimental design used in experiment 1 and 2 cannot draw reliable conclusion with respect to this additional observations.

Apart from the analyses of tonal distribution on different constituents in all yes/no questions, a further analyses of the distribution of PPh-final boundary tones and pitch accents according to different focus conditions in comparison to the all-new baseline was realized in the preceding section. The results here reveal that bilingual speakers of Turkish modify the intonation contour depending of the focus position in contrastive in-situ focused yes/no questions.

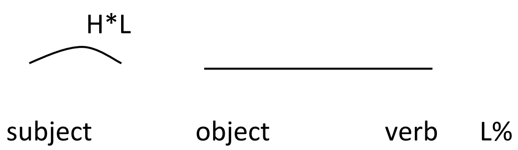
In all-new yes/no questions bilingual Turkish speakers implement a high PPh-final phrase boundary tone (H-) to the final syllable of the subject, a high pitch accent (H*) to the final syllable of the object and a further pitch accent (H*L) to the word stressed syllable of the verb. The same intonation contour is used for verb focus sentences by the bilingual speakers. From a phonological perspective all-new and verb focus yes/no questions exhibit an ambiguous intonation contour. In (3) the intonation contour found in all-new and verb focus of bilingual speakers of Turkish is schematically demonstrated:

(3): Phonologic ambiguity in the tonal structure of all-new and verb focus yes/no questions



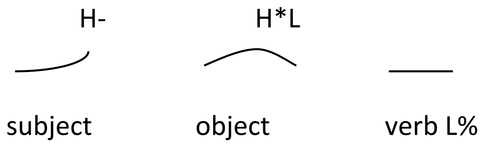
As for subject focus, a modification of the contour in (3) was observed. For subject focus the results of the phonological analyses reveal that speakers align a rising-falling pitch accent to the final syllable of the subject only. The word stressed syllables of the object and the verb in the subject focus intonation contour on the other side remain unaccented in contrast to the all-new contour. The example in (4) demonstrates the intonation contour found in subject focus yes/no questions.

(4): Intonation contour of subject focus yes/no questions



For object focus a modification of the intonation contour is also observed when compared with the all-new condition. The results of the analysis of the distribution of tones reveals that the subject and the object are realized with a high tone on their final syllables like in the all-new condition. A high pre-focal phrase boundary tone (H-) and a rising-falling pitch accent (H*L) are implemented respectively. The verb on the other side remains un-accented in contrast to the pitch accent implementation in the all-new condition. In (5) the intonation contour found in object focus yes/no questions is demonstrated.

(5) Intonation contour of object focus yes/no questions



Despite a few speaker and target sentence dependent deviances, the intonation contours outlined in figures (2) to (5) are systematically used by all bilingual speakers of experiment 1.The same intonation contours were observed in experiment 1 which was conducted with monolingual speakers of Turkish and serve as a monolingual baseline for comparison. To this effect a phonologic difference in the intonation contours used in IS modified yes/no questions is not found in the bilingual data set.

VI.5.2 POST-FOCAL DE-ACCENTUATION

A further important observation concerning the modification in the tonal distribution according to the focus is that pitch accents and PPh-final phrase boundary tones remain unrealized on post-focal constituents in the bilingual data. Post-focal de-accentuation was observed as the crucial prosodic cue to IS in the monolingual yes/no questions of experiment 1. A quantitative analysis of post-focal de-accentuation across all bilingual speakers and focus conditions revealed that de-accentuation is systematically realized after focus.

In subject focus the post-focal object was de-accented by the bilingual speakers in 87 of the 100 target sentences. Furthermore, the post-focal verb in subject focus was de-accented in 99 of the 100 subject focus target sentences. In object focus the post-focal verb was de-accented in 97 of the target sentences.

A complementary phonetic analysis of PFD also confirmed that post-focal constituents in contrastive in-situ focused yes/no questions are lower in pitch than their corresponding counterparts in the all-new yes/no questions. The mean maximum *f0* analyses on post-focal constituents of all bilingual speakers revealed that in subject focus yes/no questions the mean maximum *f0* on the object ($p < 0.001$/ t -12.016) and the verb ($p < 0.001$/ t -10.921) was significantly lower than on the same constituents in the all-new condition of the sample. In object focus the mean maximum *f0* on the post-focal verb (p < 0.001/ t -11.089) was also significantly lower than in the all-new condition of the data set.

The highly significant results with respect to the de-accentuation of post-focal constituents furthermore support the observation that de-accentuation is used in bilingual speech in order to mark post-focal constituents. As in the monolingual realization, the focused constituent corresponds to the last constituent of the IP which is realized with a pitch accent. By that means the focused constituent is aligned to the rightmost prosodic boundary since no tonal movement occurs afterwards until the realization of the obligatory low final boundary tone (L%) on the IP-final syllable. For the Turkish monolingual speakers it was shown that PFD is the only correlate to mark IS by means of *f0*. In contrast to Germanic languages no further marking such as on-focus pitch increase or pre-focal compression was found in the sample. The systematic use of PFD in bilingual Turkish motivates the assumption that the strategy of prosodic boundary alignment is also acquired by bilingual Turkish speakers. De-accentuation is used as a prosodic correlate of IS in bilingual as well as in monolingual Turkish.

Accordingly, the phonological analyses and the additional phonetic measurements of max *f0* values on post-focal constituents meet the previous expectation (i). As expected, PFD is also used in bilingual Turkish despite its marked character. This observation is in line both with previous observations within the framework of structurally determined language change based on the concept of markedness and also with its role as a functional tool in bilingual speech contributing to the contextualization and successful interpretation of a pragmatic meaning to which no further syntactic or morphological feature was available.

Studies in bilingual research have repeatedly shown that PFD is a feature which causes difficulties in bilingual language acquisition and which easily disappears in situations of language contact (Zerbian 2012, Xu, Chen & Wang 2012). In Xu, Chen & Wang (2012) the loss of PFC[93] is observed for the contact variety Taiwan Mandarin whereby the involved monolingual varieties differ typologically in the implementation of PFC. In Beijing Mandarin *f0* is lowered on post-focus words, whereas in Taiwanese PFC is totally absent. Accordingly, Zerbian (2015) supposes that prosodic marking is less likely to be found in contact languages. Based on Eckman's (1977) MDH and subsequent considerations concerning the role of markedness in language contact, it is generally predicted that marked features are prone to change in language contact. The only exception to that would arise in contact situations between languages with typologically very similar systems. In such a case, even features that are highly marked would be expected to be exchanged between these systems.

[93] Due to the character of Mandarin as a tone language the authors assume that lexical tones are still implemented and not completely deaccented if they occure postfocally. To this effect they prefere the term postfocal compression (PFC).

Considering the language contact situation of the present study a similar typology with respect to the use of PFD in correlation with IS was apparent in the cross-linguistic comparison of German and Turkish. De-accentuation of post-focal constituents was systematically observed in Turkish as well as in German and it is furthermore maintained in the bilingual Turkish variety.

Accordingly, I assume that the maintenance of PFD in the bilingual Turkish of Turkish-German bilinguals is crucially motivated by the distribution of this marked feature in both languages. Since both contact languages use PFD as a prosodic marker of IS, it is more likely to occur in the contact variety despite its marked character.

Additionally, the direction of influence may crucially motivate the difference to former studies on bilingual prosody which report difficulties or show an effect of loss of PFD in contact varieties. In most of these studies the focus of language contact is on the structural changes in the L2 of bilingual speakers. In Swerts & Zerbian (2010), difficulties in the acquisition of PFD is shown for English as a second language. Gut (2009) shows difficulties to de-accent post-focal elements for learners of English from various L1 backgrounds and Ramírez Verdugo (2002) also reports difficulties with marking prominence relations and IS for Spanish learners of L2 English. In contrast to the mentioned studies, the focus of the present study was on the use of PFD in bilingual L1.

Apart from the considerations which promote a use of PFD in the present contact variety by means of a similar typology considering the distribution of the feature in German and Turkish, also functional aspects may influence the use of PFD in bilingual Turkish. Departing from Matras' (2007, 2010) considerations about the functional aspects of language change, I hypothesized that marked prosodic features are more likely to occur in bilingual varieties when they contribute to the contextualization of a pragmatic meaning for which no other linguistic device is at hand in the linguistic repertoire of bilinguals.

Based on the assumption of activation and interaction of both languages in a bilinguals' representation of phonologic categories, the complete phonological inventory of bilinguals can be activated and used in order to optimize communicative goals. By means of functionally-driven choices the bilingual speaker generates a linguistic output which is based on its full linguistic repertoire independent of the resource language. A mapping is established between different language inherent areas such as pragmatics and prosody and also between the different languages of a bilingual in order to achieve a communicative goal. Bilinguals select the most promising output in order to contextualize a given message on the base of both languages optimizing over the full set of linguistic devices at hand. By that means a transfer and also the maintenance of a marked prosodic feature can have a functional motivation. Furthermore the pragmatic concept of post-focal givenness is a common concept to both involved monolingual languages, processed in one common conceptualizer in the bilingual mind. Furthermore both monolingual languages share the same phonological feature to indicate the pragmatic concept. Hence, the activation threshold for the use of PFD should be low in either language and so it is in the bilingual variety.

Functionally-driven choices most usefully target the fulfilling of pragmatic concepts which deviate from monolingual concepts based on their processing in a common conceptualizer. The non-realization of a specific concept soley do to the markedness character of its corresponding formal feature would result in a pragmatic gap contradicting the requirements of succesful bilingual communication. Maintaining features which would be avoided considering their structure only contributes to the contextualization of a pragmatic meaning for which otherwise a pragmatic gap would arise. However, the reverse process cannot be fully denied in situations where only one of the bilingual's languages uses the feature as studies on the loss of PFD in contact varieties show (e.g. Xu, Chen & Wang 2012). I assume that in such cases the pragmatic concept itself does become less and less important in bilingual conversations over the course of time due to less and less activation of the language of origin in a way that following generations do not acquire the concept itself anymore in an implicit manner.

In the concrete case of post-focal givenness in bilingual Turkish however, bilingual speakers resort to a highly active concept in Turkish and German which needs to be given structure on the surface which by chance coinceeds in both languages resulting in a low activation threshold for PFD on both sides. Hence the use of this marked feature in the bilingual variety is more than likely. By that means a functionally perspective based on activation processes proposes the opposite of structurally-driven assumptions on contact-induced language change. Since no other devices such as syntactical movement are possible due to the given structure of the target sentence, speakers can only use PFD to mark IS in order to successfully contextualize the true meaning of a sentence. By that means, the marking contributes to delimit the proposition from alternative meanings. A loss of PFD in the contact variety would correspond to a loss of pragmatic specialization and reduces the success of communication in the bilingual variety. Instead of fulfilling pragmatic requirements which differ from that of monolingual speakers as proposed as the main strategy of functionally-driven bilingual language development, a gap would arise in the bilingual variety. A pragmatic meaning would lack sufficient indication although the sources were at hand. The maintenance of PFD on the other side guarantees the successful interpretation of a message within a functional perspective of bilingual language development .

This perspective is basically motivated by Matras (2010), who proposes that the use of a feature in bilingual varieties does not depend on particular conditions such as frequency, structural contrast, or social factors, but is motivated by the semantic-pragmatic features of a structure. I additionally argue on the base of the results of experiment 2 that semantic-pragmatic features can also be considered as a crucial motivator for maintaining a marked structure in bilingual speech considering that language development occurs along activation and matching processes.

VI.5.3 PITCH INCREASE

In addition to the observation of PFD in bilingual Turkish and its identification as a formal correspondancy to the pragmatic concept of post-focal givenness the present study also observed the use of pitch increase on focused constituents. In contrast to PFD, the cross-linguistic comparison revealed that pitch increase is a prosodic cue of IS in German only. Pitch increase is not used in correlation with IS in monolingual Turkish which was confirmed by the results of experiment 1. The binary distinction of focus marking via pitch increase and givenness marking by de-accentuation was not found in the monolingual Turkish data. Turkish solely de-accents post-focal constituents in order to mark IS. Hence, monolingual Turkish does not dispose of explicit concepts to distinguish between focus and givenness. Both concepts are subsumed under one single category.

In the visual analyses of the *f0* contours and also in the additional phonetic analyses of the bilingual yes/no questions, pitch increase on focused constituents was observed as a further correlate to IS marking in bilingual Turkish. Pitch increase is systematically used by the bilinguals of experiment 2 meeting expectation (ii). Despite some individual differences the mean maximum *f0* values across all speakers and target sentences indicates that the mean maximum *f0* for the speakers as a group is higher on focused constituents than on the same constituent in the all-new baseline condition. Differences mainly correspond to the fact that some speakers use pitch increase only in certain focus conditions which is also reflected in the results of the statistical analyses. Pitch increase on focused constituents is significant for two of the three focus conditions. In object focus the object is significantly higher than the object in the all-new baseline ($p < 0.001$/ t 3.569). In verb focus the verb is also significantly higher than the verb in the all-new baseline ($p < 0.001$/ t -2.467). In subject focus on the other side, no significant pitch increase was observed in the data of this study.

As previously described, pitch increase is a crucial prosodic feature in the marking of focused constituents in German, where it is more relevant for verb focus and for object focus, but less for subject focus. Féry & Kügler (2008) suggest that this discrepancy is a positional effect, since the subject usually is situated in an initial position due to German word order. To this effect, the subject is already associated with the highest pitch due to processes of downstep and declination in German intonation as described in chapter V.

Though downstep has not yet been thoroughly investigated for Turkish most of the studies (e.g. Kan 2009, Kamali 2011, Güneș 2013) assume that Turkish has no systematic downstep pattern. The only study that assumes downstep in Turkish was conducted by İpek & Jun (2012) with Turkish speakers in the USA. As described in chapter III, the observed downstep pattern in this study may well be related to a possible influence of L2 English, where downstep is a crucial feature of intonation (e.g. Liberman & Pierrehumbert 1984). With respect to the systematic observation of pitch increase on focused constituents in experiment 2, in contrast to a lowering of subsequent pitch accents in the all-new conditions, it stands to reason that the bilingual Turkish speakers of the present experiment also use downstep in their realization of Turkish sentences. While the results of experiment 2 allow some preliminary conclusions on the role of downstep in bilingual Turkish, further research with a dedicated target sentence design and phonetic analyses of max*f0* should be conducted to verify the findings outlined below.

The use of pitch increase in object and verb focus but not in subject focus in bilingual Turkish is a strong indicator of functionally-driven transfer from German L2 into Turkish L1. Within the assumptions of markedness theory the transfer of pitch increase to mark a focused constituent into a language which does not use the respective feature to mark focus is surprising though. Pitch increase (similar to PFD, as described above), is a marked prosodic feature and hence assumed to not pass via language contact. Furthermore, and in contrast to PFD, pitch increase is a feature which is only present in one of the languages of Turkish-German bilinguals, namely in German. As outlined with respect to PFD, markedness theory presumes a likeliness of use of marked features in contact languages in contact situations where both involved languages dispose of the respective feature. A loss of a marked feature is predicted when both languages differ with respect to the use of the feature. Especially functional prosody, such as the prosodic marking of a focused constituent, has been reported to cause difficulties in language contact (e.g. Zerbian 2015, Mennen 2015). Yet, the observation of functional related prosody is documented in the results of experiment 2. The observation of pitch increase in bilingual Turkish shows that theoretical structural limitations arising from markedness considerations are in practice overridden by functional aspects.

As stated in the expectations previous to the conduction of experiment 2, I assume that the transfer of marked prosodic features from L2 to L1 is related to processes of functionally-driven choices. Within a process of bilingual speech optimization a mapping is established between different language inherent areas such as pragmatics and prosody and also between the different languages of a bilingual. Following Paradis' (1993) Activation Threshold Hypothesis (ATH) and Grosjeans' (2012) assumptions of language mode, German L2 should be activated in inter-bilingual Turkish conversations facilitating the transfer of prosodic features.

Given that bilinguals process pragmatic concepts in one common conceptualizer, bilingual German-Turkish speakers have implicit knowledge of distinct categories for focus and givenness. By that means the pragmatic "world" of bilingual Turkish speakers differs from that of monolingual speakers.

To this effect a formal distinction between focus and givenness is a categorical requirement in the German-Turkish-bilingual variety. To fulfill this requirement a mapping of pragmatic category and formal correspondancy is not successful within the Turkish language subsystem. A mapping with the German subsystem is. By that means, the non-success of L1 mapping results in the activation of a successful mapping with L2 and inhibitory process which serve to draw demarcation lines between both languages are blocked. The use of pitch increase in bilingual Turkish is an indicator for the ability of bilinguals to make use of the complete phonetic and phonological inventory represented in the bilingual`s mind as proposed by Matras (2007, 2010). The possibility of interaction allows merged features to arise in bilingual speech which may indicate a development towards a convergence of both languages. The observation of merged features and convergence is well documented already for segmental phonology (e.g. Flege, Schirru & McKay 2004) and also in studies on supra-segmental phonology which show that prosodic cues from both languages are used in the bilingual variety with the same pragmatic meaning (e.g. Queen 2001, 2006) .

One could say that due to the ability of interaction, bilinguals select the most promising output in order to contextualize a given message on the base of both languages optimizing over the full set of linguistic devices at hand. From a neurolinguistics point of view one could describe the same incidence as a process of neuron activation. Once a pragmatic concept is activated neural impulses are spread out and need to go to a target. If they do not find an adequate receptor in L1 gates are open for L2. Literally spoken one could compare the process to the bio-chemical process found in the semi-permeable membrane in the mitochondrians. Only in restricted cases the demarcation line represented by the inhibitory processes gets the right amount of neural impulses to allow exchange between L1 and L2.

For in-situ IS marking monolingual Turkish speakers can solely resort to PFD as shown in experiment 1. A cue to explicitly indicate a focused element is not available from monolingual Turkish. However; the pragmatic distinction between different IS categories are part of the implicit linguistic knowledge of German-Turkish bilinguals and needs to be performed on the surface. Based on activation processes bilinguals can rely on the corresponding prosodic feature used in their German L2. To this effect, the use of pitch increase in bilingual Turkish is motivated by the functional aspect of fufilling a pragmatic concept which is part of the implicit pragmatic knowledge of bilingual speakers, but not common to monolingual Turkish.

The transfer of pitch increase from L2 German into L1 Turkish contributes to a semantic-pragmatic specification of the meaning of the sentence. It is used to indicate a pragmatic meaning by prosodic cues to which monolingual Turkish has no correspondence. The functionally-driven transfer furthermore represents a process of bilingual language optimization since it facilitates the contextualization of pragmatic specification based on the use of the full linguistic repertoire at hand.

To this effect, the choice in using linguistic features is not based on language. It is based on accomplishing a communicative goal. Working on the pragmatic-prosodic interface, pitch increase is likely to be transferred from German to bilingual Turkish within a functionally-driven approach of contact induced languge change although structurally-driven approaches would predict the opposite due to the markedness of the feature. In order to optimize the understanding of a given message contribution is paid to a pragmatic concept which soley by the structural shape of its correspondancy would get lost according to markedness theory resulting in pragmatic gap.

The observation of pitch increase in bilingual Turkish and its interpretation as functionally motivated language change is furthermore supported by Thomason & Kaufman's (1998) claim that anything in a language can change if the necessary social conditions are in place and the contact situation lasts long enough. Thus the transfer of even marked prosodic features is facilitated within the German-Turkish speech community which has established an intense contact and high degree of bilingualism. Thomason (2001) also suggests that linguistic factors are easily overridden. She states that typological distance between two languages indeed affect the likelihood of the transferred structure, i.e. the more similar the systems, the easier a feature diffuses from one language to another, but if the contact between both languages is intense enough any feature can be transferred, no matter how different the contact languages are from a typological distance. By that means a transfer of pitch increase motivated by the intense contact between Turkish and German in Germany can also be described within neurolinguistics approaches. Intense contact strengthens a low activation level and high interaction between both languages in the sense of Paradis (1993) and Grosjean (1999). With respect to the situation of intense contact between both languages based on a highly developed bilingualism however, it is not clear if the observed transfer of pitch increase from L2 into L1 is restricted to the conversation between bilingual German-Turkish speakers.[94] Based on Grosjean (2012:13) who distinguishes between a monolingual and a bilingual language mode at the far ends of a continuum of bilingual communication, *it makes little sense to bring in the other language overtly if the interlocutor does not know it*. According to this view the observed transfer would not be present in conversations between bilingual and monolingual speakers of Turkish since the use of pitch increase would not support to the better contextualization of a certain message. The monolingual speaker cannot interpret the prosodic marking of the pragmatic meaning since its Turkish variety does not implement pitch increase to mark focus. However, I assume that a distinction has to be made with respect to implicit linguistic and paragmatic knowledge and explicit knowledge. Other than in lexical code-switching implicit pragmatic knowledge is part of the precudal memory and

[94] I suppose that a stable bilingual speech community does not necessarily require more than 2 speakers. The crucial requirement for a stable speech community is the shared linguistic knowledge of the participants of a conversation or speech act. I assume that a stable bilingual community can e.g. also be build up by siblings or friends with the same linguistic background knowledge.

cannot be explicitly or consciously driven like the knowledge of the declarative memory system. Usually pragmatic concepts are processed automatically and without conscious participation lexical knowledge on the other side is explicit knowledge which is consciously controllable. The distinction between language modes according to situation and interlocutor is therefore most probably not adoptable to implicit pragmatic competence. A highly developed bilingualism as in the German-Turkish contact situation leads to the emergence of diverging implicit pragmatic knowledge between mono-and bilingual speakers paying contribution to the different language and cultural specific background of both groups. To this effect it is probable that the observed feature of pitch increase to mark focus in a mutual bilingual conversation is also found in a bilingual-monolingual conversation contributing to the identification of the speaker as bilingual due to his “exaggerated” use of prosody. There are many reports that monolingual speakers in Turkey easily identify German- Turkish speakers by their different sound. However, this is only speculative since a monolingual-bilingual communication situation is not included in the present thesis and no perception test have been conducted either.

VI.5.4 PRE-FOCAL COMPRESSION

In addition to the observation of PFD and pitch increase in bilingual Turkish a further prosodic feature was observed in the bilingual analyses at the prosodic-pragmatic interface: pre-focal compression, complying with expectation (iii). The previous cross-linguistic comparison of German and Turkish though revealed that pre-focal compression is used as a correlate to IS only in German. However, pre-focal compression was observed in Göksel et al. (2009) and claimed a prosodic feature to mark sentence type in monolingual Turkish. For the monolingual speakers of experiment 1 on the other side pre-focal compression is not a relevant feature to mark sentence type, nor IS. The divergent results are probably related to dialectal variation within Turkish. Still, it was stated that given that pre-focal compression is a prosodic feature at all in monolingual Turkish its use is more probably a reflection of IS than sentence type.

In contrast to the monolingual speakers of experiment 1, the bilingual speakers of experiment 2 used pre-focal compression within the same experimental design with the same target sentences. The analyses show a significant difference in the *f0* implementation on the subject in the all-new condition and the object focus condition. The subject is significantly lower in object focus than in all-new sentences (t -2.239/ p 0.0258). The results for pre-focal compression in verb focus furthermore show a highly significant lowering: (t -4.009/ p <0.001) for the object and (t -3.551/ p <0.001) for the subject.

I assume that two different strategies may explain the use of pre-focal compression by bilingual speakers. First, (i) the use of the feature in the bilingual variety may reflect complex dynamics which gain direction through language contact. Second, (ii) the use of pre-focal compression in bilingual Turkish may also reflect a transfer from L2 German which uses the feature in relation with IS as previously described for pitch increase.

With respect to (i) the interpretation of a linguistic change as a contact induced phenomenon is difficult when an observed change could also happen through language internally-motivated changes. Thomason & Kaufman (1988) argue that language contact may also reinforce language internal tendencies. Accordingly, Schroeder (2007) proposes that linguistic changes in contact varieties may be the result of a reinforcement of features that already exist in the source language, but lack conventionalization. With respect to the Turkish orthography of German-Turkish bilinguals Schroeder (2007) observes that the orthographic system shows some tendencies in developing towards the direction of the German orthographic system. This developmental direction occurs with respect to features which show variation in the orthographic system of monolingual Turkish. Schroeder observes that differences in practice in the Turkish in Germany emerge in cases where norms are not firmly established or new conventions are able to emerge, due to the distance to Turkey. The impact of the contact language is that it offers orientation to those cases in the Turkish practice which vary. He supposes that differences may take the form of a stronger generalization for devices that are also found in Turkey Turkish. Accordingly, Poplack & Levi (2010) state that much of the evidence brought to light as a phenomenon of contact induced language change fails to demonstrate that it is the product of contact and not internal evolution. The increased use of features which are already present in the first language is interpreted as the extension of an existing option through language contact. This assumption is encouraged by numerous studies that show that bilingual varieties gain direction in language contact situations. In a study with Spanish-English bilinguals Torobio (2004) e.g. reports an overt use of subject pronouns. Although Spanish is a pro-drop language, the use of subject pronouns is not ungrammatical. Torobio interprets this overuse as a reflection of the influence of English, a non-pro-drop language. For bilingual Turkish Backus (2005) also reports an increase of overt pronouns among Dutch-Turkish speakers. Doğruöz & Backus (2009) furthermore find some evidence for unconventional structures used in the Turkish variety spoken in the Netherlands which also exist in the non-contact variety although they are usually interpreted as evidence for contact induced language change. They argue that contact may accelerate inclinations for a change which is already occurring in a language. I assume that the impact of the contact language can also serve to give direction in the use of prosodic features which show variation in the implementation of prosodic features in the target language.

By that means the use of pre-focal compression in experiment 2 possibly resembles a bilingual language development based on contact-induced conventionalization processes. Due to the observation that pre-focal compression in Turkish was only identified by Göksel et al. (2009) but not by the results of experiment 1, language internal variation in monolingual Turkish which possibly lacks conventionalization is observed. Still, the concrete pragmatic function of pre-focal compression remains unclear. It is quite possible that the speaker groups of both studies reflect prosodic conventions of different dialects. Turkish dialects are unfortunately not well researched up today.[95]The Turkish in Germany is more likely a leveled system with respect to different regional dialects of Turkish. Turkish people in Germany originate from various areas in Turkey which leads to the development of a leveled variety in Germany. Considering that the variety of Turkish in Germany is based on different Turkish dialects which show differences with respect to the use of pre-focal compression, the use of pre-focal compression in monolingual German can give orientation towards the implementation of the feature in bilingual Turkish in Germany. Yet, conventionalization should only be promoted if the formal feature is related to the same pragmatic meaning in both languages involved.

With respect to the orthographic system Schroeder (2007), as mentioned above, assumes different factors which motivate orthographic divergences between Turkish in Turkey and Germany. He suggests that the Turkish norms and conventions of orthographic practice which have emerged in Turkey have weaker impact on the written language in the diaspora which is also enhanced through the integration of German words which enlarges the functional domain of certain orthographic conventions.

The results of the present experiment showing that pre-focal compression is used in bilingual Turkish in Germany motivate the claim that the assumptions made for the orthographic system can also be used with respect to the development of norms in the prosodic system. Since Turkish in Germany is basically an oral variety, the impact of Turkish prosody as conventionalized in the monolingual varieties spoken in Turkey may be weaker in the diaspora. Also the impact of conventions of prosodic practice which have emerged in different varieties of Turkish may have weaker impact in Germany. With respect to the weaker impact of prosodic norms and conventions of monolingual varieties of Turkish the close contact to German may lead to convergences of the Turkish prosodic system with the German system. Furthermore, the integration of German words may enlarge the functional domain of certain prosodic conventions as well. In addition to the assumptions of Schroeder adapted

[95] Apparently there is not only a lack of research with respect to dialects in Turkey but also with respect to the awareness of dialects. A little anecdote from my field studies in Turkey: Before doing my recordings with monolingual speakers in Izmir I went to a linguistic conference in Ankara. While talking to a group of Turkish linguists I asked them if I could expect a different dialect down there in Izmir. This was negated by telling me that there are no real dialects of Turkish. I was critique about that answer asking again if the people in Izmir really talk the same way like the people in Ankara. The answer was: "No, no. They talk different than the people in Ankara.

to the development of the bilingual Turkish prosodic system, I moreover suppose that the high level of activation of German prosodic features promotes the integration of shared features into the prosodic system of bilingual Turkish. As outlined above, prosodic features are highly used to mark pragmatic meanings in monolingual German. Since the bilingual speakers of this study have a high level of use of German its prosodic features are highly used as well resulting in a very low activation threshold in general which may motivate the implementation of prosodic features in the contact variety. Since the pragmatic concept of prefocal givenness is part of the implicit pragmatic knowledge of bilingual speakers it needs to be given a form. This form is either provided by L1 or if the mapping is without success by the L2 to which a low activation threshold contributes.

The same probably applies to the development in the orthographic system. Since Turkish is mainly an oral language in Germany and less used in writing when compared to the frequency of use and activation of the German orthographic system, it is not surprising that tendencies that are already found in the monolingual orthographic system gain orientation in the bilingual system due to the frequency of use of German and the need to complete with concepts.

However, what remains unclear at this point with respect to the use of pre-focal compression in bilingual Turkish is the pragmatic function of pre-focal compression in the bilingual variety. The data of experiment 1 support a correlation of the feature neither to sentence type, as stated by Göksel et al. (2009) nor to IS since the monolingual speakers do not use pre-focal compression at all. Göksel et al.'s (2009) interpretation of pre-focal compression as a prosodic correlate to sentence type raises the feature to an exceptional status from a cross-linguistic perspective. If prosodic marking is used at all in languages to mark sentence type it usually occurs towards the end of an utterance. The quality of the final boundary tone is the most commonly observed feature across languages to mark sentence type prosodically. From a cross-linguistic perspective, prosodic sentence type marking at the beginning as stated by Göksel et al. (2009) is rather unusual and not observed in any other prosodic system across the world's better studied languages. To the contrary, pre-focal compression is a typical prosodic feature to mark IS which is observed in many languages that use intonation to mark IS. Apart from German the use of pre-focal compression to mark pre-focal given elements is also documented for English and Dutch (Gussenhoven 1993b, 1994) or Portuguese (Frota 2000).

Cross-linguistic observations encourage me to conclude that pre-focal compression as observed for Turkish by Göksel et al. (2009) is the prosodic expression of IS rather than representing a cross-linguistic exceptional case of pragmatic sentence type marking. However, the observation of pre-focal compression in Turkish remains reduced to interrogatives. Experiment 1 of the present dissertation cannot contribute to this question since it does not investigate the prosodic structure of declaratives but yes/no questions. As a consequence, the role of pre-focal compression in monolingual Turkish remains unidentified at this moment as well as its meaning in bilingual Turkish.

To identify the true meaning of pre-focal compression in monolingual and bilingual Turkish further studies have to be conducted, first of all perception studies.

The same uncertainty leaves room for the interpretation of the emergence of pre-focal compression in bilingual Turkish as proposed in (ii) which does not necessarily erase the argumentation that the impact of German provides orientation for the establishment of pre-focal compression. Considering solely the results of experiment 1 as a baseline for comparison and fading out the uncertain correlation of pre-focal compression and sentence type marking, pre-focal compression could be seen as an indicator of transfer from L2 into L1. As argued above especially in subchapter III.4 on the prosodic correlates of IS in German, pre-focal compression is a feature which is typically observed in German sentences to mark pre-focally given constituents prosodically. Since prosody in German is a highly active feature and bilingual Turkish speakers show a high level of use of German the interaction between both systems is very likely from a cognitive perspective. Interaction motivates a functionally-driven transfer of the prosodic feature from L2 German into the Turkish variety of German-Turkish bilinguals in order to optimize the contextualization of the pragmatic meaning connected to the feature which lacks a correspondence in monolingual Turkish. As previously described for pitch increase a low activation threshold of German and the high level of use of prosodic features, the primarily oral character of Turkish in German and the weaker impact of monolingual oral Turkish do not only contribute to a process that provides direction in internal language development of already existing categories, but also contribute to the rise up of transfer processes. Based on Matras (2007, 2010) bilingual speakers of the German-Turkish speech community can access to the full repertoire of linguistic features of both languages when contextualizing a certain message. Similar to pitch increase, I assume that the use of pre-focal compression in bilingual Turkish is a result of the interaction of the complete phonetic and phonological inventory available to a bilingual. To contextualize a pragmatic meaning a mapping between pragmatics and the available linguistic features to mark the pragmatic feature in the linguistic output is performed. Since pitch increase and pre-focal compression are highly relevant features in the prosodic marking of IS in German on the one side and Turkish lacks of corresponding prosodic features to mark pre-focal and focal constituents in Turkish, the bilingual can access the prosodic features at hand in German and transfer them to bilingual Turkish since the whole speaker community has access to the same set of features across both languages. By that means, a pragmatic concept which is part of the implicit pragmatic competence of bilinguals is realized by optimizing over the whole repertoire of structural devices. A mental comparison between both languages resulting in the use of features from one language in the other carrying the same meaning is also assumed in Heine & Kuteva (2003, 2005). Furthermore, they propose that the grammaticalization of a transferred feature is more likely in situations of collective bilingualism. A mapping at the pragmatic prosodic interface between two languages by means of generating an optimized output based on functionally-driven choices is successful for speakers of the same bilingual group but does not necessarily contribute to conversations with monolingual speakers. Neither pitch increase nor pre-focal compression would contribute any benefit to conversations with monolinguals nor would they fill any shared pragmatic concept successfully since these features on the pragmatic and formal side lack a correspondancy in monolingual Turkish. As for pitch increase to explicitly mark focus as an independent category, I expect that pre-focal compression as a specification of givenness can be found in converstaions of bilingual Turkish speakers with monolingual speakers as well. The concept is part of the implicit knowledge of bilinguals and its use can most probably not be influenced consciously according to the interlocutor like the use of lexical items. The use of the prosodic feature would most probably contribute to the identification of the speaker as bilingual from Germany.

Considering a grammaticalization of the observed features in bilingual Turkish furthermore relates to the question if it is only the pragmatic concept which is internalized into implicit knowledge or if the formal feature itself has found entry into the language variety which would cause fast and effortless processing. If the formal feature is not integrated yet into the phonological subsystem of bilingual Turkish processing needs to make detour from successless L1 mapping to L2 activation which causes more cognitive effort. Grammaticalization on the other side requires a a situation where bilinguals already acquire the changed structure and lose the ability to access the original and unmodified variety of their so called heritage language. In the framework of attrition as outlined in chapter IV, the grammaticalization of the observed feature in bilingual Turkish would be considered a permanent loss of a feature. However, the use of the term “loss” does not appear adequate in a situation where new devices are integrated into a bilingual variety for which the monolingual variety has no means. In any event, the status of grammaticalization of the prosodic features to indicate IS in bilingual Turkish has to be left open. It is unclear whether the systematic use of the observed features indicates that the Turkish variety spoken in Germany has already reached a state where the change is completed and permanent. The conduction of a replica study considering the same bilingual group in a monolingual language mode as well as time-related processing studies are necessary to draw reliable conclusions. In bilingual conversations on the other side the transfer of pre-focal compression doubtlessly contributes to the successful contextualization of a pragmatic meaning paying contribution to different pragmatic implicit knowledge promoting a functional motivation in contact induced language change.

In the end, the argumentation with respect to pre-focal compression as a transferred feature still is not fully satisfying with respect to the function of pre-focal compression, since the status of pre-focal compression in monolingual Turkish remains unclear. The concrete pragmatic-prosodic interface meaning needs to be studied by future perception tests in order to distinguish whether the feature is used to prosodically mark pre-focal constituents as in German or if it is related to sentence type marking as proposed by Göksel et al. (2009) for monolingual Turkish. Even so, the two possible interpretations of pre-focal compression in bilingual Turkish, either as a feature which has gained direction through the language contact or as a feature which is transferred from L2 to L1, support the idea of functionally-driven choices, since both contribute to fulfill a pragmatic concept existing in the implicit pragmatic knowledge of bilinguals.

A structurally-oriented approach cannot explain the motivation of use of pre-focal compression in bilingual speech. On the contrary, markedness theoretic assumption would predict the loss of the marked features even in German L2 from which they are transferred. The approach provided here on the other side motivates the use of marked features with their functional contribution to bilingual communication where they are interpreted as optimizers.[96]

VI.5.5 FINAL BOUNDARY TONE IMPLEMENTATION

Apart from the analyses of prosodic features indicating IS in bilingual Turkish, the phonological analyses also included the distribution of final boundary tones in bilingual Turkish yes/no questions as a correlate of sentence type. The literature review in chapter II brought to light that yes/no questions in monolingual Turkish are usually realized with a low terminal intonation contour though a high final boundary tone is optionally observed for some structurally marked questions (e.g. Kawaguchi et al. 2006, Kamali & Büring 2011). Corroborating these observations, the results of Experiment 1 confirmed that the monolingual Turkish speakers systematically use a low boundary tone (L%) at the end of in-situ focused yes/no questions of this study. By that means a high boundary tone is not a prosodic correlate of yes/no questions in monolingual Turkish.

A literature review concerning the prosodic realization of yes/no questions in German on the other side showed that German systematically implements a high final boundary tone at the IP-final syllable of unmarked yes/no questions. This observation was furthermore confirmed by the results of an additional experiment with monolingual German speakers outlined in chapter V.6.

The results of experiment 2 conducted with the German-Turkish bilingual group revealed that this group makes systematic use of a low final boundary tone in bilingual yes/no questions corresponding

[96] The observation of pitch increase, and pre-focal compression in bilingual Turkish however presupposes that the features are also used in the L2 German of the respective speakers from which they depart. The presupposition is furthermore confirmed by further studies with the respective speaker group concerning the prosodic focus marking in German within the SFB 632 located at the University of Potsdam. The same speaker group also uses pitch increase, prefocal compression, and deaccentuation in declaratives and yes/no questions in their German L2. Due to the limitations of the present thesis the results of the further experiments are not outlined here and hopefully published in the future.

to the realization of monolingual Turkish speakers. By that means also the previous expectation (iv) is fully met. In 92% of all yes/no questions bilingual speakers use a low final boundary tone at the end of the IP.

Although monolingual German disposes of a prosodic feature to indicate a pragmatic meaning for which monolingual Turkish has no correspondence, this pragmatic concept is not realized by means of a functionally-driven transfer of the prosodic feature. Although the feature is available in the German-Turkish contact situation the high final boundary tone (H%) which functions as a cue for sentence type distinction, is not transferred from L2 German to bilingual Turkish. While the transfer of prosodic features to mark IS was successfully observed in experiment 2, a transfer of the feature indicating the pragmatic meaning of sentence type, which would be useful in the delimitation to alternative meanings, is not found. Although the transfer could provide a contribution in the contextualization of the target sentences as yes/no questions in analogy to the contribution of prosodic cues to contextualize IS it is not used. The reason for this lack of transfer however is simple from a functional perspective: there is no unrealized pragmatic concept.

As outlined above, the transfer of a feature is motivated by its contribution to the contextualization of a pragmatic concept which is part of the implicit pragmatic knowledge of bilingual Turkish speakers but not of monolingual speakers and therefore a functional choice based in the bilingual mind-set. To justify the activation and implementation of a prosodic feature which is not used in the monolingual variety, the same variety must show a lack of a corresponding formal feature and the pragmatic concept behind it. In the case of sentence type marking, however Turkish disposes of both; the pragmatic concept and the corresponding feature. Yet the feature is not prosodic in nature but morpho-syntactic. In contrast to the marking of pre-focal givenness by pre-focal compression and the marking of focus by pitch increase for which Turkish cannot contribute a tool in the mapping process, it can contribute the morphological marker –mI to indicate the yes/no question-type.[97] By that means, sentence type is already sufficiently indicated and a transfer of a prosodic feature would only result in a redundant double marking. Redundancy would not correspond to a supposed optimization of bilingual speech based on the interaction of both languages. Accordingly, the supposed process of optimization does not only motivate transfer, it also sets limits to transfer and linguistic changes. If a pragmatic concept is already marked by linguistic features in the target language a transfer of a feature from another language is not necessary to optimize the success of contextualization.

In the concrete case of Turkish yes/no questions a morphological question marker which is used in all target sentences already contributes to the contextualization of the utterance as an interrogative. A

[97] Note that the Q-particle is primarily a morphological marker to indicate sentence type. It usually attaches to the focused constituent of a sentence but does not necessarily mark a constituent as focus since it is also free to occur non-adjacent to the focused constituent (cf. Kamali & Büring 2011)

further marking by means of prosodic features is avoided based on an understanding of speech as an economical system.

The reverse strategy of sentence type marking which also indicates the restrictiveness and efficiency of bilingual communication optimization based on functional choices has been observed for the contact variety of Turkish in Cyprus by a study of Ímer & Çelebi (2006). Instead of using the morphological question marker to indicate a yes/no question as in monolingual Turkish, Cypriot bilinguals use a different intonation to indicate a question in the Cypriot variety of Turkish. In statements bilinguals use a low boundary tone at the end of a sentence just as in Standard Turkish. In yes/no questions in contrast, they use a rising intonation towards the end of a sentence, whereas in Standard Turkish a low tone is used at the end of both sentence types. The result of the changing intonation in the bilingual variety is interpreted as a phenomenon of language contact by Ímer & Çelebi (2006), since Greek also uses a rising terminal intonation contour to indicate a yes/no question.

By that means, the results of Ímer & Çelebi`s (2006) study provide further support for the concept of optimization in bilingual speech as changes are limited. In the Cypriot variety as well as in the German variety of bilingual Turkish yes/no questions are indicated with respect to their pragmatic meaning solely by a single linguistic device: either prosody or morphology. A double marking would not represent a case of optimization since it would be redundant with respect to the contextualization of its pragmatic content. However, the diverging use of the linguistic devices to mark yes/no questions in both contact varieties is interesting. Whereas in the Cypriot contact variety the use of morphological marking is avoided in favor of a phonological marking, in the German contact variety the morphological marking is maintained and the use of prosody is not transferred from L2. The reason that two different strategies emerge in two similar contact situations is probably related to the design of the elicitation method. Although both contact languages, Greek and German, dispose of a prosodic feature to mark sentence type, namely a high final boundary tone, both contact varieties show a different structural development in the contact situation which is probably influenced by differences in the elicitation method. In the present study target sentences are provided to the speakers via a context-question pair. The pre-assembled yes/no questions already contain the morphological marker thus the choice between a morphological or prosodic marking for sentence type is limited for the Turkish-German bilinguals. In the Greek dialect on the other side participants were free to choose the linguistic device to mark sentence type own their own. To this effect, it is still assumable that bilingual Turkish-German speakers would prefer the option of prosodic marking over the morphological marking in free conversations. Moreover, it is even assumable that the preference of a high boundary tone is favored over the use of the morphological device since Turkish in Germany is a primarily oral language and prosody is highly activated in the contact language, just as in Greek and the Cypriot variety of Turkish. With respect to the elicitation method in the study of Ímer & Çelebi (2006) no concrete details are provided but it seems that the examples in their study hail from a data base of semi-spontaneous speech recorded by Çelebi (2002). The use of prosody and the rejection of the morphological marking may reflect a tendency to prefer prosodic devices over morphological devices in primarily spoken varieties when speakers generate an optimized output. It seems that within the mapping process between languages, pragmatic meaning and linguistic devices a preference is given to the contextualization of pragmatic concepts via prosodic devices in bilingual Turkish in Greece just as outlined for the contextualization of IS in bilingual Turkish in Germany. The substitution of a genuine morphological marker in favour of a transfer of a functional prosodic feature in bilingual Greek- Turkish moreover is more than surprising within a markedness approach. The structurally-driven approache claims that functional prosody causes difficulties in bilingual language acquisition and assumes that marked prosodic features rather get lost through language contact. Here it even substitutes an existing feature.

Despite the different marking strategies, both contact varieties mirror the considerations that have been made previously with respect to the use of pitch increase and pre-focal compression in bilingual Turkish: Bilinguals can access to their full linguistic repertoire and chose the optimal feature for the contextualization of a certain pragmatic meaning in a bilingual context in order to fulfill pragmatic concepts. Within this process a mapping between pragmatics and the available linguistic features to mark the pragmatic feature in the linguistic output is performed in which both languages of a bilingual are involved and redundancies are avoided.

VI.5.6 FUNCTIONALLY-DRIVEN CHANGES IN L1

The previously discussed observations of pitch increase on focused constituents, pre-focal and post-focal compression, and the implementation of a low final boundary tone in the phonetic and phonologic analyses of experiment 2 support the idea of functionally motivated processes of bilingual language change. The observed transfer of marked prosodic features, their maintenance and also the lack of transfer cannot be explained in a satisfying way considering only the structure of the observed features. In contrast, all observed features can be attributed to functionally-driven choices leading to optimized communication success based on the repertoire of two languages.

Pitch increase is a phonological feature to indicate the explicit pragmatic category of focus in monolingual German and bilingual Turkish. In monolingual Turkish on the other side the explicit categorical distinction between prefocal givenness, focus and post-focal givenness is not present. In monolingual Turkish a single category is used to give expression to focus/ giveness marking. Different pragmatic concepts are not uncommon across languages since they are language and culture specific. To this effect also pragmatic concepts of bilinguals are specific to their bilingual culture. Based on the Subsystem Hypothesis (Paradis 2004) Turkish bilinguals should have implicit knowledge about the explicit categories of focus and givenness independent of the language they speak at a certain moment since pragmatic concepts are processed in the conceptualizer which works independent of the linguistic system and is shared by both language subsystems of a bilingual speaker. The linguistic system comprising what is traditionally called grammar (phonology, morphology, syntax) works language dependent for which bilinguals process pragmatic concepts in one common conceptualizer, the formal features yet in the languae specific grammar. Both systems are needed for the successful processing of utterances. Once a bilingual speaker starts verbal communication explicit pragmatic categories to structure information are recalled and need to be given form. Given that communication in Turkish L1 is required a mapping between pragmatic category and linguistic device is not successful, since L1 Turkish does not posess of the category and/or an adequate formal correspondancy. To this effect the inhibition mechanisms of L2 are blocked facilitating the activation of L2 German where a mapping between pragmatic category and formal device is successful promoted even more through the low activation threshold of the corresponding features in L2. I call this process functionally-driven since it is promoted by the requirement to give form to a pragmatic concept which differs from that of a monolingual mind-set paying contribution to a bilingual culture and classification of the linguistic world. Pitch increase is a feature which is not used in monolingual Turkish but in bilingual Turkish in order to maximize the success of communication dealing with diverging pragmatic concepts.

Pre-focal compression also is a feature which is not used by the monolingual speakers of this study, but by the bilingual speakers. Here the motivation for functionally-driven language change is twofold. Due to contrasting results with respect to the occurance and use of pre-focal compression in monolingual Turkish where it is either not found or found and related to a different meaning its observation in L2 Turkish can either be interpreted as (i) a transfer feature from L2 German or (ii) as an indicator for contact induced conventionalization of a language internal feature. Given that (i) pre-focal compression is not a feature of monolingual Turkish yes/no questions as observed in experiment 1, its observation can be explained by the same process of functionally-driven bilingual language processing as described for the transfer of pitch increase from German L2. Based on the assumption of a common conceptualizer in a bilingual’s mind, German-Turkish bilinguals have implicit pragmatic knowledge of an explicit pragmatic category to contextualize pre-focal given constituents in the structuring of an utterance. Whilst a mapping between pragmatic category and formal correspondancy is not successful within L1, the activation threshold of L2 is lowered facilitating a successful mapping with L2 resulting in the use of the L2 feature in L1. Given that (ii) pre-focal compression is already a feature of L1 as observed in a study by Göksel et al. (2009), but not conventionalized due to the lack of observation of the feature within the monolingual speaker group of experiment 1, the use of pre-focal compression in the bilingual L1 can be contributed to conventionalization processes endorsed by the contact to L2 German. Although further studies are required to ultimately conclude the process at hand, both- conventionalzation and transfer- can be classified as functionally-driven. Both processes are motivated by the need to give form to a pragmatic concept contributing to the fulfillment of structural reqirements settled in the bilingual mind which might by their very nature differ from the monolingual mind-set. To complete with these requiremets the bilingual can make use of its whole linguistic repertoire due to language activation processes which are driven by functional choices.

A third process based on functionally-driven choices was observed in the maintenance of PFD in order to indicate post-focal constituents. PFD is present in both monolingual varieties and the contact variety. The concept of functionally-driven choices includes that the emergence of a pragmatic gap is avoided. Following the idea of bilingual language optimization, an under-specification of a pragmatic meaning in bilingual varieties is avoided which would arise through the loss of PFD.

Furthermore the concept of functionally-driven chices is supported by avoiding redundancy in bilingual speech. Instead of an analog transfer of the German prosodic feature to mark sentence type, namely a high final boundary tone, the bilingual speakers of the data set maintain the original low final boundary tone which is not a sentence type distinctive cue by means of prosody. The transfer of features from one contact language into the other is restricted to its effectiveness by means of fulflling a pragmatic concept. If a pragmatic meaning is already indicated, as by the use of the morphological question marker, the transfer of an additional prosodic cue would not contribute a surplus profit in the contextualization of the pragmatic meaning. A mapping between pragmatic concept and linguistic device is already successful in L1. By that means the activation threshold of L2 is not lowered and no exchange happens.

The observation of the three prosodic cues to IS and the lack of prosodic marking of sentence type in bilingual yes/no questions can all be traced back to their functional contribution in bilingual communication. It clearly shows that a structural modification in the bilingual variety of Turkish only occurs when it contributes to the success of the contextualization of a message. By that means it is based on functionally-driven choices which by means of the results of the present experiments seem to work independent of the structural composition of a transferred feature. Marked prosodic features from L2 are used in the less marked L1. The results of the German-Turkish contact situation demonstrate that we do not need to precede from structure to understand changes in bilingual varieties, but we do need to look behind the feature and preceede from the function of the pragmatic concept behind it. Within the results of experiment 2 sructure is incidental. It is a mere assistant in the transmission of essential concepts which need to be contextualized. They are expression of and contribution to a diverging bilingual mental classification and structuring of verbal communication due to diverging implicit pragmatic knowledge. Considering that pragmatic concepts are shaped by culture and language we have to consider that pragmatic concepts diverge in monolingual and bilingual varieties. The use of different structural features in both varieties is only a surface refection of a different underlying pragmatic reality. To this effect the structural changes observed in bilingual langaue varieties are functionally motivated. To give form to implicit pragmatic knowledge a bilingual speaker can make use of its whole linguistic repertoire by means of activation and inhibiting processes. If L1 mapping remains without success the activation threshold of L2 is lowered and demarcation lines (referring to Matras' terminology) can be crossed. The use of an L2 feature in L1 hence is driven by its functional contribution to successful communication.

VI.6 CONCLUSION

In the preceding analyses and discussion I presented the results of an experimental study designed to examine the distribution and pragmatic meaning of different intonation patterns used to mark IS and sentence type prosodically by means of *f0* in bilingual Turkish yes/no questions.

Theories on bilingual language acquisition and development such as the ones presented in chapter IV (Contrastiveness, Markedness, SLA, and LILt), which explicitly refer to the acquisition of phonetics and phonology, use the difference between languages resulting from a cross-linguistic comparison as the main point of departure for describing and analyzing structural differences between monolingual and bilingual varieties of a language. In order to look for systematic changes in the prosodic system of bilingual Turkish a cross-linguistic comparison between German and Turkish revealed that Turkish uses prosodic cues to mark IS and sentence type by means of *f0* to a much lesser extent than German does. Whereas German uses marked prosodic cues, such as pre-focal compression, post-focal de-accentuation, and pitch increase to mark focus and givenness, Turkish solely uses post-focal de-accentuation as a prosodic correlate to IS. The same picture arises with respect to sentence type marking. Whereas German marks sentence type prosodically, most typically by a high final boundary tone (H%), no prosodic correlates of sentence type marking was found for Turkish yes/no questions. A previous study by Göksel et al. (2009) however observes pre-focal compression in yes/no questions which they interpret as a sentence type marker. From a cross-linguistic perspective this correlation however seems unlikely.

Based on structural approaches of bilingual language change, markedness is a feature which is considered to regularly allow accurate predictions of structural changes in language contact (e.g.

Eckman 1979, Raisier & Hilligsman 2007, Xu, Wang, Chen 2012, Zerbian 2015). Studies have shown that features which are marked, such as the prosodic cues connected to functional related prosody of experiment 2, are not easily transferred in language contact and most probably cause difficulties in the acquisition or loss in the source language. By that means, from a markedness-based point of view, the marked prosodic features identified in German L2 should not be transferred to the L1 of bilingual Turkish speakers.

The observations made in the bilingual Turkish variety in the present study contrast with these theories. All four previously established hypotheses with respect to emerging structural differences in the bilingual variety in contrast to the monolingual variety were confirmed by the results of experiment 2. Bilingual speakers make use of prosodic features to indicate IS to a bigger extent than monolingual speakers of Turkish. To this effect bilinguals distinguish between explicit pragmatic categories for focus, pre-focal geivenness, and post-focal givenness. A classification which is not found in monolingual Turkish. Whereas all three prosodic features used to indicate IS in German (pre-focal compression, pitch increase and post-foccal de-accentuation) are also used in bilingual Turkish, a high final boundary tone to mark sentence type on the other side is not used in bilingual Turkish. In contrast to markedness assumptions, marked features are maintained or transferred from L2 German into L1 Turkish. The observed changes in bilingual Turkish reveal that despite the structural impact in addition to extra-linguistic and individual factors, the use of marked features is triggered by a functional motivation. A functionally-driven perspective on language change provides a promising alternative for describing the use of structures in bilingual varieties where markedness-based theories have no sufficient explanation for the direction of bilingual language development.

Based on cognitive approaches that assume that bilinguals have access to their full linguistic repertoire, since their linguistic systems are not two separate entities but stored in one common place, interaction between both languages is possible. Given the possibility of interaction, bilinguals can generate an output which solely relies on functional choices and is not language specific. The use of structurally marked features in bilingual Turkish indicates that bilinguals can source the linguistic means that are available from the second language to contextualize or specify on a pragmatic meaning for which the other language does not dispose of a linguistic device in order to fulfill a pragmatic concept which is moreover not present in L1. To this effect, the interaction between both languages enables a process of bilingual speech optimization. Functionally-driven choices permit the speaker to maximize the successful contextualization of pragmatic meanings which are indispensable present in a bilingual mind-set and to this effect differ from the mind-set of monolingual speakers. Similar to what has been outlined with respect to the notions of information structure where the strategy of information packaging is considered a functional tool to optimize the entry of data into the interlocutor's knowledge store, the contextualization of pragmatic meanings by means of using linguistic devices of both languages including the transfer of marked prosodic features is a tool to optimize the success of bilingual communication.

In order to maximize the successful contextualization of a message by functionally-driven choices four different mechanisms of bilingual language development have been observed in experiment 2:

(i) In order to fulfill pragmatic concepts, features can be transferred from one language to the other including structurally marked features.

(ii) In order to avoid the rise of pragmatic gaps, structurally marked features can also be maintained in language contact.

(iii) Features which are available but not conventionalized gain direction in functionally-driven language development by means of contact induced acceleration processes if the contact language makes use of the same feature in order to precise a pragmatic meaning.

(iv) Redundancy in the marking of pragmatic meaning is avoided. If both languages dispose of different features to contextualize the same pragmatic meaning only one of them is used.

In other words transfer, maintenance, providing direction, and avoiding redundancy are identified as mechanisms of functionally-driven language change in bilingual speech. The observed mechanisms are probably not exhaustive and further studies may observe further indicators of functionally-motivated changes.

In the data analyses of experiment 2, (i) was observed in the use of pitch increase identified as a transferred feature from L2 into L1. The use of pitch increase in bilingual Turkish provides the possibility to deal with a pragmatic concept to which the monolingual variety of Turkish has no correspondancy. As assumed in the Subsystem Theorie (Paradis 2004) bilinguals process pragmatic competence in a common language independent conceptualizer. To this effect the implicit pragmatic knowledge undispensably differs in mono-and bilingual speakers. In German the pragmatic category of focus structurally brought to the surface by pitch increase is a highly active feature. Turkish on the other side does not explicitly distinguish between separate categories for focus and givenness. Both are simoultaniously indicated by PFD. Based on the accessibility of the full linguistic repertoire enabled through neural impulses stimulating the activation and/or inhibition of both languages a mapping process is initiated and driven by functional choices. If a mapping between a bilingual pragmatic concept and the formal repertoire of the Turkish L1 remains without success, as in the case of explicit focus marking, the activation threshold of the German L2 is lowered and a further mapping between the pragmatic concept and the formal devices at hand is possible and successful. With that the activation of L2 contributes to the successful contextualization of a bilingual pragmatic concept for which it has a functional trigger. A concept needs to be given a form to guarantee the achievement of bilingual communication goals. To this effect the use of pitch increase from German L2 in the Turkish L1 provides a special asset in the German-Turkish context contributing to the contextualization of focus and realising a pragmatic concept of which bilingual's are (unconsciously) aware of based on their diverging cultural and language background. The use of the feature contributes to the contextualization of a pragmatic meaning present in the implicit pragmatic competence of bilinguals but not in monolinguals motivating a systematic structural change in L1.

With respect to mechanism (ii), post-focal de-accentuation was identified as a maintained marked prosodic feature. There is no difference in the use of PFD in German and Turkish apart from the fact that it constitutes the only prosodic correlate to IS in Turkish whereas German disposes of more devices to specify between different categories of IS.

The observation of PFD in bilingual Turkish contributes to Eckman's (1977) MDH and to markedness scales such as proposed by Zerbian (2015). Structurally-based approaches on bilingual acquisition assume that a marked prosodic feature is more likely to occur in a contact variety when both involved languages dispose of the feature. This is confirmed for the german-Turkish contact variety with respect to PFD. Still, the maintenance of PFD also has a functional perspective. PFD contributes to the successful contextualization of a pragmatic meaning in bilingual Turkish as well as in the involved monolingual varieties. A loss of this feature would result in the underspecification of a pragmatic concept and presuppose that the pragmatic concept of givenness itself is lost though existing in both languages. Taken the perspective that bilinguals have the possibility to optimize over their full linguistic repertoire the loss of specification of a pragmatic meaning would not contribute to the maximization of communicative success and not exploit the possibilities and advantages that the interaction between two languages offers. Yet I would not exclude that pragmatic concepts never disappear though within different conditions than in the present contact situation. Since our linguistc and conceptual environment is subject to constant changes, a concept to structure communication may become less and less active over the course of time resulting in less frequent activation and a high activation threshold. However, I assume that this process is not as easy to occure as e.g. lexical items become irrelevant over the course of time. Future generations may not aquire a word for music cassette anymore since the semantic concept behind it becomes irrelevant through dissuse. Information packaging in order to structure verbal communication to successfully meet communicative goals on the other side will still be relevant over the course of time in verbal communication. Lexical items are part of the declarative memory which is much more prone to changes than implicit pragmatic knowledge which is part of the procedural memory system.

The observation of pre-focal compression in the bilingual data of experiment 2 indicate mechanism (iii) of functionally-driven bilingual language change. However, the use of pre-focal compression is not as easily categorized, since it can be identified either as a further process of transfer or as the result of a contact induced acceleration providing direction in language development.

Based on the results of experiment 1 where no pre-focal compression is observed in the realization of monolingual Turkish yes/no questions, the observation of pre-focal compression can be traced back to the influence of L2 German. German uses pre-focal compression in order to contextualize pre-focally given constituents. The use of it in bilingual Turkish indicates its transfer from L2 to L1 in order to fulfill a pragmatic concept for which monolingual Turkish has no explicit correspondency.

On the other side, the literature review revealed that pre-focal compression was identified as a prosodic cue of marking Turkish yes/no questions in a study of Göksel et al. (2009). By that means the observation of pre-focal compression in bilingual Turkish cannot be interpreted exclusively as a transferred feature from L2 German. In addition to a process of transfer, the use of pre-focal compression can also mirror a process of contact-induced change. Features of the contact language provide direction in the development of language internal structures which still lack conventionalization in the monolingual variety. The variation in the observation of pre-focal compression in the monolingual yes/no questions of experiment 1 and the study of Göksel et al. (2009) indicate language internal variation in the prosodic system of monolingual Turkish. Language inherent variation in monolingual Turkish in turn provides background for conventionalization in the contact variety. Within that process the use of pre-focal compression in German functions as an accelerator which indicates the direction of language development. Still, the function of pre-focal compression in monolingual and bilingual yes/no questions remains undiscovered within the results of the present dissertation. The results of the present data analyses cannot contribute a satisfying answer to this question, since the experimental design does not include perception tests. However, cross-linguistic observations of pre-focal compression indicate that pre-focal compression tends to be a prosodic marker of IS rather than a marker of sentence type.

Besides motivating the transfer of features from L2 (pitch increase), encouraging the maintenance of marked features (PFD), and accelerating internal language development (pre-focal compression), mechanism (iv) of functionally-motivated language change was observed with respect to the final boundary tone analyses defining the possibility of transfer. Although prosodic features to mark IS were systematically transferred from L2 to L1 to deal with pragmatic concepts, the prosodic means to mark sentence type, namely a high final boundary tone which is absent in monolingual Turkish, was not observed in the bilingual yes/no questions of experiment 2. This apparent lack of regularity in the transfer of features from one language to the other also becomes obvious considering the varying results of studies on bilingual speech represented in chapter IV. Most bilingual approaches fail in the systematic prediction of structural changes in bilingual varieties. The acquisition of prosodic features, especially with respect to marked structures, have been shown to cause problems in bilingual language acquisition in some studies while in others they have been shown to be successfully acquired. In some cases prosodic structures are transferred from one language to another and in other cases not. The functional perspective taken here offers an approach on bilingual language development that is able to integrate this kind of variation. An approach of bilingual language change based on functionally-driven choices presupposes that the transfer of a feature is preceded by an analysis with respect to its contribution to the contextualization of a pragmatic meaning – does it provide a profit to the bilingual variety? A feature from one contact language is transferred into the other contact language as long as it provides a gain with respect to the successful contextualization of a message in a bilingual context. This requires a preceding lack of pragmatic specification in the respective language. If a pragmatic meaning is already marked by linguistic features in the target language the transfer of a feature is not necessary to indicate the meaning. For Turkish yes/no questions it was shown in experiment 1 that a morphological question marker already contextualizes the interpretation of the utterance as an interrogative. A further marking by means of prosodic features to optimize the successful understanding of the message is not necessary and a double marking is avoided based on an understanding of language as an economical system. The transfer of a high boundary tone from L2 German to mark sentence type would not contribute to the understanding of the message and is therefore redundant. Integrating the observed limitations of transfer in an approach of bilingual speech development by means of their functional contribution to bilingual varieties instead of integrating limitations based on their structure only, permits the incorporation of variation in bilingual varieties. With the ability to incorporate variation which previously seemed arbitrary, the functional perspective introduces more regularity in bilingual language development.

Despite their classification into different categories, the outlined mechanisms of functionally-driven language change in bilingual Turkish indicate a process of convergence. In contrast to what markedness-based approaches would predict, convergence does not develop towards a loss of marked prosodic features. The results of experiment 2 reveal that marked prosodic features are integrated into the less marked language. To this effect, the transferred features bring the contact variety closer to the German prosodic system and indicate a drift towards a typological shift of the prosodic system. This shift may be additionally stimulated through the primarily oral character of Turkish in Germany and the intensity of contact. Turkish speakers have reduced access to oral monolingual Turkish, but an extended input of oral German. Thomason (2001) argues that contact-induced language change is almost inevitable under conditions of intense contact, especially in cases of widespread bilingualism in a speech community. Those social factors can even outweigh linguistic factors in the prediction of the linguistic results of contact. Accordingly, linguistic predictors such as markedness can be outweighed by social factors such as the intensity of contact and high level of bilingualism.

In the case of Turkish in Germany the shift to the much more extensive use of prosody in bilingual Turkish maximizes the successful transmission of pragmatic meanings which are not indicated by means of prosody in monolingual Turkish. The transfer of prosodic features is speech optimizing especially considering the fact that Turkish is a primarily oral variety in German where the use of prosodic cues may be highly functional in order to delimit a proposition from alternative interpretations.

However, there are limitations to the approach of functionally-driven language change. The identification of the four mechanisms of bilingual language development based on functionally-driven choices was possible due to the direct comparison with a monolingual data set. Still, it remains open if the observed features are only used in the communication with bilinguals of the same speech community or if they constitute part of a stable bilingual intonation grammar which is systematically used independent of the interlocutors. Regarding this two main questions are concerned: the status of grammaticalization of the observed features and the language mode which is described here.

In chapter IV it was shown that Grosjean (2001, 2012) proposes that bilinguals possess of a continuum of language modes with a monolingual and a bilingual mode at its far ends which are used depending on the interlocutors. In a conversation with bilinguals the structural outcome differs from the structural outcome of the same bilingual`s language spoken with a monolingual speaker of that same language. Due to the elicitation procedure of experiment 2, I conclude that the reported observations in bilingual Turkish are representatives of a bilingual language mode according to the differentiation of Grosjean (2001, 2012). All persons that were involved in the recording procedure, including the interviewer, were bilingual Turkish-German adults. According to Grosjean (2001, 2012) the observed prosodic features of experiment 2 would most probably not arise in an elicitation procedure where the interviewer is not bilingual but a monolingual Turkish speaker without any knowledge of German. In this regard, Grosjean's (2001, (2012) assumption of different language modes and the theoretical framework of functionally-driven language change only partially overlap with each other. Both presuppose that interaction between both subsystems of a bilingual requires interlocutors with the same language background. The use and interaction of features from both languages is only a contribution in conversations of speakers which share the same bilingual background. Weinreich (1968) already stated that there is hardly any limit to interferences in intra-bilingual communication, whereas in conversations with monolingual speakers, the bilinguals are subject to interlocutory constraints which limit interferences. A mapping at the pragmatic-prosodic interface to indicate IS prosodically is only successful if interlocutors have access to the same languages with the same repertoire to indicate pragmatic meanings. The mechanisms of functionally-driven language change identified in experiment 2 however would not contribute any benefit to conversations with monolingual speakers since they do not share the same bilingual linguistic background which would provide the baseline for interaction and optimization. On the other hand, the use of prosodic features in bilingual speech which have no functional meaning in the monolingual variety would not harm a conversation with monolingual Turkish speakers. They would however and most probably contribute to the identification of the speaker as bilingual. In contrast to the choice of lexical items and in contrast to other phenomena of code-switching and -mixing in bilingual conversations the conscious choice of prosodic correlates to indicate pragmatic concepts is limited and most probably not consciously manipulable. Code-mixing on the lexical level may indeed happen so fast that it seems like an automatic and implicit process. But it is not. Pragmatic competence on the other side is implicit competence subserved by the procedural memory responsible for automatic processing which cannot be consciously manipulated.The formal devices observed in the bilingual yes/no questions of experiment 2 are the surface expression of an underlying implicit pragmatic knowledge. Assuming that pragmatic features are processed in the conceptualizer which is part of the verbal communication system but outside the linguistic system composed of the two language subsystems, implicit pragmatic competence works independent of language modes. To this effect I assume that the observed prosodic features to indicate IS categories in the bilingual experiment 2 would also be produced in converstations of bilinguals with monolinguals though on the lexical level a different language mode may be applied. However, this assumption would have to be verified by concrete studies including different modes of bilingual communication in order to also shed light to the status of grammaticalization of the observed features in bilingual Turkish.

In relation to the use of different language modes in bilingual Turkish, the stability of use of the observed acoustic features remains open due to the synchronic character of experiment 2. It cannot be concluded reliably from the present data if the observed features are permanent traces in the way that they are indicators of a stable and permanent grammaticalized change in the bilingual variety or if they are ephemeral.

Based on the observation of a systematic use of the same features by 20 bilingual speakers I conclude that the observed contact phenomena are not the results of spontaneous code switchings or borrowings on the pragmatic-prosidic interface in bilingual Turkish. More likely they indicate phenomenona of permanent dynamic transfers in bilingual communication. Although traces of convergence were observed by means of the systematic implementation of prosodic features to mark IS in the bilingual variety, the assumption of a dynamic process implies that the grammaticalization of German-Turkish is still an on-going contact-induced developmental process in addition to common language-internal development to which every language is subject to. To this effect I assume that the use of the observed prosodic features from German are permanent in bilingual Turkish, but they are not grammaticalized in the way that they have found entry into the phonological subsystem of the Turkish L1. I assume that the relevant features are still exclusively part of the phonological subsystem of L2 and activated each time they are required to structure bilingual communication. To this effect I suppose that a distinction has to be made between permanent transfer and grammaticalization. Not each transfer which occurs permanently is grammaticalized. It can still be exclusively part of L2 while permanently being used in L1 due to special bilingual pragmatic requirements based in the common bilingual conceptualizer. Frequent activation and use of an L2 feature in L1 furthermore lowers its activation threshold and promotes and facilitates its use by faster processing. Nonetheless, over the course of time a dynamic change may become a grammaticalized part of L1- presupposing that L1 speakers already acquire a modified variety of their L1. Still, I cannot conclude grammaticalization for the observed prosodic features a priori just by their permanent appearance. Further studies on the grammaticalization status are necessary which explicitly target the process. To gather explicit information time-meassurement studies would be one suggestion. Processing should be faster top down, i.e. when a pragmatic concept finds its formal correspondancy in a direct mapping with L1. Processing should be slower when L1 mapping remains without success and neural impulses have to battle inhibitory mechanisms (cross demarcation lines) to perform subsequent L2 mapping and activation. Of course the supposed time differences are so small that they are outside perceptibility in communication.

The aspect of language attrition often arises in order to describe permanent changes in a heritage language as outlined in chapter IV. Convergent structures as observed here in the bilingual Turkish variety are often considered as an indicator for language shift in historical linguistics and partly in psycholinguistics (e.g. Jessner 2001, Thomason 2001). Other authors such as Pavlenko (2005) argue that convergence is only one out of several processes in the interaction of languages and does not necessarily indicate language shift or attrition. The relevance of convergence processes in the initiation of language shift or attrition of Turkish in Germany needs to be investigated in future studies under a diachronic perspective. The results of this study can only contribute to a synchronic description of the German-Turkish contact variety within its limitation of indicating mechanisms that are temporarily at work in the development of contact varieties. Still, in my opinion diverging structures in bilingual varieties are not an iniciator for language loss or shift. I assume them to be the expression of a language developmental process which is as uncounscious and natural as internal language development is to which each language is subject. Language shift or loss on the other side is a conscious process initiated through disuse and its several motivators that are not settled in the language system itself.

A further requirement to affirm the concept of bilingual language change based on functional aspects is the conduction of perception studies. Within the limits of this study, the observed mechanisms to enhance bilingual communication based on the interaction of two languages are justified by their systematic application and significance in bilingual speech and their absence in the monolingual variety. However, since the idea of functionality and optimization in bilingual communication is primarily based on generating the most promising output on the base of the whole linguistic repertoire of bilinguals in order to maximize the success of contextualizing a pragmatic meaning, the investigation of the actual success of contextualization needs to be verified by speech perception test.

The approach provided here, is based on experimental production data and provides further evidence that the development of bilingual varieties such as Turkish spoken in Germany is based on bilingual language interaction. The results do deliver evidence for systematics in bilingual language interaction confirming that linguistic change is not an arbitrary matter of fact nor is it exclusively structural-driven. The investigation of bilingualism which includes a further perspective, namely the functional relevance of linguistic devices in bilingual communication can provide additive value. Moreover, the functional aspect of linguistic transfer observed in the present study shows that it is not structure that drives the change, but the pragmatic concept behind the structure. By the help of neuro-linguistic approaches, most of all the Subsytem Theory and the Activation Threshold Hypothesis, which differentiate between neural substrates and mechanisms subserving the conceptualization of pragmatic knowledge and the so called traditional grammar, linguists can and should amplify their approaches build upon observations in the linguistic output. There is an "unvisible" guide behind the surface. Like in Plato's world of ideas we need to realize that the movements on the screen of a shodow play are the result and mere refelctions of the processes behind the screen. The movements reflected on the screen are not an independently existing cosmos. It is not the movement on the screen that changes first and subsequently promotes a change behind the screen. Before we become aware of a changing structural output a cognitive change was initiated much before. Any theory of language acquisition and development should take into account the complexity of the verbal communication system. Verbal communication not only comprises linguistic knowledge and competence but at least it also comprises metalinguistic knowledge, pragmatic competence and motivation and the bio-chemical processes that guide and enable acquisition as well as performance. If we consider that the verbal communication system and all the parts upon which it is grounded are dynamic we understand that a change in of the components causes a change in another component. If the implicit pragmatic competence of a bilingual differs from that of a monolingual due to the incidence that the development of pragmatic competence is influenced by culture and language, we understand that differing pragmatic concepts require a changing structure on the surface to fulfill with the concept. To this effect the structural change on the surface is initiated by a change of an underlying concept and functional in the sense of paying contribution to a diverging and changing cognitive world in which bilinguals move.

FINAL REMARK

This dissertation investigated contact-induced prosodic changes in bilingual Turkish spoken in Germany. The study was motivated by furthering the understanding of linguistic changes in the L1 of so called heritage speakers and of contact induced changes of functional related prosody.

I discussed several existing models and concepts on bilingual acquisition of prosodic features showing that marked prosodic features cause difficulties in language contact and are likely to not pass via contact. On this basis, I conducted two experiments on features of functional related prosody, namely the marking of IS and sentence type. Experiment 1 was conducted with monolingual speakers providing a baseline for comparison with the bilingual data elicited in experiment 2. In both experiments the methodology of Xu (1999) to elicit in-situ focus was used in a slightly modified version in order to elicit also sentence type.

Considering current methods and approaches in bilingual language acquisition, a contrastive analysis of the monolingual varieties of German-Turkish speakers was realized.

A literature review on aspects of German prosody revealed that German is one of the best investigated languages with respect to its intonational phonology. The results of a supplementary study with respect to changes in the intonation contour of IS modified monolingual German yes/no questions, which was presented previously at LAGB 14, contributes to this abundant research. The results revealed a complex interplay between prosodic cues marking IS and prosodic cues marking sentence type.

The literature review on Turkish prosody revealed a lack of clarity with respect to the prosodic realization of IS and sentence type in Turkish. To this effect first, the conduction of a supplementary Q-particle placement test was necessary in order to justify the stimuli used in the experiments. The test concerned the default location of the morphological question marker in all-new sentences which is a discussed controversy in the Turkish literature. The test with 25 native Turkish speakers revealed that the Q-particle is most typically attached to the verb to evoke broad focus reading in simple SOV yes/no questions. Furthermore, experiment 1 was conducted eliciting prosodic focus and sentence type marking by means of *f0*. The monolingual experiment was conducted with 11 monolingual Turkish speakers from Izmir with no contact to German and no further second language. The motivation for experiment 1 was primarily to provide a baseline for comparison with the results gathered from the bilingual experiment. Additionally, the results contribute to the general and IS classification of Turkish intonational phonology:

(i) Turkish uses prosodic cues by means of *f0* to mark IS but not to indicate sentence type in contrastive in-situ focused yes/no questions.

(ii) Focused constituents are aligned to right prosodic boundaries in the way that the focused constituent is the rightmost prosodic constituent in a prosodic phrase which is realized with a pitch accent.

(iii) By means of post-focal de-accentuation the focused constituent becomes the most prominent in an IP.

(iv) Further prominence indicating strategies, such as pitch increase or boundary introduction, were not observed.

(v) With respect to the prosodic correlates of sentence type, no effects were found for the use of pre-focal compression or a high final boundary tone.

The results of experiment 1 provided the base for the comparative analysis of the prosodic cues used to indicate IS and sentence type in monolingual German and in monolingual Turkish. The comparison revealed that both languages use prosodic cues to indicate sentence type and IS by means of contrastive in-situ to different extents.

(i) Turkish solely uses post-focal de-accentuation to indicate prosodic prominence.

(ii) German specifies between pre-focal compression and post-focal de-accentuation to indicate givenness and pitch increase to mark focus.

(iii) German most typically uses a high final boundary tone at the end of yes/no questions to indicate sentence type.

(iv) Turkish does not mark sentence type by a high final boundary tone in yes/no questions, except for some very restricted and marked cases.

Based on these preliminary observations, experiment 2 was conducted in order to find out whether the bilingual Turkish variety would differ from the monolingual variety with respect to the use of prosodic cues to mark IS and sentence type considering German as a possible motivator for changes in the bilingual variety. The 400 contrastive in-situ focused SOV yes/no questions gathered from 20 bilingual Turkish speakers, born and raised in Berlin, were analyzed with respect to changes in *f0* according to focus position and sentence type.

The results of the complex phonetic and phonologic analyses revealed systematic changes in the marking of IS but not of sentence type in bilingual Turkish.

(i) Bilingual speakers use a monolingual-like de-accentuation pattern on post-focal given constituents. Post-focal de-accentuation is used in monolingual German and Turkish.

(ii) Bilingual speakers use a significant pitch increase on focused objects and verbs but not on focused subjects. The same marking strategy is reported for monolingual German.

(iii) Bilingual speakers compress *f0* significantly on pre-focal given constituents as observed for monolingual German speakers.

(iv) Bilingual speakers use a low final boundary tone at the end of yes/no questions as observed in monolingual Turkish.

The observation of the use of marked prosodic cues to contextualize pragmatic meanings on the supra-segmental level in bilingual Turkish which are not indicated in monolingual Turkish but in monolingual German sheds new light on the role of markedness as a predictor in bilingual language change. The observation of the transfer of pitch increase and pre-focal compression in addition to the maintenance of post-focal de-accentuation shows that theoretical structural limitations arising from markedness are in practice overridden.

A functional perspective on contact induced language change based on Matras (2007, 2010) and the neurolinguistic approaches of the Subsystem Theory and the Language Activation Hypothesis (Paradis 2004- as its main representative) can provide an explanation of these observations. The transfer of marked prosodic features from L1 to L2 and the maintenance of marked features in language contact are motivated by their contribution to fulfill bilingual communication requirements based on the existence of pragmatic concepts which differ from monolingual implicit pragmatic knowledge. Based on cognitive studies which assume interaction between the languages of bilingual speakers, which is furthermore confirmed by the results of this study, speakers can access the full repertoire of linguistic features in order to achieve communicative goals. If one of the involved languages does not specify on a pragmatic meaning, bilingual speakers can specify by means of using the respective cues from the other language in bilingual conversations. To this effect, the transfer of marked prosodic features is functionally-driven. However, it was also shown that transfer is limited by redundancy. A high final boundary tone to indicate sentence type prosodically was not transferred from German to Turkish, since sentence type is indicated morphologically already and no pragmatic concept needs to be given form on the surface.

The results of experiment 2 and the approach of functionally-driven language change can successfully contribute to the understanding of bilingual language development and its motivation. A functional factor by means of paying contribution to a culture and language specific implicit pragmatic competence provide a complex traceability of bilingual language change including its manifold caracteristics. Combining approaches based on structural observations on the surface with

neurolinguistic approaches based on observations of neuron activity which are the chemical base of communication simplifies to understand that bilinguals develop different pragmatic concepts and categories since their cultural and linguistic environment undespensably differs from that of monolinguals. By means of the use of structural features contribution is paid to the changing implicit pragmatic competence which finds its neural substrates in the common conzepzualizer which at the same time is the motivator of the structural change. Everything is connected to everything based on changes. Outside impulses motivate a change in the inside motivate a change on the outside. We cannot seperate cause and effect. Structural exchange and interaction in turn is only possible through language activation impulses settled in the neurons. Through bio-chemical process a language can be accessed or its access can be inhibited. The activation of L2 is usually inhibited as long as L1 delivers formal devices to pragmatic concepts in the bilingual brain and the formal devices are easily activated. If the activation of an L1 features is successless or causes difficulties inhibitory processes are out of action and activation potential spreads over to L2 facilitating the use of a correspondancy from L2 in order to complete with pragmatic requirements and the achievement of communicative goals. To this effect the use of features of L2 in L1 as observed within the German-Turkish contact situation is not random or structurally-motivated but functionally-driven.
My hope is that further studies on bilingual language change can build on these new insights and the results can contribute to the initiation of further studies concerning changes in L1 prosody of bilingual speakers. Downstep, e.g. has been additionally observed in experiment 2 as a feature in bilingual Turkish and most probably absent in monolingual Turkish providing an interesting point of departure for new and necessary studies. The additional observations made with respect to monolingual Turkish also provide a baseline for further studies on the description of the Turkish prosodic system in order to classify it with respect to its prosodic typology as well as in order to develop a conventionalized model for its phonologic description.

I would like to close my dissertation with a quote from Beardsmore (1986:36) which also adapts to the functional perspective in language change outlined here:

> *Bilingualism is not a phenomenon of language; it is a characteristic of its use. It is not a feature of the code but of the message.*

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