The use of focus markers

in second language word processing

Dissertation zur Erlangung des Doktorgrades der Philosophie

vorgelegt von

Anke Sennema-Skowronek

Institut für Linguistik / Allgemeine Sprachwissenschaft
Humanwissenschaftliche Fakultät
Universität Potsdam

Potsdam, Juni 2008

Published online at the
Institutional Repository of the University of Potsdam:
URL http://opus.kobv.de/ubp/volltexte/2009/3723/
URN urn:nbn:de:kobv:517-opus-37237
[http://nbn-resolving.org/urn:nbn:de:kobv:517-opus-37237]

Acknowledgements

The present thesis developed out of work conducted within the collaborative research enterprise Sonderforschungsbereich 632 “Informationsstruktur: Die sprachlichen Mittel der Gliederung von Äußerung, Satz und Text“, project C4 „Prosody and information structure as forms of 'input' in second language acquisition”, at the University of Potsdam.
I thank the principal investigators of this project, Prof. Suzanne E. Carroll and Dr. Ruben van de Vijver, for their project initiative and their guidance in experimental and thesis work. I also gratefully acknowledge the funding of project C4 of the Deutsche Forschungsgesellschaft.

I want to specifically thank Jun.-Prof. Jörg Mayer for his supervision, support and constructive comments. I also would like to thank Prof. Ulrike Gut for reviewing this dissertation. Furthermore, I thank my thesis committee, Prof. Shravan Vasishth, Jun.-Prof. Silke Hamann and Dr. Robin Hörnig.

This thesis strongly benefited from the careful reading and helpful comments by Dr. Bei Wang and Dr. Sam Hellmuth.

I would also like to warmly thank Anne Zimmer-Stahl for discussions and practical experimental support. Thanks go also Bernadett Smolibocki and Emily Aydemir for their help in conducting the experiments. An extra thanks to all participating listeners and speakers of University of Potsdam, University College London, and University of Essex.

Contents

CHAPTER 1

1. Focus marking and second language processing

1.1. Motive: Efficient processing of a second language

There are many factors which make understanding a foreign language more difficult than understanding one's native language. For example, a lower accumulated lexical familiarity, a reduced knowledge of idiomatic expressions, a smaller vocabulary size, and difficulty with phonetic distinctions have all been argued to combine to make nonnative comprehension of spoken language less effective than that of native listeners. Explanations for the reduced proficiency of second language (L2) learners tend to reference traditional factors such as age-related critical periods or source language interference. This interference concerns, for example, stress patterns that L2 learners perceive through the filter of their native language (Cutler *et al.*, 1986; Cooper *et al.*, 2002), or the way in which the speech rhythm of the native first language (L1) influences the perception of the L2 (Gut, 2003; Weber & Cutler, 2006). There is also evidence that the L1 influences lexical representations of the L2, for example in quantity distinctions (McAllister *et al.*, 2002), and interference accounts of phonetic information on L2 representations for Japanese learners of English (Cutler *et al.*, 2006). The scientific interest in these separate factors has also led to more awareness of the overall principles that determine the organization of information in the L2, that is, of its information structure (Dimroth & Starren, 2003; von Stutterheim, 2003). Understanding the way in which information is organized is assumed to guide the L2 learner towards an appropriate comprehension of the communicative context.

In the same way that characteristics of the L1 are argued to influence the acquisition of the L2 linguistic system, it is likely that conceptual patterns of information structure of the L1 also influence the organization of information in the L2. Furthermore, strategies and patterns that are used to exploit information structure for efficient language processing in the L1 may be transferred to processing of the L2, for instance, there are indications that nonnative listeners make use of information provided by prosodic parameters (Akker & Cutler, 2003, Makarova, 2003), by lexical means (Dimroth & Watorek, 2000), or by syntactic means (E. Klein, 1988). These factors share the characteristics that they highlight important information by giving an element greater prominence relative to others, thus assigning focus to it (Krifka, 1997). The concept of focus is part of the information structure of a language, and speakers can draw from a rich pool of linguistic means when they want to express focus. Listeners in turn are sensitive to means of focus marking such as, for instance, focal accent placement which they exploit for

efficient and rapid speech processing (Cutler & Fodor, 1979; Pitt & Samuel, 1990). Linguistic means to express focus and their use in native and nonnative language processing are central to this dissertation. The general question is whether the various means to mark focus in the learners' native language are also accessible in the nonnative language, and whether a L1-L2 transfer of their usage should be considered desirable. According to Dimroth & Starren (2003), the general principles underlying information structure contrast structurally across different languages and determine how speakers structure information in context. Therefore, since languages might differ in the way they express focus, strategies beneficial in the L1 may not apply to the L2 due to such differences in information structural encoding. This would require the learner to make adjustments regarding the use of information structural devices in the L2. The basic assumption of the current study is that the ability to encode and decode information structure has an impact on the level of the learners' appropriateness and linguistic competence in the L2.

The present thesis examines the role of focus marking in L1 and L2 word processing. For native language processing it is assumed that focus marking facilitates efficient processing of the element in focus. In this thesis I examine the effect of focus marking on native word processing and word recall, and address the question whether focus marking facilitates word processing and word recall in an L2. I conceptualise 'word processing' as the segmentation of a word from the speech stream, and 'word recall' as the accurate representation of a word in the memory.[1] Three experiments are conducted each of which assesses one parameter of focus marking: focus realized by prosodic, by lexical, and by syntactic means. These three parameters represent areas important for L2 acquisition and L2 proficiency, namely phonology (corresponding to prosodic means of focus marking), syntax (corresponding to syntactic focus marking), and lexical properties of a language (corresponding to lexical focus markers). The experimental studies comprise data collections of adult German learners of English. The comparisons also include control data from native speakers of British English.

The study explores how information structure helps the listener to discover and structure the forms and meanings of the L2 with the aim of getting a better understanding of how listeners make use of information structure in the L1. Ultimately, the ability to access information structure in the L2 is believed to form a powerful resource underpinning the L2 learners' ability to effectively communicate in the second language.

[1] This with reference to Cutler *et al.* (1997, p. 142), according to who "[..] the concept of word processing and word recall involves the processing of suprasegmental information, including phonetic segment identification".

1.2. Information Structure in L2 processing

There is a variety of theories and frameworks that have been developed to account for the principles that determine the organization of information in a discourse. Understanding the structural organization of information in the L2 is, in my view, an important part of the linguistic knowledge of L2 learners because the ability to encode and decode information structure has an impact on the level of L2 proficiency. Lambrecht (1994) described the function of Information Structure (IS) as being "concerned with the relationship between linguistic form and the mental states of the speakers and hearers and that the linguistic dealing with information structure must deal simultaneously with formal and communicative aspects of language" (1994:1). The concept of IS can be briefly characterized as *the structuring of linguistic information, typically in order to optimize information transfer within discourse* (research assumption of the Sonderforschungsbereich 632, University of Potsdam). Information structure refers to the way information conveyed by discourse is packaged into informational units within and between clauses. The aim is to provide clues about the relative saliency of the units. In a communicative setting it is also to guide the listener (or 'perceiver') towards an appropriate understanding in the precise discursive context.[2] Pragmatic approaches to information structure connect its use more strongly to communicative purposes. In the process of L2 acquisition, learners do not seem to readily adapt to the information packaging requirements of the target language, but instead seem to have a limited awareness of the appropriate use of information-structural means. This can be seen, for example, in both overproduction and avoidance of specific structures such as preposing, inversion, or *it*-clefts (Callies, 2006). It is therefore of interest to investigate the language-specific use of devices that learners apply in order to extract information structure.

The role of information structure and discourse organization in second language acquisition (SLA) has been addressed with increasing research interest. For example, evidence suggests that for the early and advanced stages of acquisition, child and adult learners rely on similar means for the expression of the concept of finiteness at subsequent stages of acquisition (Dimroth & Starren, 2003, p. 91). Similarly, the concept of focus as a means to highlight discourse elements is an important aspect of language use. Von Stutterheim (2003) argues that the linguistic devices learners have at their disposal in the L2, strongly relate to patterns of information organization of their native language. This view is supported by evidence on the phonological processing of an L2. With regard to phonological properties it was shown that listeners perceive a second language through the filter of the system of their native language

[2] The term 'perceiver' implies the multi-modality of perceptual possibilities but is less common than the for the current work adopted term 'listener'.

(White, 2003). Hawkins & Chan (1997) argued that listeners might not just carry over the cues of native listening to the processing of non-native prosodic patterns. Instead, they adopt solutions which are different from those of their L1. This implies a certain plasticity of linguistic features that might also apply to the level of information structure.

There is evidence that experiential knowledge of information structure conveyed in one's native language is transferred to the L2. The link between the structures of the native and the nonnative language is addressed in the concept of the 'initial state', outlined in brief in the following: The aim of L2 acquisition is to arrive at a linguistic competence which allows the learner to communicate, i.e., to understand and to produce an L2. In the process of language acquisition, learners have to construct a system that provides them with this linguistic competence. They are confronted with the problem that they already have a means of representing language but that this system is not sufficient to acquire - and to account for - complex and subtle properties which are present in the L2. The kind of unconscious linguistic knowledge that the L2 learner starts out with is related to as the 'initial state' (see White, 2003 p. 58ff). In 1996, the characterization of the L2 initial state had still been declared as "one of the more neglected topics in L2 acquisition research" (Schwartz and Eubank 1996:1). This has changed in the past decade and a lively account of the debate on the nature of the L2 initial state is documented and discussed extensively in White (2003). One of the central issues is the extent to which L2 learners transfer representations from their L1 into their initial state L2 grammars. A number of studies addressed this question, mostly using data from learners of L2s that are typologically very different from their L1s, for instance studies of Turkish and Korean learners of German (Schwartz & Sprouse, 1994, and Vainikka & Young-Scholten, 1994; for research on Hindi learners of English, see Bhatt & Hancin-Bhatt, 2002). This has been recently complemented by data from learners who are acquiring an L2 that is typologically similar to their L1, e.g. for Afrikaans and English learners of German (Grüter & Conradie, 2006).

Research literature was mostly not so much concerned with differences between L1 and L2 regarding the level of information structure but more with regard to the segmental level. Some examples will be given, firstly, to illustrate this main line of research in the field of SLA, secondly, because, for example, differences at the phonetic level are the very obvious and basic issues that L2 learners are confronted with. For instance, cross-language speech perception studies have repeatedly shown that L2 learners often find it difficult to discriminate and identify syllables that differ in a consonantal feature (e.g., Werker & Tees, 1984; Flege & Hillenbrand, 1986; for further reviews, see also Pisoni *et al.*, 1994). Differences in perceptual difficulty were related to the acoustic salience of the consonant but were also correlated to subjects'

descriptions of their assimilation strategies (Polka, 1991). In the discrimination of cross-language consonant contrasts listeners showed a better performance with native-like contrasts. This finding was taken as an indication that linguistic experience shapes the discrimination of nonnative speech contrasts (Polka, 1995). In other nonnative listening tasks, learners were able to adapt to surface phonetic information such as a consistent talker across items, but again showed some difficulty when it came to fine phonetic discrimination at the segmental level (Bradlow & Pisoni, 1999).

How does a model of second language acquisition account for the perception of linguistic features in the L2? Flege's Speech Learning Model (SLM, Flege, 1995) suggested that similarity relationships between L1 and L2 categories affect learning. This is because the L1 and the L2 exist within the same perceptual space rather than being organized into independent subsystems. Prosodic patterns of the L2 may thus be relatively easy to learn when they fall within an unoccupied region of the perceptual space, i.e. far from existing L2 patterns. When a new L2 pattern is similar to an existing L1 pattern, learners will often use the L1 pattern in their L2 and they will process the L2 using native-like perceptual cues when the L1 pattern differs. Learning to reduce this bias, i.e., perception within native categories, often requires modification to one's L1 perceptual categories (Flege, 1995; Flege *et al.*, 2003). This is done by, for example, category merger or by compromising perceptual categories that can accommodate both L1 and L2 perceptual cues, as shown for creation of vowel categories in Italian learners of English (Flege *et al.*, 1999). Numerous studies on the influence of L1 on L2 with regard to perception and production of a second language have supported the claims of SLM (Flege, 1988; Flege & Fletcher, 1992, Flege et al., 2003).

The above mentioned literature is concerned with linguistic experience at segmental level, proposing that this shapes the acquisition and perception of an L2. This links upwith the assumed plasticity of an information structural awareness that is formed in the process of L2 acquisition. In a volume investigating the impact of IS on L1 and L2 acquisition, Dimroth & Starren (2003) stress the inter-relatedness of factors, saying that "the dynamics of language acquisition are located in the interface of information structure and the linguistic means the learner brings along" (2003:5). Information Structure encompasses various concepts such as *background information*, *topic* and *focus*, of which *focus* will be explored further.

1.3. The concept of focus

Focus describes the concept by which parts of a sentence, single words or even syllables, receive more prominence than others (Krifka, 1997). This concept also applies to isolated sentences where it is governed by the syntactic relationship between the constituents.

As for the formal semantic sense, I refer to Krifka's (2006) understanding of focus which is based on Rooth's claim of Alternative Semantics (Rooth, 1985, 1992).[3] Krifka gives a definition of focus in a very concise form: "Focus indicates the presence of alternatives that are relevant for the interpretation of linguistic expressions" (Krifka, 2006:6). He further elaborates that a typical reason why the presence of an alternative is highlighted is because the current clause does not deliver all the information that is expected. Speakers thus have various reasons for highlighting information in the discourse such as, for example, the marking of attention, repair, or the re-introduction of the topic. Gussenhoven (2007) also discusses dimensions of focus meanings such as *Development* vs. *Correction*, *Eventive* vs. *Non-eventive*, or *Definitional* vs. *Contingency*. Different types of focus with varying properties have been proposed in the literature. The types of focus such as, for example, narrow focus or contrastive focus adopt different functions, though they can also overlap in these functions. A basic and common notion is that focus has the function of highlighting and of conveying informativeness (Bolinger, 1985), or that narrow focus often expresses new information (Selkirk, 1984). A property more specific to contrastive focus is, for instance, that it evokes a set of alternatives (Rooth, 1985, outlined in König, 1991, p. 32) which can also be true for narrow focus. This shows that a certain function can be adopted by different types of focus.

The categories of *broad*, *narrow* and *contrastive* focus are important for the current thesis. Due to its phonetic approach, examples of these categories are taken from work that discusses categories of focus from a phonetic point of view. To illustrate the relationship between categories and their different readings, consider the following examples by Sityaev & House (2003, p. 1819; capitals indicate the position of the main sentence accent):

(1) She broke her LEG.

Sentence (1) can be an answer to any of the following three questions:

(2a) What happened?

(2b) What did she break?

(2c) Did she break her neck?

Depending on the question, different focus structures are associated with sentence (1):[4]

(3a) [F She broke her LEG]

(3b) She broke [F her LEG]

(3c) She broke her [CF LEG]

Sentence (3a) is considered to have a broad focus reading, in other words, the whole utterance is presented as new information. (3b) has a narrow focus on the word 'leg', i.e., only

[3]Rooth (1992, p.36): „The key to a uniform interpretation for focus is an interpretation principle which introduces a variable, thought of as a contrasting element or set of contrasting elements".

[4] Capital 'F' refers to the constituent in broad or narrow focus, 'CF' indicates contrastive focus.

part of the utterance contains new information.[5] (3c) can be described as having a contrastive focus on the word 'leg': The speaker uses contrastive focus to introduce a contrasting element ('leg') into the discourse with which he intends to override or correct an element (e.g., 'neck') already present in the hearer's informational context. In this, Sityaev & House (2003) restrict contrastive focus to focus used for truly contrastive purposes, which goes beyond the condition of indicating a limited set of alternatives as put forward by Rooth (1985). The present study employs in the experiments conducted all three readings of focus illustrated above, i.e., broad, narrow, and contrastive.

With regard to the information organization of discourse, the following structure is often seen as convention for the integration of new information: When people communicate, they first summarise or allude to relevant background information, and then present what is novel (Haviland & Clark, 1974). This structure cues the listener to what the speaker considers to be important information. The highlighting of important information constitutes a universal which can be manifested in sentence accent (Bolinger, 1972). The placement of sentence accent depends thereby not so much on syntactic constraints but rather on the intention of the speaker (Bolinger, 1972, p.644). Later, Bolinger (1978) used the term 'point of information focus' for sentence accent.

Schafer *et al.* (1996) investigated the role of focus conveyed by pitch accent in two auditory comprehension studies. They addressed the question whether intonation and prosody influence the comprehension of a sentence structure in which pitch accent is used to convey focus. Results showed that the presence of pitch accent attracts a relative clause which suggested that the most important information is considered the most likely to be elaborated. This effect is described as *Focus Attraction Hypothesis* of Schafer *et al.* (1996, p.136). Listeners seem to relate adjuncts to important information in the sentence and also to actively seek focused words. Accent is thus found to convey informational focus, and this is consistent with a notion of prosody as a structure closely related to information structure (see Steedman, 1991; Vallduví, 1991).

Cutler & Fodor (1979) advocated listeners' *active search for focus*. They argued that when listeners detected where in a sentence the focal accent falls, they have located the informationally prominent part of the utterance. The listeners' active search for focus thus serves the interest of the listener attempting an efficient apprehension of the semantic structure of an utterance.

[5] In the case of (3b) it could also be argued that the complete constituent of 'HER LEG' ought to have narrow focus reading.

Perceptual salience is thus found to put parts of utterances in focus of the listeners' attention. Pitt & Samuel (1990) provided further evidence for the claim of Schafer *et al.* (1996) that important information is the most likely to be elaborated. They hypothesized that attention might lead to a more detailed processing of the signal and investigated how listeners might optimise the acquisition of the speech signal. In their study, the probable location of the target phoneme was varied to encourage subjects to attend more closely to one location than to others, under both normal and more difficult (additional processing demands through word categorization task) monitoring conditions. Results indicated that temporal selective attention is very flexible and precise: Benefits in performance were obtained at the attended location, and costs were observed at the unattended locations. Imposing extra processing demands on the subjects by way of additional tasks resulted in a loss of attentional selectivity. Perceptual prominence can thus be linked to attention, and both these factors facilitate more detailed processing (Pitt & Samuel, 1990).

In natural speech, at least one word in an utterance is given a higher level of emphasis than others and is perceived as more prominent (Cutler, 1984, p.82). The focusing on salient information in utterances has been identified as one of the principal functions of accent (Cutler, 1984). Although the notions of focus and accent are defined independently, there is a clear connection between accent and the assignment of focus, in that accentuation serves as a linguistic strategy to highlight information, or to distinguish important information from unimportant information. There are various means to assign focus, and next to the marking of focus by prosodic means there are also lexical or syntactic strategies to highlight certain elements in an utterance. Regardless of the type of focus marker it can be assumed for the function of focus that the listener gets drawn to the focused information which in turn facilitates comprehension (Cutler & Fodor, 1979; Pitt & Samuel, 1990).

1.4. Parameters of focus marking

Languages of the world exhibit a wide range of possibilities to realize focus. In Japanese, for example, focus marking by pitch accent is used because *wh*-questions are always accompanied by a focus intonation (Ishihara, 2004), though Japanese also marks focus morphologically by using focus morphemes (see also Foley, 1994, p. 1680). Another type of morphological marking is the use of verbal agreement affixes in Bantu languages (Foley 1994:1681). In Gur and Kwa languages, focus marking on the subject is realized by prosodic or morphosyntactic means, while focus marking on the object was not always found to be compulsory (Schwarz, to appear; Fiedler & Schwarz, 2006). A similar asymmetry was observed for Chadic languages (Hartmann

& Zimmermann, 2007; Zimmermann, to appear). In European languages, focus is typically expressed in spoken language by prosodic means (Krifka, 1997). Even if languages use similar means to express focus, they can still be distinct regarding the perception and phonetic realizations of focal accent, as shown in the case of different use of prosodic focus marking in Dutch and Italian (Swerts *et al.*, 1999). Irrespective of the dominance of the expression of focus by prosody, the concept of focus is independent, as pointed out by Féry (1993): „Focus is a linguistic feature [+/- F] exhibited by part or the whole sentence and defined independently of its phonetic realization, i. e. the accent signalling it" (Féry, 1993, p.13). Two further options to express focus are word order and the use of particles, which are introduced in the following.

Many languages make use of word order and complex syntactic constructions to express focus, e.g., Basque or Hungarian (Krifka, 1997; Kiss, 2006). In Hungarian, the first position in a sentence is a topic and is to be interpreted as the logical subject of predication and the preverbal position is the focus. Clefting as a syntactic focusing device appears to be a common feature among languages, with differences as to the range of the constituents that are permitted in the focus position (Lambrecht, 2001). The type of cleft sentence that is used in Experiment 2 of the current study is the *IT*-cleft. An example of an it-cleft is given in (1b), derived from sentence (1a) with a syntactically unmarked structure (capital letters indicate the position of the main sentence accent):

(1a) I like CHAMPAGNE. (canonical sentence)

(1b) It is CHAMPAGNE (that) I like. (IT-cleft)

(Example from Lambrecht, 2001, p. 467)

The equivalent construction in German is the so-called *Spaltsatz*:

(2a) Ich finde den RHYTHMUS schwierig. (canonical sentence)

(2b) Es ist der RHYTHMUS, den ich schwierig finde. (Spaltsatz)

Lambrecht argues that across languages, the cleft is one of three major types of grammatical devices used to mark the focus of sentences that deviate from the unmarked, predicate-focus type (i.e., sentences with either argument-focus or sentence-focus articulation).[6] He correlates the occurrence of cleft constructions in languages with the degree of freedom the language offers in regard to placement of accents and syntactic constituents (Lambrecht,

[6] Next to the cleft formation, Lambrecht names as the other two types of grammatical focus markers (1) prosodic shifts, as changes in the unmarked position of focus accents, and (2) syntactic shifts, as changes in the unmarked position of focus accents (Lambrecht, 2001:488).

2001:488). In that respect, syntactic focus marking is a fitting parameter to investigate the role of focus marking in L2 processing, as the two languages in the present study - English and German - were found to differ in their degree of free word order (Thompson, 1978).

Similar to the marking of focus by prosody or by syntactic construction, focus can be assigned by lexical means, in the current study realized by focus particles. Particles seem to be a universal phenomenon and means to mark focus, as a minimal set of these particles can probably be found in all languages (König, 1993). In the present study, the role of particles as focus markers will be examined using *only/even* for English and their German translation equivalents *nur/sogar*. An example of a sentence with the focus particle *nur/only* is given in (3a), and of *sogar/even* in (3b) (König,1991; note that accent indications were given for German only), with capitals indicating the position of the main sentence accent.

(3a) Nur PAUL hat seiner Frau Blumen geschickt.

,Only Paul sent flowers to his wife.'

(3b) Sogar DER PRÄSIDENT kam zur Versammlung.

,Even the president came to the meeting'. (König, 1991, p. 24)

Altogether, three different parameters of focus marking are used in the present study to investigate the effect of focus on L2 processing, namely focus marking by prosody (as realised by pitch accent and position of the word in the sentence, reported in chapter 2), the marking by syntactic means (as realised by cleft, chapter 3), and focus marking by lexical means (as realised by focus particles, chapter 4). The three parameters were chosen because they constitute common ways to mark focus in the two experimental languages German and English; moreover, by looking at three separate parameters, the role of focus markers can be examined from different linguistic angles.

With regard to the specific aspect of L2 processing, each of the parameters also corresponds to an area important both to L2 acquisition and L2 proficiency: Prosodic means refer to the phonology of a language, syntactic focus marking refers to the syntax of a language, and marking by lexical means refers to the lexical properties of a language. These parameters are going to be tested in studies on the *perception* of speech. For a study on the role of focus markers in L2 *production*, I refer to the experimental work and to the corpus analyses done by Callies (2006).

1.5. Outline of the present study

The present thesis examines the impact of parameters of information structure on the functioning of the learner's system of second language processing. The assumption is that focus effectively draws the listeners' attention to the most important part of information in a sentence. Word processing then takes place based on segmentation strategies tuned to the phonological characteristics of the learners' native lexicon. If native segmentation strategies get transferred to the processing of the L2, the expectation is that focus will interact with these transferred strategies in word processing.

There are three parameters under closer investigation, namely focus marking by accent, by syntactic marking, and by lexical means. Three studies will each focus on one of these parameters. The studies experimentally test the hypothesis that focus marking facilitates word processing and word recall in the native and the nonnative language. It is assumed that second language processing underlies a flexible concept in which multiple factors interact that are phonetic, syntactic and semantic in nature. L2 learners are expected to show variable sensitivity to different kinds of focus marking. The goal is to determine how L2 learners use prosodic, syntactic and lexical markers of information structure for an efficient word processing and word recall in the L2.

This study aims at getting a better understanding of how information structure can be used by learners to discover and to structure the forms and meanings of the L2. The ability to access and exploit information structure of the L2 is assumed to advance learners' proficiency in the L2.

The thesis is structured as follows: Chapter 2 reports on the Experiment 1, which deals with prosodic means to express focus. Experiment 1 investigated how focus accent, word length and word position in a sentence act as cues to efficient L1 and L2 word processing, with the aim to evaluate learners' sensitivity to the phonetic realisations of focus. Chapter 3 develops an account of the effect of syntactic focus marking in native and non-native listening studies. Data are presented from Experiment 2 on the use of clefted structures, including an evaluation of the role of accent and the role of context. Chapter 4 documents Experiment 3 on the use of lexical means to structure information. In this, data are presented of a study that investigated the effect of focus particles in L1/L2 word processing. Finally, Chapter 5 brings together the findings of the three experiments and treats issues of L1-L2 differences in word processing and representation in the memory, focusing on the parameters under investigation. Also in chapter 5, the limitations of the study are discussed and suggestions for future research are made. Finally, the main results of this thesis are summarized and conclusions of the present work are presented.

CHAPTER 2

2. The role of prosodic prominence in L1 and L2 word recognition

This chapter reports on a perception experiment on the use of prosodic realizations of focus in native and nonnative word processing. The questions were whether a word was better recognized if accented, how relevant in this process the position of the word in the sentence was, and if word length influenced recognition. Focus accent was realized by prosodic means, and a word recognition experiment was designed presenting single sentences that were balanced for accent on the target (+/-), position of the target (initial, medial, final), and target length (1- or more-syllabled). Test materials comprised natural, unmanipulated stimuli and also a set of manipulated spliced stimuli. Three groups of native German learners of English were assigned each to three different focal accent conditions (Experiment 1a), and a further two subject groups were presented spliced sentence materials (Experiment 1b). Participants were tested on a word recognition task in their native language (German L1) and in English as their second language (English L2). A group of native English speakers was tested as controls (English L1). Key findings were that focus marked by prosodic accent did not seem to help subjects to recognize accented words more accurately, in neither the L1 nor in the L2. Experiments with spliced conditions showed that word recognition performances were not influenced by the local prosodic realization of the target words. Target position yielded the most salient results. Here, specifically the final position seemed to be a strong cue for word recognition. The length of a word did not appear to be a significant factor to determine its successful recognition.

2.1. Introduction

Studies on the relationship between prosody and first language processing (Cutler, 1984; Cutler *et al.*., 1997; P. Warren, 1996) and prosody and second language processing (M. M. Carroll *et al.*, 2000; Dimroth & Starren, 2003) show how the prosodic structure of spoken language has been implicated in the production and comprehension at a range of levels of analysis. These include the segmentation of the speech signal into words and the access of word forms from the mental lexicon (Cutler & Norris, 1988), the segmentation of larger stretches of speech into syntactic constituents for the determination of linguistic and paralinguistic meaning (Gussenhoven, 2002; White, 2003), and the establishment and maintenance of discourse functions (Hirschberg & Pierrehumbert, 1986; Pierrehumbert & Hirschberg, 1990). In the

present chapter, I concentrate on the relationship of prosodic structure to word segmentation. I ask if listeners make use of prosodic realisations of prominence for the word segmentation in L1 and L2 listening (Experiment 1a) and investigate the impact of sentence intonation contour and of the acoustic realization of the targets on word processing (Experiment 1b).

The term *prosody* refers to a complex set of suprasegmental features which include sentence accent, lexical stress, phrase and compound stress, utterance rhythm and utterance intonation (Hayward, 2000). Any (natural) spoken utterance must be realized within these dimensions, or, as Cutler & Swinney (1987) stated, "utterances without prosody are simply impossible." Prosodic features are thus vital factors in language production and comprehension, and the phonetic properties associated with these features may combine in different ways to mark parts of a sentence as prosodically prominent. The present two experiments examined some of these prosodic features with regard to their impact on word segmentation. I understand s*egmentation* as the psycholinguistic process that permits a listener to represent parts of the continuous signal as prosodic units. Segmentation is an essential process in word learning because it provides learners with a word form to be stored in the long term memory. The experimental task of the present experiment is the accurate recognition of such word forms from a first representation in the learners' memory. A subsequent process of word learning itself can be seen as the result of a multifaceted set of processes which involves lexical representations on three levels: prosodic, morphosyntactic, and semantic (Jackendoff, 1983:9, Jackendoff, 1983:16). This comprehensive process is, however, beyond the scope of the present study. In a word learning sequence of segmentation, recognition, recall, and retention, the current experiment sets in at the point of word recognition, and measures accurate word recognition as an indication of the representation of a novel word in the listener's memory.

A central issue is to understand how listeners segment the continuous speech signal into discrete words. At what point does word segmentation of a continuous speech signal set in, in particular for L2 listeners with no, or restricted linguistic knowledge of the language they are listening to? A major division can be made between concepts that emphasise lexical or contextual processes, and those that deploy acoustic/phonetic cues. Proposals in the former category use concepts such as the uniqueness point of the word, lexical competition, or 'top-down' knowledge (e.g., Marslen-Wilson, 1973; McClelland & Elman, 1986; Norris, 1994). In the latter, word boundaries are located based on local perceptual cues. This suggests that segmentation involves attending to acoustic properties of the signal which are *salient* for listeners (Hatch, 1983). Salience refers to the relative importance or prominence of a part of the speech signal. A word is produced with more acoustic salience, or prominence, in order to

contrast that word with other less prominent words. Just as phonemes serve to distinguish one word from another word, a system of prominence allows a speaker to contrast the relative importance of words. Words that are prosodically prominent stand out because they are perceptually salient (see S. E. Carroll, 2006). In the context of a speech stream, salience helps listeners to quickly rank large amounts of information by importance and thus give attention to that bit which is the most important. Natural speech comprises both phonetic and lexical cues. In the present study, I took the 'phonetic' approach and explored the effects of perceptual prominence as realised by focal (pitch) accent, and considered also the implications of the position of the word in the sentence and the implications of word length.

The next two sections deal with prosodic and positional factors of prominence. In section 2.2.1, I focus on prosodic prominence as realised by pitch accent and describe their realisation and function. Section 2.2.2 outlines relevant research on the role and the benefits of word salience conducted in different languages. Section 2.2.3 reports on cross-linguistic evidence on language-specific segmentation strategies. Section 2.3 is concerned with the influence of word position in the sentence on word segmentation in native and nonnative speech processing. Then, section 2.4 considers the influence of word length on word processing. On this background, the hypotheses of Experiment 1 are formulated in section 2.5. The main aim of this experiment is to explore the influence of prosodic marking by pitch accent in L2 learners of English. This study comprises two parts: In Experiment 1a, natural stimuli are used and in Experiment 1b, manipulated stimuli are used. Accordingly, Experiments 1a and 1b are reported in two parts (2.6 and 2.7), and conclusions will be drawn in section 2.8.

2.2. Intonational marking of prominence

2.2.1. Pitch accents

In natural speech, some parts of the speech signal are uttered with more emphasis than others and are thus perceived as more prominent (Cutler, 1984). In intonation languages, perceptual prominence of a particular word in a sentence is brought about by the occurrence of a pitch movement on the lexically stressed syllable of the word (t'Hart *et al.*, 1990). The term *pitch* has been defined as "that attribute of auditory sensation in terms of which sounds may be ordered on a musical scale" (American Standards Association, 1960). This reference to music suggests that spoken language shares properties with music: pitch variation gives spoken language its melody. The pitch of a tone is related to its fundamental frequency; if the frequency increases, the pitch rises. Thus, in physical terms, the auditory sensation of pitch can be

correlated with the fundamental frequency of the voice (Hayward, 2000). Pitch denotes a psychological attribute of (speech) sounds and refers to our mental perception, thus it may be defined as the psycho-acoustical instantiation of fundamental frequency of the signal (Hayward, 2000:27; for an extensive account on the acoustics of speech perception, see Rosen & Howell, 1991).

Pitch can vary over whole phrases and can also help to delimit phrases. This function of pitch is known as intonation. Words that appear intonationally more prominent than others are said to be stressed, or to bear pitch accents. Conversely, words that hearers identify as unaccented tend to differ from their accented versions with respect to pitch, and this in some combination of duration, amplitude, and spectral characteristics (Hirschberg 1993). In Germanic languages, the two parameters of pitch accent and stress are distinct dimensions but they are each related to the relative prominence of one syllable in comparison with others. The difference between stress and accent is that stress is a property of words, whereas accent is a property of sentences, or more generally, of utterances (Cutler, 1984; see also Bolinger, 1972, p. 644). Stress and accent are not independent from each other, in that accent is usually realised on a syllable which is also stressed. Sluijter & van Heuven (1996) see a further difference between accent and stress in their pragmatic origins. In their view, accentuation is clearly used to focus information and it therefore conveys the communicative intentions of the speaker, whereas stress is a structural, linguistic property of a word (1996:2471). This shows that accent is determined by language behaviour, in contrast to stress which is determined by the system of the language. Bolinger (1972) argued with regard to accent assignment in the sentence that accented words are points of information focus and that they reflect directly the speaker's intent. He concludes that the distribution of sentence accents is determined by semantic and emotional highlighting and that syntax is of more statistical importance, in the way that some structures are more likely to be highlighted than others (Bolinger, 1972, p. 644).

To create the perception of prominence, pitch accents interact with other phonetic and structural features in the speech signal. The realisation of a pitch accent often combines with an increase in syllable duration, as words perceived as accented also tend to be somewhat longer than their deaccented counterparts (Hirschberg, 1993). This combination of pitch accent, increase in word duration (this by increase of the duration of stressed syllables) and also an increase in amplitude, leads to greater spectral clarity of the accented syllables (see Klatt, 1976; van Santen & Olive, 1990; Eefting, 1991; Koopmans-van Beinum & van Bergem, 1989). Accented syllables are therefore often acoustically clearer and hence easier to process. This was shown early on in a phoneme detection study by Cutler (1976). She reported that listeners could

detect a target phoneme faster when it occurred in a stressed syllable (or in a monosyllabic word) that received emphatic (sentential) stress than when the syllable was unstressed.[7] This was still true when the acoustic cue of stress was removed by cross-splicing, indicating that already the listeners can enhance the processing of syllables that they expect to be important. Pitt & Samuel (1990) reported a similar result for syllables that are rhythmically cued to be stressed. As in Cutler's study, an enhanced performance was observed even when there was no local acoustic base for the effect; target detection was superior when the target phoneme occurred in a syllable that was expected to be stressed as opposed to unstressed. These two findings illustrate that attention to stress can facilitate word processing.

The perception of prosodic prominence, however, does not arise solely from the processing of the physical properties of the signal. When listeners were asked to mark what they perceived to be prosodically prominent expressions in an utterance, a variety of prosodic, lexical and morpho-syntactic features were found to correlate to the perception of prominence such as word class, word length, Part-of-speech categories (adjective-noun combinations) (Streefkerk, 2002; see also Bradlow & Pisoni, 1999). In the current experiment, prosodic prominence results from focal accent as a grammatical construct; it does not result from an emphasis which is given because, for example, a misunderstanding has to be corrected by repeating of what has been said.

The perceptual salience of accented words is not only due to acoustic distinctiveness of the word itself but also seems to be linked to the surrounding sentence prosody. This was demonstrated in an experiment by Cutler (1976), using the splicing procedure. This procedure will be used in Experiment 1b, and it is therefore explained in the following. *Splicing* implies that the acoustic cues to the accent on the target word itself are removed, leaving only the cues provided by the surrounding sentence prosody. To accomplish this, two sentences are recorded, one with accent on the target word and one with accent on a word other than the target. Apart from the difference in accent pattern the sentences are otherwise identical. The target word is spliced out of each recording and replaced by an identical word which is taken from a third, 'neutral' recording of the sentence. The results of this procedure are two versions of a sentence, each with acoustically identical target words but with differing prosodic contours. It appeared from the study by Cutler (1976) with materials that were thus manipulated that the cut out 'accented' targets still elicited faster responses than the formerly 'deaccented' ones, despite the fact that no acoustic correlates of accent were present. Since the difference lay only in the overall prosodic contour, this was seen as evidence that listeners must have used prosody to

[7] Both Cutler (1976) Pitt & Samuel (1990) use the term *stress* for words in a sentence that are prominent due to "heightened acoustic clarity" (Cutler, 1976, p.56). Therefore, a distinction between *stress* and *accent* does not apply and for citations I adopt the terms used in these studies.

predict the placement of sentence accent, which led "to the inescapable conclusion that prediction of upcoming stress locations is an integral part of the sentence comprehension process" (Cutler, 1976, p.58; for the use of the term *stress*, see footnote 7). This shows that listeners use cues in the prosody to direct their attention to the sentence accent.

Finally, it has to be noted that acoustic properties also interact with visual cues in what listeners perceive as prominent, for example, when pitch and eyebrow movements are aligned on the same word (Krahmer *et al.*, 2002). Observing the talker's lips and tongue movement as well as the facial gestures such as eyebrow and head movement has recently been termed "visual prosody" (Granström *et al.*, 2001). Relevant prosodic categories such as prominence, phrasing and emphasis are captured by visual gestures and, for example, modelled to expressive speech in audiovisual synthesis, resulting in a believable animated talking agent (Granström & House, 2007). Since this is beyond the scope of the present study - the current study does not test audiovisual cues - this brief note has to suffice as an indication of the complexity of perceptual prominence in communicative situations.

2.2.2. Language-specific segmentation patterns

The acoustic dimensions which accompany greater or lesser salience of a speech signal include fundamental frequency (F0) (e.g., Rietveld & Gussenhoven, 1985; Gussenhoven *et al.*, 1997), intensity (Klatt, 1976), duration (Fry, 1955), and spectral properties (Sluijter & van Heuven, 1996). These signal properties associated with salience are not totally independent from one another, neither in production nor in the psycho-acoustics of speech perception. Investigations into the role of these factors in production, perception and comprehension of native and nonnative speech have been reported for many languages, and cross-linguistic experiments have been prompted by consideration of phonological differences across languages. For instance, Andreeva *et al.* (2007) compared the four acoustic dimensions mentioned above in the degree to which they change between phrasally unaccented and phrasally accented words for the German language. Acoustic analyses of production data obtained by six speakers indicated a hierarchy of parameters in which the acoustic cues were exploited: Pitch (change) and duration were stronger cues to accent than intensity and spectral balance. They also observed evidence of speaker variability, in that speakers who share the same language nevertheless seemed to have individual prominence-producing strategies.[8] Other studies on the perception of accent have also

[8] This variation itself was not relevant to the present study, and by having only one speaker per language this problem was also avoided.

established a clear and marked change of F0 and duration as the most important cues (see Bannert, 1991; Mixdorff & Fujisaki, 1999), and intensity as a weaker cue for the perception of stress (Issatchenko & Schädlich, 1966).

For English, duration and intensity have been seen as a primary perceptual cue in the distinction of the presence or absence of emphasis (Klatt, 1976; Huss, 1978). Cutler & Norris, (1988) proposed a model for speech segmentation, in which strong syllables provide segmentation points for words. In this model, segmentation sets in at strong syllables because this is seen as the most efficient location of a word where lexical access can get initiated: Listeners assume that a stressed syllable begins a new word. Similarly, Wells (1986) showed that shifts in the fundamental frequency are an important cue to prosodic boundaries of units in British English. Other studies focused on the durational variation of particular syllables as a cue to salience. In early work, Fry (1955) explored the influence of certain physical cues on the perception of linguistic stress and found that the duration ratio is an effective cue for the judgement of stress in disyllabic words, in that the stressed version of a syllable is longer than the unstressed version. R. M. Warren *et al.* (1990) presented listeners with different arrangements of the same three vowels and found that the longer sequences of steady-state vowels were more likely to be perceived as words. [9]

Other evidence of language-specific segmentation patterns includes French which has syllabic rhythm. Mehler *et al.* (1981) reported that when French listeners were presented with French words, the syllable was found to function as a segmentation unit. In Japanese with its rhythm being based on a subsyllabic unit, the mora, listeners use moraic segmentation (Otake *et al.*, 1993). Beckman (1986) found in her study that pitch accents in Japanese were marked with pitch only and no associated duration or loudness, whereas for English the phonetic correlates of pitch accents were not only characterized by a pitch movement but also by greater duration and loudness (Beckman, 1986, in: Ladd, 1996, p.155-156). For further studies conducted on word salience and segmentation patterns of speech, see also House *et al.* (1998) for Swedish, Chapman (1995) for Swiss German; Cutler & van Donselaar (2001) for Dutch, or Suomi *et al.* (2003) for Finnish.

2.2.3. Language-specificity and cross-linguistic transfer

It can be thus assumed that languages differ in their exploitation of the various acoustic dimensions which are associated with perceptual salience of speech, and that speech

[9] Most of the research has been done on and refers to Germanic languages. Therefore a thesis on word segmentation in Egyptian Arabic seems particularly worth mentioning: Aquil, R.M. (2006). *The segmentation/ parsing unit in Cairene Arabic.* PhD thesis, Georgetown University.

segmentation routines, for example stress-based or syllable-based, vary across languages. Since languages vary in how prosodic prominence is expressed, a number of psycholinguistic investigations have sought to establish the patterns of perception by which L2 learners interpret the particular expression of prominence found in a particular target language. As mentioned above, Mehler et al. (1981) showed that in French the syllable constitutes a unit of speech processing. Based on this evidence, Cutler et al. (1986) investigated if native French listeners listening to a stress language like English would use a segmentation strategy that involves an, in this case appropriate, phonemic routine rather than a syllabic routine. To this end, they presented French and English listeners with English nonsense words. Results revealed that native French listeners consistently made use of syllabification in segmentation when listening to the foreign language (English), whereas the English listeners did not. This led Cutler *et al*. (1986) to conclude that monolingual listeners follow a language-specific segmentation routine in nonnative listening. Vroomen *et al.* (1998) investigated if listeners from different language backgrounds apply their native segmentation routine when listening to an artificial, synthesised language. To this end, they asked Finnish, Dutch, and French listeners to segment words (strings of syllables) which differed in their stress patterns and the presence or absence of vowel harmony. They found that each group paid attention to the suprasegmental properties present in their native language. Indeed, performance was best when the phonological properties of the artificial language matched those of the native language.

Similarly, but then for a natural language, Eriksson *et al.* (2002) asked native speakers of English to judge the perceptual prominence of syllables within utterances in a language the subjects did not have any knowledge of (here: Swedish). The acoustic cues for the rating of prominence were vocal effort, the distinctness of F0-movements, and vowel duration. Results showed that prominence ratings of the English and Swedish listeners matched.[10] There were, however, differences in the weight that the Swedish and English listeners attached to different acoustic cues in the listening experiments. Swedish listeners gave more weight to vocal effort and English listeners attached more weight to effort, pitch, and duration. Although this particular finding was seen to reflect language-specific preferences, the altogether similar prominence weightings were interpreted by Eriksson et al. (2002) as evidence that the perception of accent is a universal phenomenon.

Evidence for beneficial impact of accent structure on L2 acquisition can be also found in L2 learner studies conducted by Rast (2003) and Rast & Dommergues (2003). They

[10] The "apparent relative vocal effort" was calculated for each vowel, based on the signal level L0 (dB), defined as the level of the signal after low-pass filtering at 1.5 F0 (-3 dB), emphasis (dB) and F0max (st), (see p. 728).

presented native French learners of Polish with sentences in Polish and after that asked them to repeat the sentences.[11] This was tested at three different periods of instruction (0 hours, 4 hours, and 8 hours). Performance scores showed that the French learners repeated accented words more accurately than unaccented words. This indicated that, upon first contact with an unknown language, the French learners whose L1 did not have lexical stress, relied on this property when reproducing words in Polish. It was concluded that, amongst other factors, word accent is a factor that characterises perceptual saliency.

Cross-linguistic transfer of prominence processing strategies seems to extend to tasks with written materials, as Goetry *et al.* (2006) showed for French-native and Dutch-native bilinguals. They reported a cross-linguistic effect, in that the stress processing abilities observed in the French-native group influenced their reading development in a second, stress-based, language (i.e., Dutch). Overall, however, they concluded that stress processing abilities are "a learnable set of skills" (2006:359).

Other work on the difference in segmentation strategies showed that factors also co-vary. For example, the perception of stress contrasts in native French and native Spanish listeners was found to depend upon a combination of memory load and phonetic variability in F0 (Dupoux et al., 2001). The authors ascribed this finding to 'stress-deafness' among the French-oriented listeners, as French is a language with non-contrastive stress (see also Peperkamp et al., 1999).

Of major interest for the current study is the work of Akker & Cutler (2003) which investigated nonnative perceptual processing of information conveyed by sentence accent. It provides a reference point for the present study and will therefore be described in detail. Akker & Cutler tested (1) the predicted-accent effect, whereby listeners direct attention to accented words, with predicted (+/-) accent provided by the prosodic contour surrounding the target; they also tested (2) the question-induced semantic focus effect whereby listeners show processing advantage for words focused by a question. The expectation was that when one effect is present, the addition of the other one should not produce a difference because both deliver the same information. Four experiments were conducted: Experiment 1: English L1 speakers listening to English L1; Experiment 2: Dutch L1 speakers listening to Dutch L1; Experiment 3: same Dutch speakers listening to English L2; Experiment 4: other Dutch L1 speakers listening to English L2 only. A basic observation was a better performance in the native language condition compared to results achieved in the nonnative language condition. To Akker & Cutler, this suggested a language-dominance effect for processing focus and accent structure in L2 processing (L1 >

[11] A polish native speaker judged the L2 productions. The two criteria for a correct repetition were (1) the number of syllables in the word had to be the same in L1 and L2 production, and (2) only one phoneme per syllable could be repeated incorrectly.

L2). Furthermore, results of Experiment 1 and Experiment 2 revealed that both English and Dutch listeners detected accented and focused words faster than unaccented and unfocused words, and the effects of focus and accent interacted. This was interpreted as indication that they served a common cause, namely the efficient apprehension of the semantic structure of an utterance (Akker & Cutler, 2003, p. 81). In contrast, there was no interaction between the effect of focus and the effect of accent in the nonnative listening task with Dutch L2 speakers of English (Experiment 3), thus when the two language tasks were tested in a within-subject design: Both predicted accent and focus showed significant effects in the native listening task, but no significant effect for the two factors was observed in the nonnative listening task. In Experiment 4 (Dutch subjects listening to L2 English only), the predicted accent effect and the focus effect were both significant, although the presence of focus did not influence the accent effect, as the processing advantage for accented words was as significant with focus as without focus. Other findings were that across experiments and L1/L2 tasks, items occurring late in the sentence (VP) were faster detected than items occurring earlier in the sentences (subject NP). This position effect was always greater for unfocused targets than for focused targets. With regard to an efficient exploitation of sentence prosody, Akker & Cutler (2003) concluded that nonnative listeners process semantic focus structure less efficiently in the L2 than in their native language. However, when tested only in the nonnative language, L2 listeners seem to competently process the sentences for meaning (focus effect) and likewise for predicted accent. For the present study it is relevant that accent had no effect in nonnative listening when the native language had been tested before. From a methodological point of view it illustrates the difficulty to collect comparable data in two languages from the same listener group, and that a learning effect might influence the results: the performance in the second experiment could be influenced by knowledge acquired in the first experiment.

All these lines of research combine to show that processing accent structure is beneficial for L2 learners, at least if the phonological systems of the L1 and the L2 do not differ too much (e.g., as it is the case of Dutch L1 - English L2, and as it can be assumed for German L1 and English L2). A brief look at studies investigating prosodic processing in other L1-L2 pairs shows the impact of differences between the phonological systems of native and target language on processing patterns, and the relatedness of L2 proficiency and L2 processing patterns. For example, Pennington & Ellis (2000) reported on difficulties of native Cantonese L2 learners of English to make use of information conveyed by prosody.[12] Pennington & Ellis

[12] Standard Cantonese is a tonal language and the mainstream dialect of the Cantonese linguistic family. It is commonly spoken in Hong Kong, Guangzhou and Macau, and by many overseas Chinese.

(2000) tested the Cantonese L2 learners in their ability to recognize English sentences that contrasted in meaning. When presenting English sentences in which prosody cued meaning contrasts they found that the memory performance based on prosodic information was generally poor. Even after participants' attention was explicitly directed to intonation, the performance improved only on sentences in which prosody cued contrastive stress, and not in sentences with neutral intonation (broad focus).

The fact that languages not only vary in their phoneme inventory but also in the way suprasegmental properties are used, can be of consequence for learners when confronted with a different system: In Chinese, tones are used to make lexical distinctions, and this could be the reason why Chinese learners of English don't seem to use prosody to mark contrasts like this is done in English, being a language that uses stress (on the lack of focal accent in tone languages, see also Hartmann, 2006, and Hartmann, to appear). Thus, listeners might not be able to carry over representations of native listening to the processing of nonnative prosodic patterns. For a scenario like this, Hawkins & Chan (1997) predict two possible effects for L2 learners. Firstly, L2 learners will map morphophonological forms from the L1 onto L2 feature specifications, resulting in, for example, an L1 syntax with L2 lexical items; secondly, with continued exposure L2 learners will then establish grammatical representations which diverge from those of native speakers as well as from their own L1s, which Hawkins & Chan (1997) term 'possible grammars'. The authors illustrate this claim by presenting evidence that L1 Chinese learners of L2 English became progressively more accurate in their intuitions about English morphology as their exposure to L2 English increased (Hawkins & Chan, 1997, p. 216f). This finding might seem to contradict the finding that Chinese L2 learners of English showed poor memory when information was based on prosodic contrasts (Pennington & Ellis, 2000), but it is cited here to illustrate the dynamics that the L2 linguistic system underlies due to a changing L2 language proficiency. Differences in the phonological systems of the L1-L2 pair can influence the perception of prosodic patterns, and processing may also change within the course of L2 attainment.

The experimental evidence outlined in the three previous sections shows that the acoustic dimensions associated with word salience (i.e., F0, intensity, duration) are similar across languages. This being said, depending on the patterns of tonality within a language, these dimensions can vary both in degree and in combinations in which they influence perception and production. Or, to put it differently, languages use in general roughly the same acoustic properties to realise word salience, but the degree to which each particular correlate is used varies. Word segmentation preferences seem to be language-specific, albeit with a certain degree of plasticity. In the two experimental languages of the current experiment, i.e., English

and German, stress distinctions are used and listeners process accentual structures. Hence, the mapping of prosodic accent to semantic structure can assumed to be similar in the two languages, and both languages should exhibit a similar type of processing.

With regard to the topic of nonnative processing of prosody, the current experiment is close to the above-mentioned study of Akker & Cutler (2003) but nevertheless does not aim at reproducing it with German L1-English L2 as another language pair. Furthermore, a different testing paradigm is used for the current experiment (i.e., percentage of accurate word recognition instead of reaction time to a target phoneme).

2.3. The influence of word position in the sentence on word processing

Slobin (1985) attested perceptual salience for initial and final syllables in native language processing. By *salience*, he refers to Peters (1985) who described 'salient' stretches of speech as those that are reasonable candidates for extraction, that is, for recognising and remembering. Slobin formulated 'operating principles' (4a, 4b) with regard to places in the utterance where important information can be expected:

(4a) Pay attention to the last syllable of an extracted speech unit. Store it separately and also in relation to the unit with which it occurs.

(4b) Pay attention to the first syllable of an extracted speech unit. Store it separately and also in relation to the unit with which it occurs. (Slobin, 1985:1166)

Slobin breaks up language processing into two tasks: (1) the perceptual task of converting the speech stream into word units which can be processed in the working memory, and (2) the task of organising these units into a mental lexicon (Slobin, 1985:1161). Acoustic evidence for the salience of the outer ends of utterances was provided earlier by Oller (1973) who investigated the duration of speech segments as a function of position in utterances (initial, medial, final). He showed that in English the ends of utterance-final phrases with various intonational patterns (imperative, declarative, interrogative) are often marked by syllable lengthening. Discussing the effects of this lengthening he suggests that lengthening in certain positions of an utterance is a learned aspect of language which cues listeners concerning the location of boundaries of words, phrases, or sentences. Phrase-final lengthening is relevant for the salience of word position because lengthened syllables are less likely to vary from a prototypical articulation of consonants and vowels. In this they might offer learners a better and more stable input, which in turn supports faster processing (Cutler, 1984; Cutler & Norris,

1988). The preference of listeners for attending more readily to the beginning and to the end of the sentence has also been attested for German (W. Klein, 1984).

Parallel to this strategy of 'pay attention to the outer ends', VanPatten (2002; VanPatten, 2004) has proposed similar principles for L2 acquisition with respect to word position in the sentence. This is based on two studies dealing with how input processing is related to acoustic salience (Barcroft & VanPatten, 1997; Rosa & O'Neill, 1998). These studies investigated stress perception and word position in the sentence among native English L2 learners of Spanish, using Spanish stimuli to show positional sensitivities in processing. The findings indicate that elements that appear in certain positions in the sentence are more salient to learners than others, namely, sentence initial position is more salient than sentence final position that in turn is more salient than sentence internal or medial position. In VanPatten (2002; 2004) he proposed this as the 'sentence location principle': "Learners tend to process items in sentence initial position before those in final position and those in medial position" (2004:14). VanPatten points out that sentence length may interact with this principle, in that, for example, processing a sentence like "Is it cold outside?" is different for the L2 learner than "Is it cold outside or do you think I can go out with just a shirt on?" (examples from VanPatten, 2004:13). Experiment 1 of the current study aims at verifying the claim of VanPatten's sentence location principle for L2 processing in German learners of English, and therefore includes word position in the sentence (initial/medial/final) as a factor.

Other evidence for the advantage of word position comes from a study dealing directly with word learning during the first eight hours of exposure. Rast (2003) and Rast & Dommergues (2003) showed that native French learners of Polish repeated words occurring in sentence-medial position less accurately than those occurring in sentence-initial or sentence-final position. In fact, words in middle position were consistently of greatest difficulty for repetition, irrespective of word length or time of testing (three different periods of instruction: 0, 4, and 8 hours). Results showed that the position of a word in the sentence seems to be a strong contributor to the salience of speech segments (and hence for a more accurate representation of it) for learners at the early stage of L2 acquisition. This supports the notion of salience of the outer ends of the sentence for the initial stages of L2 acquisition.

In the Akker & Cutler (2003) study, the comparison of word position was not relevant to the study and results for the comparison of early vs. late position in the sentence are only mentioned in a footnote (2003:84). Across all four L1 and L2 experiments, reaction times to later targets (target phoneme occurring in VP) were faster than to earlier targets (target phonemes occurring in subject NP). Word position was not significant with the Dutch materials

(Dutch L1) but the effect was sometimes significant with the English materials.[13] The authors suggest that this was probably due to the English words being shorter than the Dutch words, so that English early targets occurred in fact earlier then the early Dutch targets. Position never interacted with accent and always interacted with focus, in that the position effect was greater for unfocused targets than for focused ones. I take these results as indication that listeners in general are sensitive to word position in a sentence. Moreover, in the absence of clear focal accents on the target, and when listeners' attention is diverted to other parts of the utterance, position seems to become a reliable cue to efficient word processing.

2.4. Word length as a factor in word processing

There is a debate as to whether the length of a word affects its recall. It could be argued that in a longer novel word there are more properties to map and to store, which, on one hand, could provide more reference points for recall. On the other, short words could require less processing resources, and could therefore be entered easier in the learners' memory. Let us consider first the perception of words in isolation. For instance, Baddeley *et al.* (1975) showed that the immediate memory performance is directly influenced by the length of the word. They presented words of different articulatory durations controlled for syllable number, as for example lists of one-syllabled words (e.g., *sum, wit, hate*) spoken aloud by the experimenter, and lists of 5-syllabled words (e.g., *university, aluminium, opportunity*). The materials thus differed in both number of phonemes and in spoken word duration. Recall of the short words was considerably better than that of the long words. Baddeley et al. motivated this finding with a longer articulatory rehearsal time: Listeners are able to rehearse more short words in a given time than long words, so they lose less of the short items from phonological memory as a consequence of decay. They concluded that "short term memory is a time-based system" (1975:581) and that one mechanism underlying recall involved subvocal articulation.[14]

Inspired by this finding, Caplan *et al.* (1992) further investigated the articulatory determinants of word length effects on auditory and visual span. Results showed that, when the words were matched for the number of phonemes, effects of word length were eliminated: Neither the duration nor the complexity of their associated articulatory gestures affected word recall. The authors suggested that the phonological structure of a word and not features of its actual articulation determines the degree of a word length effect. Lovatt *et al.* (2000) argued that

[13] No further specification is given as to whether this effect in the English language condition occurred in English L1 listening or in English L2 listening.

[14] Subvocalization, or silent speech, is defined as the internal speech made when reading a word, thus allowing the reader to imagine the sound of the word as it is read. This is a natural process that helps to reduce cognitive load and to remember what has been said (Carver1990).

the (lack of) word length effect may be due to experimental artefacts, which made them replicate and revise the experiments of Baddeley et al. (1975) and of Caplan *et al.* (1992). Lovatt *et al.* (2000) examined recall of English disyllabic words that differed on spoken duration in three experiments, employing strict criteria with regard to word materials and the recall method. One experiment confirmed the advantage for short-duration words in the word set originally selected by Baddeley *et al.* (1975) but, using the second set of items, no difference was found between long and short disyllabic words. Lovatt *et al.* concluded that there is no reliable advantage for short-duration disyllables in memory span tasks. Previous accounts of a word-length effect in disyllables were attributed to accidental differences between list items, thus leaving the evidence concerning a word duration effect inconsistent.

In an L2 word repetition task in connected speech, word length (measured in number of syllables) was not a factor determining successful repetition of a word (see Rast, 2003; Rast & Dommergues, 2003). Recall that this was a production study that involved repetition of words of three different lengths (0-1 syllables, 2 syllables, 3-6 syllables), with partly new phonemes for the subjects who were native French learners of Polish. Indeed, the correct repetition of a word containing 3-6 syllables (for example *uniwersytecie ('university', locative case),* or *wykładowcą ('professor', instrumental case*)) embedded in sentence context, could be expected to pose much greater difficulty in terms of pronunciability and memory limitations than short words, such as *w* (*'in'*, 0-1 syllable length), or *ale* ('*but'*, 2-syllable group; examples from Rast & Dommergues, 2003, p. 135 and p. 139). It appeared that word length did not influence the number of correct repetitions at any of the three periods of testing. However, there was an interaction of word length with sentence position such that words of one or two syllables were much easier to repeat in sentence-initial and sentence-final position (Rast, 2003, p. 251, 279, and Rast & Dommergues, 2003, p.148). It could be that the salience of the outer ends of a sentence prompts efficient word segmentation in which the length of a word makes a difference to its accurate representation in the memory. If a positional cue for word salience were activated, word length could in my view further facilitate accurate word reproduction.

To sum up, memory tasks involving native language materials report contrasting evidence of the influence of word length on the memory span. For L2 word recall, no claim of direct effect of word length on word recall could be substantiated. In the present experiment, word length (1-syllabled vs. 2-or more-syllabled) varied systematically and no research hypotheses were put forward with regard to word length. The aim of including this factor as an independent variable in the current study was to confirm the absence of effects of word length in a different L1/L2 language pair (German/English instead of French/Polish).

2.5. Research hypotheses

In this chapter, the question at issue is whether word prominence realized by pitch accent and by word position, helps German L2 learners of English to recognize words they heard before more accurately. Both pitch accents and word position can signal relevant information, and speakers may use pitch accents and/or word position to signal to the listener which part of the current utterance should be interpreted as important information.

The first question is, then, do German learners of English make use of prosodic marking conveyed by sentence accent to recognize new words better? And, in this, are there any differences between native and nonnative processing? Bolinger (1972) showed that accent highlights important information, which makes the accented word perceptually more prominent (Klatt, 1976; van Santen & Olive, 1990; Eefting, 1991; Koopmans-van Beinum & van Bergem, 1989). Listeners in turn may exploit these prosodic cues to word prominence in order to store a first representation of the novel word in the memory and they may recognize the thus highlighted word more accurately than non-prominent words (Pitt & Samuel, 1990). The perceptual salience of accented words is not only due to their acoustic distinctiveness but also due to the preceding sentence prosody, as listeners use cues in the prosody to direct their attention to the sentence accent (Cutler, 1976). Accent structure gets faster processed in native than in nonnative listening (Akker& Cutler, 2003, Expt. 3), thus there is a language-dominance of L1 > L2. Evidence of the beneficial effect of accent for L2 word learning in a production task comes from Rast (2003), and Rast & Dommergues (2003), but no effect of accent in L2 word processing was found in the perception study of Akker & Cutler (2003, Experiment 3).

The prediction is, therefore, that listeners process accent structure efficiently in their native language, and that they exploit accent structure for accurate word recognition better in their L1 than they do in the L2 (L1 > L2). Secondly, as listeners are sensitive to pitch accent realisations of focus structure in their L1, a difference in word recognition performance in L1 listening is expected between different focus conditions: Accented target words in a narrow focus condition will be better recognized than target words realised in broad focus conditions. As focus is said to draw listeners attention to the important stretches of a sentence, target words occurring in broad focus conditions are better recognized than the same targets occurring in sentences in which focal accent is realised on a different constituent than the target. For L2 word processing, an overall sensitivity to accent structure is expected due to the languages sharing relevant aspects of phonological structure, such as accent expressing semantic focus, or the predictability of accent placement due to preceding prosodic contour (yet to be confirmed for German). This means that across conditions accented targets are better recognized than unaccented targets. On a more fine-grained level of different prosodic realisations of focus

(broad focus, narrow focus, narrow focus not on the target), it is expected that in nonnnative processing the mapping of prosody is less efficient, and that nonnative listening cannot equal native listening: In different focus conditions, L2 learners fail to exploit focal accent structure to recognize accented words more accurately.

The question will be raised if listeners attend to local prosodic parameters of a word such as its pitch accent, or rather to global prosodic cues such as the surrounding sentence prosody. In line with the results of Cutler (1976) it is hypothesized that global sentence prosody is a main cue as to where in the sentence the attention of the listeners is directed to.

The second research question aimed to establish whether in native and nonnative listening, German learners of English recognize words better when these occur in initial, medial, or final position of the sentence. Slobin (1985) found a preference of English listeners for attending outer ends of sentences, as did Klein (1984) for German. The phrase-final lengthening of a syllable is a learned acoustic cue to signal the end of a sentence (Oller, 1973), which ensures a stable acoustic input that in turn supports faster processing. For L2 word processing, the sentence location principle (VanPatten, 2002) claims a ranking of salience of initial > final > medial position, and results for L2 word learning from Rast (2003) and Rast & Dommergues (2003) confirmed the notion of salience of the outer ends of the sentence. Akker & Cutler (2003) provide evidence of a general advantage of items occurring late in the sentence over earlier items in L1/L2 tasks. They also found that the position effect was always greater for unfocused targets than for focused targets. On one hand, long distances (in terms of number of syllables) between the word positions tested would therefore be desirable, in which case the length of the sentence could pose a problem for nonnative listening; on the other, if distances between the positions tested were small, then effects between initial-medial position and medial-final position could become less clear. The main concern was, however, not to compromise valid results by of presenting very long sentences. Hence the sentence length was kept within the limits motivated by a pilot experiment (see section s*peech materials* under 2.6.1).

The prediction for the effect of word position on recognition accuracy is that in L1 processing, words occurring in initial and final position are better recognized than words in medial position. For L2 processing, I put VanPatten's sentence location principle to the test which claims an advantage of initial over final, and of final over medial position against the competing hypothesis based on Akker & Cutler (2003), namely that an advantage of the final over the initial position can be expected. However, the length of the sentences of the current experiment has to be considered, which means that less clear-cut effects of differences between

initial-medial, and medial-final position are predicted. Regareding the effect of word position in different prosodic focus conditions, an interaction of position with focus seems probable: In the absence of a clear accent cue for word salience, listeners will pay attention to positional cues for accurate word recognition. Hence, a stronger effect of position is expected for the listening condition with focal pitch accent realized on a constituent other than the one containing the target.

The length of the target words (one-syllabled vs. two- and more-syllabled) was controlled for when constructing the speech materials of the present experiment and the effect of word length was not a central issue. An earlier study of L2 word learning reported no main effect of word length, but that correct repetitions of words depend on word length as a function of word position (Rast, 2003; Rast & Dommergues, 2003). With the present experiment I intend to confirm the absence of an effect of word length on word recognition accuracy in a new L1/L2 language pairing and also with different methodology.

The two main hypotheses concerning the effects of pitch accent and word position are repeated below:

1. German L2 learners of English use pitch accents as a cue to accurate word processing in their L1, and they map this pattern onto word processing in the L2. The most beneficial focal accent structure for word recognition in L1 is when narrow focus is realised on the target; narrow focus on a different constituent does not facilitate word recognition. In nonnative listening, a split into different focus conditions is expected to lessen the overall beneficial impact of accent: the facilitative effect of accent is expected to disappear in separate focus conditions of English L2. In addition, global sentence prosody is expected to emerge as an important factor with regard to information highlighting.

2. Words occurring at the outer ends of a sentence are recognized more accurately than those in medial position, showing that the initial and the final position in the sentence present a reliable cue to accurate word processing in the L1. In the L2, a ranking of initial > final > medial position in the sentence is expected. The effect of position is expected to depend on the focus condition: when there is no focal accent realised on the target, then the position of the target in the sentence becomes an important anchor for the perception of prosodic prominence.

To test the hypotheses, a word recognition experiment was set up in two parts. Experiment 1a tested the two hypotheses in three different focal accent conditions with natural stimuli, and Experiment 1b sought to clarify an aspect of hypothesis 1, namely whether

liesteners attend to local or global prosodic cues. The assumption is that the perceptual salience of accented words is not only due to their acoustic distinctiveness but is also due to the surrounding sentence prosody (Cutler, 1976). In Experiment 1b, two experimental conditions that differed in focal accent placement were set up with manipulated stimuli, employing the splicing technique.[15] Experiment 1a and Experiment 1b were conducted in parallel but will be reported in separate sections, that is, Experiment 1a in section 2.6 and Experiment 1b in section 2.7. Each of the experiments comprised a test in the subjects' L1 (German), and a test in the subjects' L2 (English). In addition, data from a native English control group was gathered.

2.6. Experiment 1a: Effect of prosodic prominence in native and nonnative listening

Experiment 1a investigated prosodic focus marking by pitch accent in comparing native with nonnative word processing, and in this also considered the aspect of word position. At issue was the question if German L2 learners of English use pitch accents and word position in the sentence to accurate L1 word recognition, and whether they would map this pattern onto word recognition in the L2.

2.6.1. Speech materials

Test materials were divided into two sets. One set consisted of targets that occurred in sentences ('in-sentence' targets), and one set consisted of targets that were single words not embedded in sentences ('word-only' targets). The set of in-sentence items contained 12 targets and 12 fillers; the set of single word items contained 24 fillers. The following passage describes the content of these two sets in detail.

A set of 12 sentences was constructed in each German and English that contained a target word ('in-sentence' targets)[16]. All sentences were dealing with bird life. The experiment was designed to reflect word recognition in a word learning environment and therefore target words were used that were thought to be less common in both the listener's L1 and L2. Hence, the topic of bird life was chosen in order to provide a theme in which novel words, in this case low-frequency names of birds, could be introduced in a meaningful context. In both the German and English language condition the length of the sentences varied between 20-25 syllables. This

[15] The splicing procedure performed on the stimuli will be explained in Experiment 1b (see 2.7.1).
[16] I am grateful to Prof. Suzanne E. Carroll for designing and constructing the test materials in English, and to Anne Zimmer-Stahl for constructing the test materials in German.

length resulted from a pilot experiment conducted in the English language condition in which two nonnative listeners judged sentences with regard to their, for L2 learners feasible, length.[17]

Each of the target sentences contained a bird name as target word. Bird names were chosen as items because this type of word is conceptually simple and because a vast number (target and fillers taken together) of low frequency words were needed which the subjects - L2 learners and native controls alike - were unlikely to know. Thus, target words uncommon names of real birds such as *brants* or *dotterels* (German examples: *Trogon, Sprosser)*, and they were controlled for word length. Six items consisted of one-syllabled words and six items consisted of two- or more-syllabled words. In the carrier sentence the target words occurred in three different positions: initial, medial and final. Word position and word length were balanced over target items.

To study the effects of different types of focus, prosodic variation of the sentences was elicited by using wh-questions. It is assumed that a wh-question focuses a specific constituent of the sentence and that the answer to the wh-question focuses the same constituent (Selkirk, 1995). In varying the questions for the target sentence, three different types of F0 contours of each target sentence were elicited. This resulted in three different realizations of focus structure, i.e. broad focus on the whole sentence (examples 5a/6a), narrow focus on the target word (examples 5b/6b), and narrow focus realised on a constituent other than the one containing the target word (examples 5c/6c). A broad focus context, for example, is created as an answer to the question '*What's happening?'* as in (5a) below. The focus structure determines accent location in the sentence (Féry, 1993), and the following examples of the English test sentences (language condition English L1/L2) illustrate different accent placement in the three focus conditions. In the examples, a question ('Q') prompts an answer ('A') and the accented constituent is indicated in capital letters.

(5a) Broad focus condition (from here on named condition 'B1')

Q: What's happening?

A: Birds like flickers can get blown off course by gales when migrating south to America.

(5b) Narrow focus on the target (named condition 'N1')

Q: Who can get blown off course by gales?

A: Birds like FLICKERS can get blown off course by gales while migrating south to America.

[17] Two student assistants listened to 12 English sentences of various lengths (14-45 syllables) and were asked to recall target words which occurred in initial, medial, and final sentence position. They indicated their processing limit/preference for sentences that were up to 25 syllables long.

(5c) Narrow focus on a constituent other than the one containing the target (named condition 'B2')

Q: When do flickers get blown off course by gales?

A: Birds like flickers can get blown off course by gales WHILE MIGRATING SOUTH TO AMERICA.

Examples of test sentences in German (condition German L1) are given in (6a)-(6c).

(6a) Broad focus condition (condition 'B1')

Q: Was ist los?

A: Regloses Ausharren vor seiner Auserwählten während der Balzzeit kennzeichnet den Trogon.

(6b) Narrow focus on the target (condition 'N1')

Q: Wen kennzeichnet regloses Ausharren vor seiner Auserwählten?

A: Regloses Ausharren vor seiner Auserwählten während der Balzzeit kennzeichnet den TROGON.

(6c) Narrow focus on a constituent other than the one containing the target (condition 'B2')

Q: Was kennzeichnet den Trogon?

A: REGLOSES AUSHARREN VOR SEINER AUSERWÄHLTEN WÄHREND DER BALZZEIT kennzeichnet den Trogon.

Note that in the experiment only the answer sentences were presented to the participants and not the questions. This means that in condition B1 (broad focus) and, albeit to a lesser degree, in condition N1 (narrow focus on target), the sentence accent falls on a part of the sentence which is expected by the listener to be accented. In condition B2, however, the accent placement can be unusual and surprising for the listener because the focus-directing question is not presented as well.

In addition to this, a set of 75 filler sentences was constructed in each language (see Appendix 1a for the complete set of sentences in English, and Appendix 1b for the complete set of sentences in German). A third of the filler sentences contained names of real birds that were thought to be commonly known. Examples of such filler items in English are birds like *ostrich* or *grouse*, examples of German items are *Reiher* or *Kauz*. The other two thirds of the sentences contained made-up names of birds (examples of English filler items: *sipperds*, *dunnocks*; German: *Tadorna, Kurol*). The filler items varied in word length (1 syllable, 2 or more syllables) and in sentence position (initial, medial, final), and were similar to the target

sentences with regard to their focus types. All target and filler items are listed in Appendix 2, and their distribution can be summarized as follows: In each language, a set of 48 words was constructed. 12 words were names of birds occurring in target sentences (see Appendix 2a for items in English, Appendix 2c for items in German), 12 words were bird names occurring in filler sentences (Appendix 2b for items in English, and Appendix 2d for items in German). The remaining 24 words consisted of bird names that did not occur in sentences (Appendix 2e for items in English, Appendix 2f for items in German). These words were presented as single word prompts after a block of four sentences had been played.

The distribution of word prompts across length and position is shown for the English language condition in Tab. 2.1, for the German language condition in Tab. 2.2.[18]

Tab. 2.1: *Distribution of items (English language condition), occurring in three positions (initial, medial, final) in a sentence, and items occurring as single word prompts.*

Type of item	word length (in syllables)	position: initial	medial	final	total
Target item in sentence	one syllable	2	2	2	12
	two or more	2	2	2	
Filler item in sentence	one syllable	2	2	2	12
	two or more	2	2	2	
Single word prompt	one syllable				9
	two or more				15

Tab. 2.2: *Distribution of items in the German language condition in three positions (initial, medial, final), and the number of single word prompts.*

Type of item	word length (in syllables)	position: initial	medial	final	overall
Target item in sentence	one syllable	2	2	2	12
	two or more	2	2	2	
Filler item in sentence	one syllable	1	1	1	12
	two or more	3	3	3	
Single word prompt	one syllable				9
	two or more				15

Twelve practice sentences and four single word prompts were constructed in each language for a familiarization phase (see Appendix 3a for practice materials in English, and Appendix 3b for practice materials in German). Two of the four single word prompts were used

[18] The two data sets were uneven with regard to word length of the filler items: in the German language condition there were more long words than short words, thus not balanced as in the English language condition. This was due to a mistake in the composition of the sentence materials that only got noticed after testing had started. As this did not concern the target items, the experiment was continued regardless of this shortcoming.

in sentences of the familiarization phase. The practice items also consisted of bird names but were not balanced for length or position in the sentence.

Three focus conditions were set up with identical testing procedure: Broad focus (condition B1), narrow focus on the target (condition N1), and narrow focus on a constituent other than the one containing the target (condition B2). The complete speech materials are listed in Appendix 1, including the question used to determine the focal accent placement. In the experiment, a word recognition task was used and analyses of the data were based on the percentages of correct word recognition. Reaction times (RT) that were recorded served as a bench mark to include or discard data from analyses and were not used as a further measure to evaluate word processing.

2.6.2. Speakers and recording procedure

A female speaker of South Eastern British English recorded the speech materials in English and a female native speaker of Standard German recorded the materials in German. They were given a print-out of the speech materials and were asked to read aloud the questions with the corresponding answers. They were instructed to place the sentence accent on the constituent focused by the question. The intended accents were not marked or in any editorial way highlighted in the written materials. During the recordings the realization of the focus accent was monitored, and speakers were asked to repeat the answer sentence in case the accent placement or its realization had not been appropriate.

In each language and for each of the three focus conditions, 12 target sentences and 62 filler sentences were recorded. The bird names occurring in the target and filler sentences were also recorded in isolation. In addition, 75 filler sentences were recorded in broad focus reading only. A further twelve practice sentences and three single word items were recorded for the familiarization phase. Digital recordings were made in a sound-proof booth, using an Audiotechnica 4033a microphone (audio sampling rate 22.05 kHz, 16-bit samples per second). Both the English and the German tokens were checked for their level of loudness and items were adjusted to an average intensity of 70 dB.

2.6.3. Participants

Sixty German learners of English participated in the experiment. They were German students or employees at the University of Potsdam and were at an intermediate to advanced level of English proficiency. All participants had started learning English after the age of 8. Of the sixty German participants, 39 had never been in an English speaking country, four subjects had spent up to 3 months in an English-speaking country, ten subjects between 6-11 months, and seven subjects had stayed for longer than 12 months in an English speaking country. On

average, they had spent 9.8 months in an English speaking country. They were between 18 and 45 years old (mean 21.0 years). A British English control group of 22 participants was tested in the UK. Five of them were students recruited from University College London, and 17 subjects were first and second year students at the University of Essex. The range of age was between 18 and 43 years (mean 22.5).

Participants either received credit for course requirements or were paid for their participation. At the time of the experiment all participants reported normal or corrected hearing and normal or corrected vision.

The sixty German subjects were distributed equally over the three focus conditions N1, B1, and B2. Ten English controls took part in each of the focus conditions N1 and B2, and two controls in condition B1.[19]

2.6.4. Estimating language proficiency: The Oxford Placement Test

Studies focusing on L2 comprehension can be very heterogeneous in their results, a finding which Rüschemeyer *et al.* (2005) attributed to the fact that subject groups in experiments differ in relevant biographical information such as age of L2 acquisition, or level of proficiency in the L2. Other perception and production studies stress that next to these factors also the level of exposure to an L2 can greatly influence how an L2 is processed (Flege, 1988; Flege *et al.*, 1995; Flege et al. 1999, Flege & Liu, 2001). Therefore, care was taken in the present experiment to collect data on the learner history and to stratify the participants of the present experiment by proficiency level.

The German participants of the present experiments were mainly undergraduates of similar educational background. Their English language skills were assumed to vary in their degree of proficiency as some of them reported a longer stay in an English speaking country. To obtain a measure of language proficiency the Oxford Placement Test (OPT; Allan, 2001) was administered. The test offers a base line for the initial assessment of students in English. It is a standardized test (multiple-choice) divided into two main sections, Listening Test (10 min.) and Grammar Test (~30 min, as indicated by the OPT).[20] Both sections of the test have 100 items and produce percentage scores. The two sections of the tests are designed to be used together. The aggregate score from the two sections can be used to establish a rank order for placement or other purposes, in our case to ensure a similar level of English proficiency within all three focus conditions. Participants completed both listening and grammar section of the test. The scores for

[19] Due to organizational problems only two control subjects were tested in this condition.
[20] The time allocated to the listening test was fixed as the sentences were played automatically and time frames for answers were already included in the recordings. For the grammar test no time limit was set in order to avoid the impression of an examination. It took subjects about 40 minutes to complete the grammar part.

the listening and grammar part were collapsed, and the mean percentage of correct answers was calculated per subject. The median value of all OPT scores was 85, indicating that half of the subjects had achieved a score of <=85, and the other half a mean score of more than 85. The two groups were then equally balanced over the three focus conditions. This means that in each focus condition ten subjects had a score of <=85 percent, and ten subjects had a score of >85 percent correct. A listing of the test score with the corresponding proficiency ranking according to the OPT is given in Appendix 4.

2.6.5. Procedure and experimental task

A closed-set word probe detection task was built for the experiment, using DMDX software (version 3.0.0.13). The speech materials were presented in 48 blocks of 4 sentences. After each block a word prompt was played. The word prompt had either occurred in one of the four sentences, or not. Each block either comprised a target sentence and three fillers, or contained fillers only. The target sentences were balanced in terms of presentation order within the blocks (position 1-4) and the blocks were listed and presented in randomized order, which was produced by a random-sequence generator. To compensate for possible fatigue effects, a second list was created with stimuli in reverse order of list one. Subjects were distributed equally across the two lists.

Before the experiment started, subjects were asked to complete a questionnaire about their language background (see Appendix 5a for version in German and Appendix 5b for the version in English). They then entered a brief familiarization part in which they heard three blocks of four sentences followed by a word pronounced in isolation. Subjects were asked to decide if this word had occurred in one of the previous four sentences. Listeners were asked to press a key marked 'YES' on a computer keyboard when they recognized the word as one having occurred in one of the previous 4 sentences, and a key marked 'NO' when the word in isolation had not occurred in one of the previous four sentences. They were instructed to make their decision as quickly as possible. The accuracy of subjects' responses and reaction times to targets (RT) were automatically recorded.

There were 24 word prompts with 'yes' as the correct answer (12 target items and 12 filler items), which indicated that the word in question had been present in one of the previous four sentences. 24 word prompts had 'no' as correct answer, meaning that the word had not been mentioned in one of the previous four sentences. Responses were timed out when subjects took longer than 2500 ms to respond, and a missing answer was recorded. The sentences and word probes were presented at a comfortable listening level via Philips SBC HP250

headphones. At any time of the experiment listeners could adjust the volume level to individual hearing preferences.

Feedback was given in the trial part on the correctness of the answers but no feedback was given during the actual test, and there was no further communication with the experimenters once the test had started. Subjects heard the stimuli sentences only once. Two self-timed pauses were programmed within the experiment after the 15th resp. the 32nd block. Each experiment (German task and English task) took the listener about 30 minutes to complete.

The experimental order was as follows: First, the Oxford Placement Test was administered; after that, participants completed the experiment in the German language condition, and they then returned after an interval of on average 8 days to do the experiment in the English language condition. The English control group was tested in the English language condition only.

2.6.5. Results of Experiment 1a

This section is dived into two parts. Firstly, the hypothesis of a native language-dominance is examined in the German subject group, with the expectation of German L1 > English L2, and the expectation in the English language condition of English L1 > English L2. Analyses of the effect of accent structure on accurate word recognition in native and nonnative listening in the three different focus condition B1 (broad focus), N1 (narrow focus on target), and B2 (narrow focus on a different constituent than the target) are reported. The prediction was that narrow focus on the target yields better recognition results than when the focus is on a different constituent than the target. In addition, the impact of position in the sentence and of word length on word recognition in the L1 and L2 are examined between the focus conditions.

Secondly, the effect of accent structure is investigated per language condition, focusing on the L1-L2 comparison. This tested the hypothesis that listeners use pitch accent realisations of focus structure to accurate word processing in the L1 and to a similar but lesser extent in the L2. To test the ranking of the sentence location principle (expectation: initial > final > medial position), each focus condition also considered the effect of word position. Analyses were expected to reveal the absence of effects of word length in the language pair of German L1 and English L2.

In a first step, the number of correct responses was identified and the data valid for analyses were computed as follows:

For all target items (German L1: n=1440, English L2: n=1440, English L1: n=1080) the timed-out responses (RT > 2500ms), and the responses with reaction times below 150 ms were discarded from analysis (percentages of correct probe recognition without timing

constraints per focus condition are listed in Appendix 6). In the program, subjects' responses in the word recognition task were recorded either as false recognition (false 'yes', and false 'no' answer), or as correct answer (correct 'yes', and correct 'no'). Tab. 2.3 shows the percentages of timed-out answers, of false answers, and of correct answers for target items (the distribution of false no-answers is given in Appendix 7).

Tab. 2.3: *Percentages of data distribution for targets in three focus conditions, for answers given by German subjects and English controls.*

	timed-out		false answers		correct answers	
	n	%	n	%	n	%
German L1	72	5.0	107	7.4	1261	87.6
English L2	209	14.5	117	8.1	1114	77.4
English L1	40	5.6	36	5.0	452	89.5

The analyses in the following sections are based on target words, and within these on items with correct 'yes'-answers only. This is because these were items that had actually been presented in sentence context, therefore providing data on focus condition as well as on position of the target in the sentence. The percentages of correct recognition of target items in the three test conditions were calculated for each of the language conditions (German L1, English L2, English L1), and percentage values are shown in Tab. 2.4:

Tab. 2.4: *Scores (% correct)of accurate target recognition in three focus conditions, for German subjects and English controls.*

	B1 (broad focus)	N1 (narrow focus)	B2 (narrow focus not on target)
German L1	92.5%	91.4%	92.5%
English L2	91.9%	88.8%	91.0%
English L1	100%*	90.4%	93.4%

*number of subjects N=2

The high mean scores of the subject groups in all conditions suggest that the word recognition task did not seem to present any difficulties to the listeners. As can be seen in Tab. 2.4, there were hardly any differences between the focus conditions in German L1 and English L2. In all conditions, scores in the native German L1 conditions were slightly higher than those achieved in the nonnative conditions. To evaluate the effect of prosodic prominence on word recognition in the L1 and L2, the accuracy scores of the German subject group were subjected to a univariate ANOVA with language and focus condition as fixed factors and correct

responses as dependent variable. The focus conditions differed with regard to accent placement on the target, and the ANOVA tested for differences in recognition scores between the language conditions and for effects of focus condition.

In this analysis, the effect of focus was not significant and there was no interaction of focus and language. In the English control group, a t-test comparing scores correct recognition of condition N1 with condition B2 revealed no difference between these two focus conditions. [21] Results revealed a significant difference between German L1 and English L2 with regard to recognition scores [$F(1,119)=15.078$, $p<.001$], suggesting that German subjects performed better in their native language L1 than in the L2.

Overall, the German subjects achieved a lower score of correct word recognition in condition English L2 (90.5% correct) than the native English L1 control group (92.6% correct). This difference was not significant in a t-test with independent samples.

These first analyses confirmed the expectation of the native language dominance in the German subject group (German L1 > English L2), and in the two English language conditions (English L1 > English L2). Contrary to expectations, no differences between focal accent conditions were found in neither of the two subject groups.

Next, the effect of target position and of word length was examined in the three focus conditions of the three language conditions[22]. Results are reported for each factor separately, and this concludes the first section of the result part. In the second part of the result section, analyses are reported per focus condition, which consider word length and position in native and nonnative word recognition.

Target position in the sentence

In each of the three focus conditions percentages of correct word recognition were calculated for the three word positions in the sentence (initial, medial, final), and values (% correct) are presented in Tab. 2.5. Recall that, unfortunately, due to problems with the organization of the native English controls only 2 subjects were tested in condition B1. As a consequence, comprehensive statistical analyses for target position over the three focus conditions were not possible and results are not conclusive.

[21] Accuracy rates from condition B1 were not included in the analysis due to low number of controls in this group.

[22] I sincerely thank Robin Hörnig for his advice and help with the statistical analyses of this part of Experiment 1. Errors of fact and interpretation are mine.

Tab. 2.5: *Percentages of correct target recognition per word position in the three focus conditions (B1= broad focus; N1= narrow focus on target; B2= narrow focus not on target) for each of the language tasks.*

	Position:	initial (% correct)	medial (% correct)	final (% correct)
Condition: German L1	B1	90.5	97.2	92.5
	N1	92.0	95.9	97.5
	B2	88.9	95.8	98.7
English L2	B1	98.4	93.8	94.1
	N1	89.9	91.8	83.1
	B2	96.7	93.7	93.0
English L1	B1*	100	100	100
	N1	94.9	94.6	89.5
	B2	94.4	94.1	97.1

**N=2*

One-way ANOVAs were carried out on the data per language and focus condition, with number of correct responses as independent factor and word position as dependent variable (thus irrespective of the factor of word length). This revealed a significant difference for position only in the native language condition German B2 [$F(1,59)=4.973$, $p<.05$].

Post-hoc tests with Bonferroni adjustments indicated a significant difference in condition German B2 between initial and final position, with higher recognition scores obtained for targets in final position than for targets in initial position. The other comparisons of word position within the focus conditions B1 and N1 revealed no significant effect.

Fig. 2.1 displays the percentages obtained per focus condition, with lines showing the results for items in initial (blue small-dotted line), medial (yellow large-dotted line), and final position (pink solid line). Recall that condition B1 is with broad focus realization, condition N1 with narrow focal accent on the target, and condition B2 with focus accent is realized on a constituent other than the target. Thus, in condition German B2 the target is assumed to be not prominent to the listener. In this condition, listeners were found to use the salience of the final position for efficient word recognition and not, as hypothesised, the initial position (see end points of blue and pink lines in the first panel of Fig. 2.1).

Note that the high value of correct responses in condition B1 in the language condition English L1 may be misleading, as the mean percentages are based on the data obtained from only two subjects.

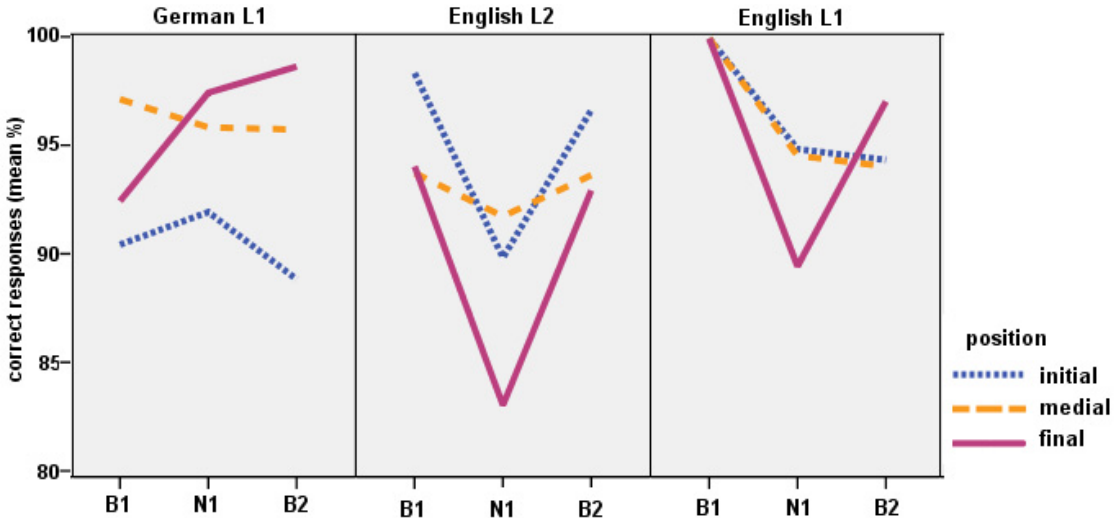

Fig. 2.1: *Correct responses (mean %) obtained in the three languages in each of the focus conditions (B1= broad focus; N1= narrow focus on target; B2= narrow focus, not on target).*

In addition to the effect of word position in condition German B2, there also was an effect of native language dominance in the German subject group (German L1 > English L2, see p. 43). This can be seen in the on average higher values for medial and final position (pink and yellow lines) in German L1 (Fig. 2.1, left panel) in comparison to English L2 (medial panel). The initial position (blue line), however, shows higher values in the L2 than in the L1. These differences will be further looked into in the sections dealing with L1-L2 differences in each focus condition (see p. 48f.). Fig. 2.1 also illustrates the advantage of English L1 (right panel) over English L2 (medial panel).

Target length

Percentages of correct probe detection for target length (one-syllabled or more-syllabled items) were computed across focus conditions, and values are presented in Tab. 2.6.

Tab. 2.6*: Word recognition scores (% correct) across focus conditions for word length.*

Word length:	one syllabled (% correct)	more syllables (% correct)
German L1	92.4	96.2
English L2	94.8	90.2
English L1	97.6	91.5

A univariate ANOVA with correct recognition as dependent variable and word length and language as fixed factors showed no significant main effect of word length across the combined German data (German L1 and English L2), and there was no main effect of word

length in the control data of English L1. However, there was an interaction in the combined German data (German L1 and English L2) of word length with language [F(1,239)=16.022, p<.001], which is depicted in Fig. 2.2.

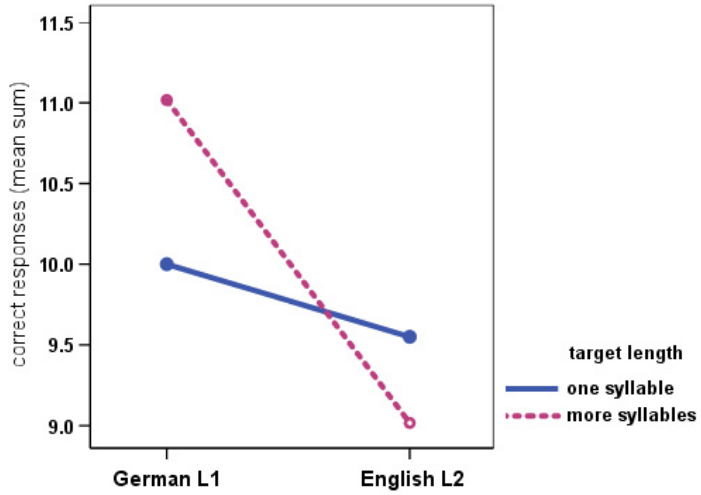

Fig. 2.2: *Interaction of word length with language condition.*

It can be seen in Fig. 2.2 that there is a bigger difference in scores between short and long words in condition German L1 than there is in English L2. In the condition German L1, longer words were more often recognized correctly than short words, whereas in condition English L2 short words were better recognized.

Next, percentages of correct word recognition were computed in each focus condition for the two measures of word length, i.e., for one-syllabled targets and targets consisting of two or more syllables (Tab. 2.7).

As can be seen in Tab. 2.7, the overall advantage of longer words over shorter words shown for German native listening (see Tab. 2.6), emerged in all three focus conditions. The reverse finding, namely an advantage of shorter words in nonnative listening, was also apparent in each of the focus conditions of English L2. A similar tendency could be observed in the results of the English L1 control group.

Tab. 2.7: *Correct target recognition (%) per word length in the three focus conditions (B1= broad focus; N1= narrow focus on target; B2= narrow focus, not on target) for each of the language tasks.*

	Word length:	one syllable (% correct)	more syllables (% correct)
Condition:	B1	89.2	95.7
German L1	N1	89.7	93.1
	B2	89.3	95.7
English L2	B1	94.2	89.8
	N1	93.9	83.7
	B2	93.3	88.5
English L1	B1*	100	100
	N1	91.1	89.7
	B2	95.1	91.7

**N=2*

One-way ANOVAs were carried out to evaluate the effect of word length per language and focus condition, with number of correct responses as independent factor and word length as dependent variable (thus, not taking the factor of position into account). This showed a significant effect of word length in condition German B1 [$F(1,38)=7.445$, $p=.05$], indicating an advantage in correct word recognition of longer words over shorter words. Word length was not significant in condition German N1. There was a significant effect word length in German B2 [$F(1,38)=6.782$, $p<.05$], in that again longer words were better recognized than shorter words. In the nonnative language conditions there was a significant effect of word length in the English L2 condition N1 [$F(1,38)=4.457$, $p<.05$] and in the English L2 condition B2 [$F(1,38)=4.095$, $p=.05$], suggesting in both cases an advantage in recognition scores of shorter words over longer words. In the English L2 condition B1, word length was not significant. In the data of the control group, word length was not significant in any of the three conditions. These analyses conclude the first part of the result section of Experiment 1a.

The following second part reports on analyses examining the joint influence of word position in the sentence and word length per focus condition, in a comparison of native German L1 and nonnative English L2 listening. This aims at a closer investigation of L1-L2 differences with regard to the joint effect of word position and word length in the separate focal accent conditions. The expectation was that in the absence of focal accent on the target (conditions B1 and B2), word position would become more important as a cue to accurate word recognition. A different ranking of position is expected for L1 (initial > final > medial position) and L2 (initial > final). Furthermore, the absence of an effect of word length was expected for the language pair of German L1 and English L2.

To test the hypotheses, accuracy scores for targets occurring in sentences were subjected to ANOVAs with repeated measures, with target length (one-syllabled or two- or more-syllabled items) and target position in the sentence (initial, medial, final) as within subjects factors and focus as between subjects factor. Paired comparisons for target position examined initial vs. final, and medial vs. final position. This was done in order to test for the hypothesis of salience of the outer ends of a sentence. The results are reported per focus condition.

Condition B1: Broad focus

In condition German L1 with broad focus (B1) there was no effect of target length, as one and more-syllabled words were equally well recognized. There was a significant difference between the target positions [$F(2,38)=6.032$, $p=.05$]. Paired comparisons of the final position against initial and medial position revealed a significant difference between initial and final target position [$F(1,19)=6.032$, $p<.005$], indicating that targets occurring in final position were better recognized than targets in initial position. In the corresponding L2 task target length also failed to reach significance [$F(1,19)=3{,}347$, $p=.83$], and there was no effect of target position despite the seeming difference displayed in Fig. 2.3.

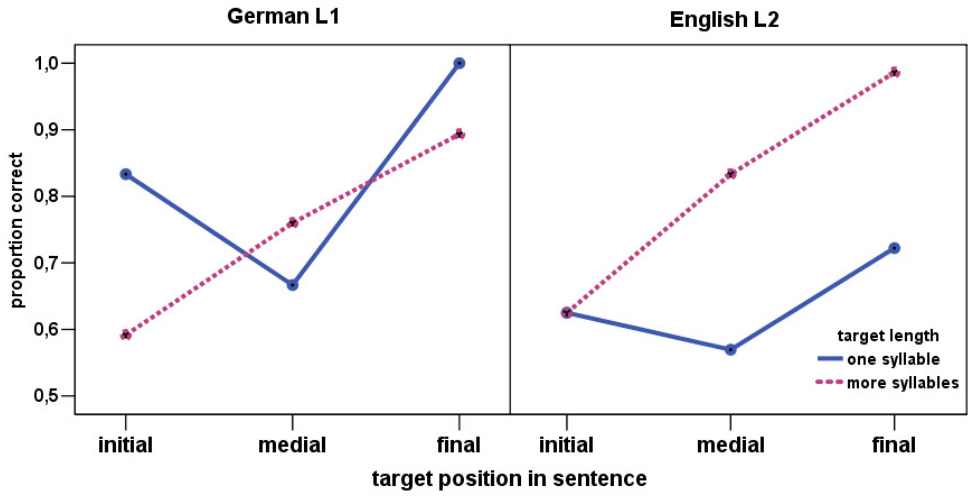

Fig. 2.3: *Accuracy rates of German subjects in condition B1 (broad focus).*

Condition N1: Narrow focus on the target word

In the condition with an accented target (N1), target length had no effect on word recognition in either German L1 or English L2. In the native listening task, target position was significant [$F(2,38)=5.209$, $p=.01$]. Paired comparisons revealed a significant difference

between initial and final target position [$F(1,19)=13.470$, $p<.005$], suggesting that targets occurring in final position were better recognized than targets in initial position. Target position also interacted with word length [$F(2,38)=4.358$, $p<.05$], suggesting that short words were better remembered than longer words when occurring at the outer ends of the sentence, whereas in the middle of a sentence it were the longer words that were better recalled. Tthere was no effect of target position or of word length in the L2 task. In this, the two patterns of L1 and L2 are thus different. Fig. 2.4 illustrates the interaction of position with word length in German L1. The graph also shows the difference with regard to the salience of final position between the two language conditions: When a narrow focus accent is realized on the target, the advantage in native language listening of short words occurring at the outer ends of a sentence over longer words does not hold for nonnative language listening.

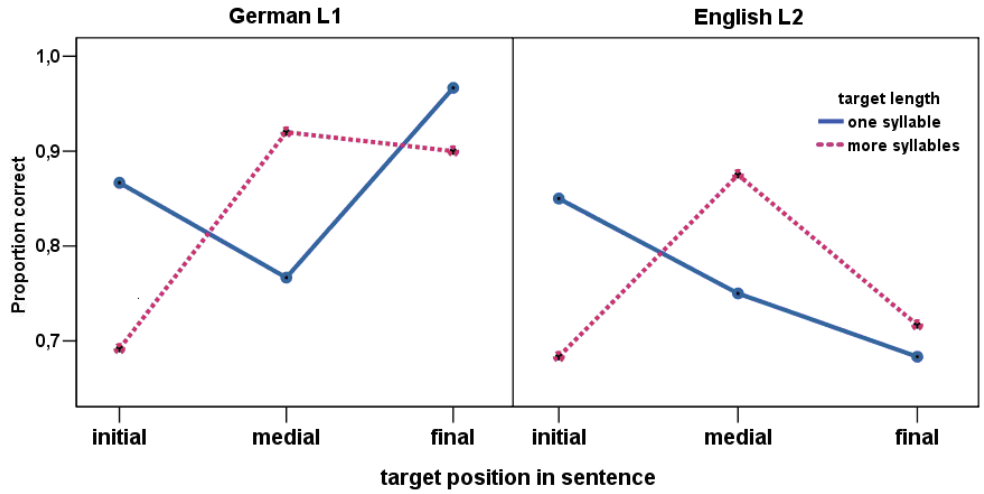

Fig. 2.4 *: Accuracy rates of German subjects in condition N1 (narrow focus on target).*

Condition B2: Narrow focus on a constituent other than the target

The response patterns for condition B2 are shown in Fig. 2.5 below. Analyses revealed no effect of word length in neither of the language tasks. Target position was significant [$F(2,38)=3.261$, $p<.05$] in German L1. Paired comparisons revealed significant differences between the initial and the final position of the target [$F(1,19)=6.265$, $p<.05$], and also between the medial and the final position [$F(1,19) = 4.388$, $p=.05$]. This suggests that for the recognition of an unaccented target, the final word position has an advantage over both initial and medial position. The position of the target interacted with word length [$F(2,38)=4.166$, $p<.05$], in that in medial position longer words were at an advantage, whereas in final position short words were at an advantage (see left panel of Fig. 2.5). The effect of

target position was also significant in the L2 task [$F(2,38)=5.028$, $p<.05$], and paired comparisons showed a significant difference between the initial and final position [$F(1,19)=14.241$, $p<.005$], indicating that words in final position were significantly more often recognized than words occurring in initial position. There was no interaction of target position with word length in the L2 task.

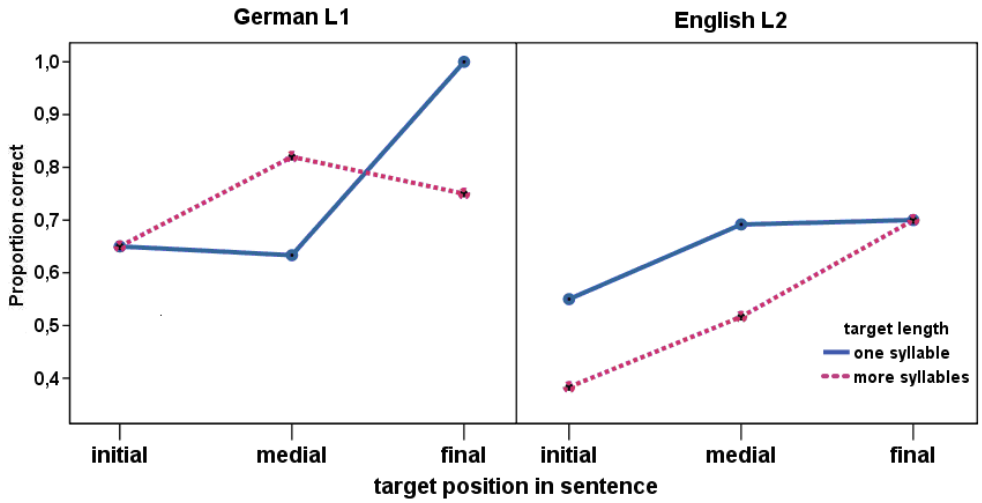

Fig. 2.5: *Accuracy rates of German subjects in condition N1 (narrow focus on target).*

Thus, when words are unaccented (as targets were condition B2), the final position seems to be a strong cue to accurate word recognition in both L1 and L2. Moreover, the final position brings out a positive effect of short words in native language processing. In the L2, word position clearly seems to be a stronger cue than word length.

Further analyses

Focus effect in medial position

It could be argued that the effect of position found for initial and final position obliterates any possible effect of focus, in that a strong position effect may outweigh an effect of focus. I therefore examined the recognition accuracy of targets in medial sentence position only, with the aim of excluding a possibly superimposed effect of sentence position (Tab. 2.8; see Tab. 2.5, p. 44, for percentages obtained in initial and final position).

Tab. 2.8: *Scores of correct word recognition (%) per focus condition for targets occurring in sentence medial position.*

	B1 (% correct)	**N1** (% correct)	**B2** (% correct)
German L1	97.2	95.9	95.8
English L2	93.8	91.8	93.7
English L1	100	94.6	94.1

The effect of focus condition on the correct responses given for items occurring in medial position was examined in univariate ANOVAs, with sum of correct responses as dependent variable, and focus condition and language as fixed factors. This revealed no effect of focus condition in neither language task. In addition to that, one-way ANOVAs with correct responses as dependent variable and focus condition as fixed factor examined the data for medial position in each of the language conditions separately. The effect just failed to reach significance in condition English L2 [$F(2,57)=2.987$, $p=.058$]. In the conditions German L1 and English L1 there was no effect of focus, indicating that the word recognition scores of targets in medial position did not differ significantly between focus conditions. This lack of a focus effect for items in medial sentence position is taken as an indication that the positional effect found at the outer ends of the sentences did not outweigh an effect of focus. Instead, it strengthens the conclusion that there was no effect of focus in the three conditions examined.

Influence of language proficiency

It had been a concern that results might be influenced by the foreign language proficiency of the subjects. To control for this factor, the English proficiency of the subjects was assessed with the Oxford Placement (OPT, Allan, 2001). Based on the total score (listening and grammar scores collapsed) achieved in the OPT, two proficiency groups of subjects were formed with the median score as break point, and distributed equally across the three focus conditions. This means that there was an equal number of lower and more advanced learners in all three focus conditions. Results were examined to evaluate if scores of the recognition tasks in the three conditions could be related to the English language proficiency of the subjects.

First, the scores achieved in the OPT tasks were examined. A oneway ANOVA revealed no significant differences in subjects' total OPT scores between the three focus conditions. This indicated that the procedure to equally distribute subjects across conditions had served its purpose. Next, scores achieved in the listening and grammar part of the OPT were examined separately. There was no difference in grammar scores between subjects in the three focus conditions. However, an analysis of the scores of the listening tests showed a significant difference between the focus conditions [$F(2,57)=4.202$, $p<.05$], with post-hoc tests indicating a significant difference between subjects of condition N1 and B1, and between subjects of B1 and B2.

To look further into the question whether the recognition results could be related to learners' proficiency, the correlation of correct word recognition and the two proficiency groups was examined for all 24 target words and all 60 listeners in the nonnative language condition. It

turned out that there was no correlation between learner group and score of word recognition accuracy. This suggests that dividing the subjects according to their language proficiency had no effect on the word recognition scores.

To briefly summarize the results of Experiment 1a:

Recognition scores in the native language conditions were better than in the nonnative language conditions (German L1 > English L2; English L1 > English L2). There was no effect of focus condition in neither the German data or in the data of the English control group. Across conditions, word position had an effect only in the German condition B2, indicating an advantage of the final over the initial position. In the German data (across conditions), word length interacted with language in that longer words were more often correctly recognized in German L1 than short words, whereas in English L2 it was the reversed, i.e., an advantage of short words over long words. In analyses with word length as a single factor, longer words were better recognized than short words in condition German B1 and B2 (no effect in N1). In the nonnative condition English N1 and B2, short words were better recognized than longer words (no effect in B1).

A closer inspection of the joint effect of word position and word length per focus condition revealed no effect of word length in German L1 and English L2 in condition B1, and an advantage of final over initial position in the German L1; there was no effect of position in English L2. In condition N1, there was no effect of word length in German L1 and English L2 but there was an effect of position in German L1 with an advantage of the final over initial word position; word position had no effect in condition English L2. Moreover, word length interacted with position in the native German condition N1, suggesting that short words occurring at the outer ends of a sentence were better recognized than long words, whereas long words were at an advantage when occurring in medial sentence position.

In condition B2, there was no effect of word length in German L1 and in English L2. In both language conditions of B2 there was an advantage of the final over the initial word position in the sentence. In German L1, position interacted with length: long words were better recognized in medial position, and short words were better recognized in final position.

An analysis of recognition scores for medial items was conducted to investigate the effect of focus irrespective of the strong position effect found in the data. Results confirmed the absence of a focus effect on word recognition scores also for this subset. The accuracy rates of correct recognition scores could not be statistically related to language proficiency groups.

2.6.6. Discussion of Experiment 1a

The present study examined whether and how the processing of focus realized by pitch accent differs between L1 and L2 word processing, and if word position in the sentence influences word recognition. To this end, sentences were recorded in three focus conditions, namely broad focus (B1), narrow focus on the target (N1), and narrow focus on a constituent other than that in which the target word occurred (B2). Sentences were presented to German L2 learners of English in the native language (German L1) and in the nonnative English language (English L2), and to a native English control group (English L1). The effect of focus structure and of position in the sentence (initial, medial, and final) on correct word recognition was evaluated. Furthermore, word length (one-syllabled vs. two- or more-syllabled words) was taken into account.

A basic observation is that German L2 learners recognized novel words better in their native language than in the second language. They also missed fewer items in the native language task than they did when listening to the nonnative sentences. This is in line with earlier findings of Akker & Cutler (2003) who reported an advantage of native word processing over nonnative processing and confirmes the hypothesis of native language advantage. However, the accuracy rates of the German L2 learners matched the level of performance of the native English speakers. This indicates that the nonnative language task was feasible for the German L2 learners who seemed to have little difficulty processing the English sentences. In fact, the task may have been too easy to reveal effects of prosodic prominence, as performance was close to ceiling level.

The main finding of the present experiment is that prosodic prominence as conveyed by pitch accent did not lead to a better word recognition. A lack of focal accent effect was found in German L1, English L2, and in English L1. This indicates that there was no effect of prosodic prominence on the recognition task in native language processing, where listeners were expected to be sensitive to accent information, as well as in the L2, where a transfer of the facilitative effect of accent structure was expected. From studies reporting beneficial effects of prosodic prominence on word processing (Cutler & Fodor, 1979; van Santen & Olive, 1990; Eefting, 1991; Pitt & Samuel, 1990), I derived the prediction that L2 learners would recognize novel nouns better when these are focused through prosodic prominence. How can the lack of sensitivity to focus realization by pitch accent in the current experiment be explained?

Let us first look at the sentence materials. In the present experiment, prosodic variation was elicited using wh-questions for otherwise identical sentences. It could be that the emphasis elicited by those questions was not a strong enough cue. During the recordings,

speakers were instructed to utter the sentences with natural emphasis, depending on the preceding wh-question. An exaggerated accentuation in the realization of the speech materials might have led to more distinct results with regard to the focus conditions, but the naturalness of the stimuli had been of greater concern.

With regard to L2 processing, it could be that focal accent cues are simply not something that L2 learners of a language make easily use of. For example, Pennington & Ellis (2000) found in their study on Cantonese learners of English that the memory performance based on prosodic information was generally poor. Pennington & Ellis (2000) concluded that L2 learners need explicit prosodic cues to process focus structure. The subjects of their study were native speakers of a tonal language, which might have influenced their stress processing abilities, resp. patterns. It may, therefore, be premature to apply conclusions based on the poor processing patterns of the Cantonese L2 learners to the present results. The subjects of the present study were native Germans, and in both German and English stress distinctions are used, and listeners process accentual structures. Therefore, a similar use of accent cues for efficient word processing is much more likely than in the study of Pennington & Ellis (2000).

The absence of a significant focus effect in L2 listening is not consistent with earlier findings for L2 learning by Rast (2003) and Rast & Dommergues (2003), who found accent to be beneficial in word learning in French learners of Polish. They investigated word learning by controlled use of lexical input during 0-8 hours of language tuition. As their experimental task was different from the one used in the present experiment, these results may not present a good base for comparison. A better comparison yield the results obtained in the study of Akker & Cutler (2003), because their testing methodology involved a perception study measuring accuracy rates and reaction times in a comparative L1/L2 setting. In their study they found an absence of a focus effect in Dutch learners of English when testing learners in both language conditions (Experiment 3). The results of the present experiment confirm their findings. Akker & Cutler (2003) suggested that it was apparently not possible to collect comparable data in two languages from the same listener group because the performance in the second experiment would be influenced by knowledge acquired in the first experiment. As one main interest of the current experiment was to keep the study as a within-subject comparison of native with nonnative listening, the absence of a focus effect in the present experiment could have been due to the experimental design, as subjects were tested in both language conditions. The test order of the current experiment was German L1 followed by the English L2. The rationale for always running the English language condition after the German condition was to put the most difficult condition last so that in case of a learning effect, this would work conservatively to boost the scores of the English L2 tasks. While this is not considered to be a full explanation of the lack

of focus effect, this result suggested that for the subsequent experiments of the current work, the test order of the languages ought to be taken into account.

Another factor that might have contributed to the lack of accent effect was the overall strong positional effect which could have overshadowed any effect of accent. A closer inspection of items in medial position was conducted in order to reveal an effect of focus by pitch accent, because in considering medial items only the overall strong effect of position had been ruled out. This was not the case, as also in this subset of data no effect of focal accent on word recognition scores could be found. However, because a strong effect of position was found for items occurring in final and in initial position, it is still probable that the lack of a clear accent effect is due to the dominance of a positional effect. This view reflects the idea that there are multiple parameters that convey information in a language and that it is their relatedness and their weighting which are important for listeners, rather than one parameter that is singled out. It suggests that probably combinations of prosodic, lexical and morpho-syntactic features convey prominence to the listener.

The length of the words to be recognized did not seem to matter to the listeners in broader analyses that took language, focus condition and word position into account. There had been no main effect of word length in these analyses, neither in the German L1 and English L2 conditions, nor in the data of the English controls. Based on findings for English L1, it was argued that a single stressed syllable would be articulated in a more prototypical fashion which would make it easier for learners to process shorter words more accurately than longer words (Cutler & Norris, 1988). This reasoning is in line with Baddely *et al.* (1975), who reported an advantage of short words over long words in memory tasks. Lovatt *et al.* (2000), on the other hand, found no reliable advantage for short-duration disyllables in recall tasks in English. Their finding is in line with the absence of a main effect of word length in English L1 in the current experiment.

In analyses with word length as a single factor, an advantage of long words over short words could be observed in conditions German B1 (broad focus) and B2 (narrow focus on another constituent than on the one containing the target). This suggests that in the absence of other factors, word length seems to be important for an efficient recognition of words which are not highlighted by focal accent. In the native English listening, an advantage of short words over long words was found in the condition N1 condition (narrow focus on the target), and in condition B2. The reverse direction of the effect, i.e., long > short in German L1 and short > long in English L1, indicates different processing patterns in native German L1 and in English L2. This is supported by an interaction of language with word length that showed in analyses of

the German data across conditions: German participants recognized words better when they were long in native listening, and it was the reverse case for nonnative listening task: in English L2, listeners found it easier to recognize shorter words. In separate analyses per focus condition in English L2, German listeners showed a better recognition of short words in the English L2 conditions of N1 and B2, and results could thus be interpreted as to extend the claim of a processing advantage of short over long words from native English to nonnative English. In the absence of other factors such as word position, word length can have an effect on word processing in English L2. As this is based on restricted analyses, more investigation into this aspect is needed. [23]

The word length effect disappeared in joint analyses of the two factors of length and position per focus condition in German L1. A processing benefit of short word length only emerged in the interaction of word length with position (conditions German N1 and B2). Listeners recognized short words better than long words when the former occurred at the outer ends of the sentence, whereas in the middle of a sentence they recognized long words better. Position thus seems to give rise to an effect of word length in German native word recognition. Similarly to German L1, there was no effect of word length in English L2 listening. The absence of an effect of word length confirms Rast & Dommergues (2003), who suggested that the length of a word is not a significant factor determining its successful repetition. The study of Rast & Dommergues (2003) involved production accuracy, and the current result complements their findings in a different task, i.e., word recognition, and extends them also to a different language pair, namely German L1 - English L2.

Learners' sensitivity to positional cues was examined in both the L1 and the L2 task. In analyses across focus conditions and without taking word length into account, position was a strong cue to L1 word recognition only in the condition German B2. In this condition, listeners obtained significantly higher recognition scores for targets in final position than for targets in initial position. This confirmed Akker & Cutler (2003) in their finding of an advantage of items occurring late in the sentence over early targets. However, there was no effect of position in the corresponding L2 task of condition B2.

The separate analyses per focus condition yielded different results for *position*. In examinations of the three focus conditions of German L1, results revealed an advantage of the final over the initial position in all three focus conditions, as listeners consistently remembered words better when these had occurred in final position in the sentence. Word position had no

[23] These analyses did not take the factor of word position into account. Also, there was no effect in condition B1.

effect in the nonnative language conditions, but a trend could be observed of an advantage of items occurring at the outer ends of the sentence, indicating an advantage of initial over final position. This suggests that focus condition had an effect on the way that listeners made use of position, and that this effect was levelled out in analyses across conditions. Overall, findings point to the direction of results obtained earlier for native English listening by Slobin (1985), and for German by Klein (1984), who both stated a preference of listeners for attending the outer ends of sentences. The current findings do not, however, follow the ranking of initial > final > medial position proposed by VanPatten (2002; 2004). In none of the three focus conditions words occurring in initial position were significantly better remembered than words occurring in final position. I interpret the results of the current experiment therefore more as *recency effect* (Murdock, 1962), meaning a cognitive bias that results from disproportionate salience of recent stimuli or observations. This effect refers to the finding that recall accuracy varies as a function of an item's position: People tend to better recall items at the end of a list than items located in the middle of a list. The recency effect in the current data is based on the finding that words occurring at the end of a sentence were better represented in the memory than words from earlier parts of the utterance. The notion of salience of the final position also agrees with a convention for the integration of new information in a discourse, mentioned in the introductory chapter 1.3. It states as communicative strategy that relevant background information is referred to first, and then what is novel (Haviland & Clark, 1974). This structure is assumed to cue the listener as to what the speaker considers to be important information. It could be that the advantage of the final position benefits from this convention.

With regard to the acoustic realization of words in final position, Oller (1973) showed that speakers signal the end of utterances and phrases by lengthening of the final syllable. The lengthening provides listeners not only with a stable acoustic input that facilitates recognition, but also cues listeners concerning the end of linguistic input. The similar direction of the effect of final over initial position found in German L1 and English L2 (condition B2) suggests for one that the sensitivity to final position can be interpreted with Oller (1973) as a learned aspect of language. The similarity also implies that listeners use similar strategies in L1 and L2 with regard to position when there is no accent information available.

It is also striking that the advantage of final over initial word position (nonnative condition B2) was the only significant effect in any of the L2 language conditions. This advantage of words occurring later in the sentence confirms Akker & Cutler (2003), and partly results from Rast (2003) and Rast & Dommergues (2003), who found better learning of words occurring in sentence-initial or sentence-final position. In the present nonnative condition B2, with narrow focus on a constituent other than the one containing the target, listeners responded

to word position as a major cue to word recognition when other indicators of focal accent structure such as pitch accent were not available. In the absence of clear focal accents on the target and when listeners' attention is being diverted to other parts of the utterance, the sentence final position seems to become a reliable cue in L2 word recognition. Taken together, the benefit of the position at the outer ends of a sentence, and specifically of the final position, was a consistent finding in German L1, and also one with a similar direction in L1 and L2 listening.

There was an interesting interaction of word length with word position in two of the German language conditions, namely in condition with narrow focus on the target (condition N1) and in condition with narrow focus on a constituent other than the target (condition B2). In these conditions, the position at the outer end of the sentence facilitated the recall of shorter words, but longer words were clearly at an advantage when occurring in medial sentence position. I see two possible interpretations of this result. Firstly, the similarity of effects could suggest that the accent realizations of the focus conditions had not been distinctive enough: the two focus conditions were meant to draw listeners' attention to very different parts of the sentence, but the similar effects indicate that the focal accent realizations were a much weaker cue for word recognition than positional and (to a lesser degree) durational cues. Secondly, one could hypothesize that the switch of preference in the medial position to an advantage of longer words illustrates a general processing pattern in German: an advantage of short words at the outer ends of a sentence due to primacy/ recency effects, which is complemented by an advantage of longer words in the medial position because these provide a larger amount of information as reference points for later recall.[24] The two effects thus serve the interests of efficient representation to the listener's memory. These two possible interpretations, however, need to be clarified by currently yet unavailable evidence. It is expected that the outcome of Experiment 1b, which tests for effects of surrounding sentence contour, will clarify whether the first interpretation is reasonable or not. To confirm the second interpretation, additional tests in the native language condition would be needed, using longer sentences that distinguish more clearly between the three word positions.

A last point concerns the estimate of foreign language proficiency of the participants. This is considered to be an important factor in L2 acquisition studies (Rüschemeyer et al., 2005; Flege, 1988; Flege et al., 1995, 1999; Flege & Liu, 2001). A large number of subjects had been tested and care had been taken to control the subjects' L2 proficiency by administering the Oxford Placement Test (Allan, 2001). The aim was to eliminate unwanted effects of L2

[24] The effect found in German N1 and B2 is supported by the results obtained in the broad focus version German B1, in which a trend towards the same direction could be observed.

proficiency on the results of the nonnative language tasks. It turned out that the factor of learner group showed no correlation with the accuracy rates. Carrying out the OPT not only proved to be very time-consuming in the process of data collection, subjects also felt very much reminded of a classroom situation when they had to fill in the grammar tests. It was therefore decided for Experiment 2 (effect of syntactic focus marking) and Experiment 3 (effect of lexical focus marking) to select subjects based on their learners' history English (i.e., the length of stay in an English-speaking country).

The main hypothesis of the present experiment was that focal accent makes the target words more salient. The perceptual salience of accented words is not only due to their acoustic distinctiveness but also lies in the surrounding sentence prosody. This had been demonstrated in early work by Cutler (1976), who used the splicing procedure to examine effects of surrounding intonation contour on word recognition. To examine if word recognition results were due to the prosodic sentence contour or due to the distinctiveness of the target word, the current experiment was extended by two conditions with spliced materials. The splicing procedure, the methodology, and results of Experiment 1b are reported in the following section 2.7.

2.7. Experiment 1b: Effect of the surrounding prosodic contour on word recognition

In condition N1 of Experiment 1a, both the surrounding prosodic contour and the accent on the target word were expected to draw the attention of the listeners to the target. Yet, results were not different from the other two focus conditions, which were assumed to highlight either the whole sentence (B1), or a different constituent than the one containing the target (B2). It might be that the realisation of the targets in those two conditions was perceptually too prominent for the focus conditions to reveal an effect of prosodic contour. The question arises: how important is the local prosodic realization of a word in contrast to the surrounding global prosodic contour of the sentence? Would recognition change if the prosody of a N1-sentence were kept and the target word spliced in from a B1 or B2 sentence?

To answer these questions, Experiment 1b was set up with two conditions, using manipulated sentence materials from Experiment 1a. For the construction of the materials the splicing procedure of Cutler (1976), introduced in section 2.2.1, p. 20, was adopted and slightly modified to accommodate the research question. The procedure will be explained in the following section 2.7.1., introducing examples of the two conditions with spliced sentences.

2.7.1. The splicing procedure

Two conditions with spliced materials were derived from conditions N1, B1, and B2 which were used in Experiment 1a. The N1 sentence supplied the base into which a segment originating from either B1 or B2 was spliced in. In one of the spliced conditions, a target item of a B1 sentence was spliced into the context of a N1 sentence and replaced the original N1 target. This yielded the focus condition *B1 spliced*. This condition thus contained a target with default accent cut from a constituent in broad focus and embedded in a global sentence contour with narrow focus on the spliced-in target. In the other condition, an unaccented target of a B2 sentence was spliced into a N1 sentence, yielding the focus condition *B2 spliced*. This condition contained an unaccented target cut from a condition with narrow focus realised on some constituent other than the one containing the target. The surrounding prosodic contour of the N1 sentence, however, was one that put narrow focus on the spliced-in target.

To illustrate differences between the spliced versions, two examples of sentences with spliced-in targets will be given in the following. An example of a spliced B1-sentence is shown in Fig. 2.6, in which the target 'flickers' originates from sentence with default accent, with a maximum pitch value of 349 Hz (the original N1 target had a pitch value of 359 Hz). The word accent contour is that of a L+H* L- on 'flickers', that is, a L+H* focus accent which is also followed by a phrase boundary. [25]

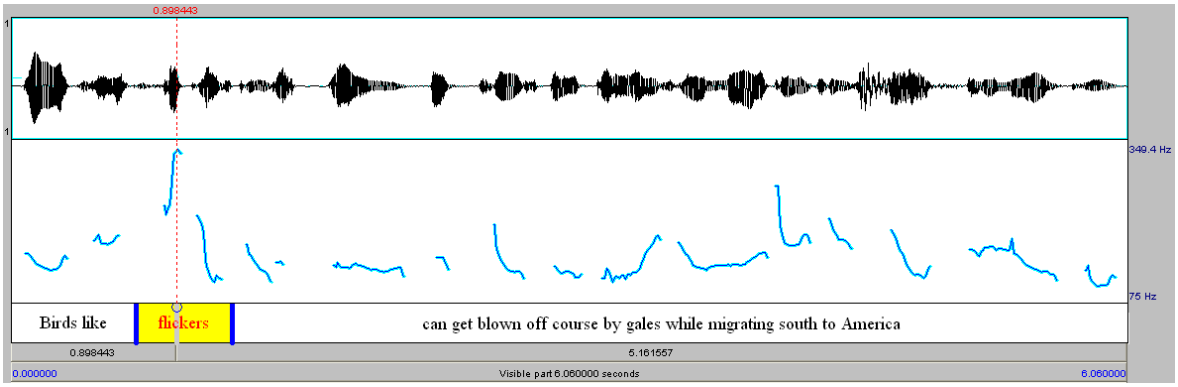

Fig. 2.6: *Example of a sentence of condition B1 spliced: (default) accented target 'flickers', cut out of a B1 broad focus sentence and spliced into a N1 sentence.*

Fig. 2.7 shows an example of the same version in condition *B2 spliced*: Here, the target originates from a B2 sentence, has a maximum pitch value of 271 Hz, and a word accent contour on the target *flickers* of H* H-, that is, a H* focus accent which is also followed by a H-

[25] I am grateful to Sam Hellmuth for her close inspection of the accent contours. For sentence B1 spliced (Fig. 2.6.a) she suggested that „it could even be L+H* L-L%; i.e. a full 'IP boundary', which is mainly a theoretical distinction, but it is certainly a bigger juncture than the one after *flickers* in B2 spliced".

phrase boundary. In each of the two spliced versions, the spliced-in target is embedded in the same prosodic contour of a N1 sentence with narrow focus on the target.

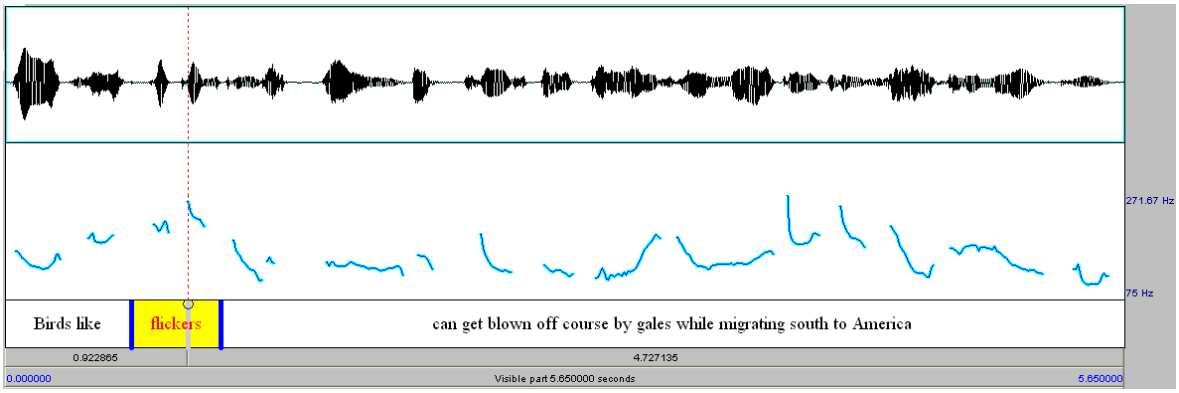

Fig. 2.7: *Example of a sentence of condition B2 spliced: unaccented target 'flickers', cut out of a B2 sentence with narrow focus on a constituentother than the target and spliced into a N1 sentence.*

The assumption is that a B1-target fits into the prosody of a sentence with narrow focus on the target, but is perceptually less prominent than the original N1-target. On the other hand, a target spliced from a B2-sentence is expected to be perceptually inconsistent with the prosodic contour of an N1 sentence. The two spliced conditions aim at testing whether listeners pay attention to the global sentence contour surrounding the target, rather than to the local prosodic realization of the target itself. The expectation is that the surrounding prosody of a sentence with narrow focus on the target (N1) highlights the spliced word, and that a spliced target originating from a B1-sentence with broad focus gets better recognized because it is consistent with the surrounding sentence prosody. A sentence with a spliced B2 target is therefore expected to yield lower recognition scores.

However, if there is no difference in recognition scores between the two spliced conditions, it means that the local realization of the target word makes no difference to the listeners. In this case, the global prosodic contour of the whole sentence can be interpreted as being the main cue that draws listeners' attention to the target word and facilitates its recognition.

The two factors of word position in the sentence and word length are examined as well. The expectation is that findings of Experiment 1b will get confirmed, in that words in final position are better recognized than words in initial and in medial position (ranking: final > initial > medial). In the German native language conditions it is expected that longer words are at an advantage, whereas in the nonnative condition short words are better recognized.

2.7.2. Methodology

The test methodology was the same as the one employed in Experiment 1a (section 2.6), except that the original N1 sentences containing experimental targets were replaced by spliced versions, yielding the two test conditions *B1 spliced* and *B2 spliced*. This means that subjects listened to the same filler sentences as subjects in Experiment 1a, but that the test sentences were all spliced sentences (either B1 or B2). Experiment 1a and Experiment 1b were conducted in parallel. Results from condition N1 of Experiment 1a were taken as control values.

Participants

40 German learners of English who had not taken part in Experiment 1a participated in the Experiment 1b. They were German students at the University of Potsdam and were at an intermediate to advanced level of English proficiency. Participants had started learning English after the age of 6. On average, they had spent 8.5 months in an English speaking country. 25 of the forty German subjects had never been in an English speaking country, three subjects had spent up to 3 months in an English speaking country, and twelve subjects had stayed between 7 and 14 months in an English speaking country. They were between 18 and 26 years old (mean 21.3). A native English control group of 22 participants was tested in the UK. 21 of them were students recruited from University College London, and one subject was a student at the University of Essex. The range of age was between 18 and 43 years (mean 24.5). Ten of them were assigned to focus condition *B1 spliced*, and 12 of them to condition *B2 spliced*.[26]

Participants of both language groups either received points for course requirements or were paid for their participation. At the time of the experiment all reported normal or corrected hearing, and normal or corrected vision.

Materials and experimental task

24 test sentences were constructed (see section 2.7.1), 12 of which were devised to elicit a correct no-answer, and 12 sentences were expected to elicit a correct yes-answer. Apart from the spliced-in target words the sentences remained identical to the N1 sentences of Experiment 1a (i.e., targets were balanced for word length and position in the sentence).

The experimental task and the testing environment were the same as in Experiment 1a (see section 2.6.5). The German participants first completed the Oxford Placement Test (Allan, 2001), according to which they were distributed equally across the two focus conditions. As in Experiment 1a, participants were assigned to two lists of material sets. They started out with the

[26] Twelve controls were recruited for condition spliced B1, but two of them had to cancel on short notice and due to time constraints it was not possible to replace them.

German language condition and then returned after an interval of on average 8.5 days to take part in the English language condition. The English native controls did the test in the English language condition only.

2.7.3. Results of Experiment 1b: Spliced conditions

Timed-out responses for all target items with response latencies of more than 2500 ms and responses with reaction times below 150 ms were discarded from the analysis. This concerned 6.8% of all responses in condition German L1, 8.9% of all responses in condition English L2, and 12.1% of all responses of the English control group (condition English L1). The following analyses are based on target words with correct 'yes'-answers, as those represented words that had actually been presented in sentence context, thus providing data on position as well as on focus condition. The percentages of correct recognition of target items in the two test conditions were calculated for each of the language tasks (German L1, English L2, English L1), and values are given in Tab. 2.9, including results of the condition N1 (see Experiment 1a, Tab. 2.4) as control values.

Tab. 2.9: *Recognition scores (% correct) for targets in spliced conditions, for German subjects and English controls.*

	B1 spliced (% correct)	B2 spliced (% correct)	N1 (control) (% correct)
German L1	93.4	94.7	91.4
English L2	89.3	83.8	88.8
English L1	94.4	90.7	90.4

Accuracy scores of conditions B1 spliced and B2 spliced of the German subject group were subjected to a univariate ANOVA with language and focus condition as fixed factors and correct responses as dependent variable. Results revealed a significant effect for language [$F(1,87)=13.179$, $p<.001$], suggesting that German subjects performed better in their L1 than in the L2. The effect of focus was not significant. The interaction of focus by language failed to reach significance [$F(1,87)=3.128$, $p=.081$]. Overall, the German test group achieved a lower score of correct word recognition in condition English L2 (86.6% correct) than the native English L1 control group (92.6% correct). This difference was not significant in a t-test with independent samples. A t-test of the data of the English control group revealed no difference between recognition scores of condition B1 spliced and condition B2 spliced.

For a comparison between conditions N1 (which provided the embedding sentence), condition B1 spliced, and condition B2 spliced, the percentages of correct responses are

depicted in boxplots (Fig. 2.8). The boxplots illustrate the range of distribution of scores obtained. In the data of the German group (German L1 and English L2), the response values of N1 correspond to those obtained in condition B2 spliced.

In the nonnative listening conditions (English L2), condition B1 spliced has a higher median value of correct responses than condition B2 spliced, and an equal median value to N1 but higher box quartiles. Thus, in English L2 there is a trend of B1 spliced > B2 spliced, although this advantage was not significant. It also seems that in German L1 the condition B2 spliced yielded better results, whereas in English L2 the advantage was with condition B1. This tendency illustrates the nearly significant interaction of focus by language that showed in the ANOVA (German data, see previous paragraph).

In the English control data there is no difference between the boxplots of the two spliced conditions, except that the longer lower whisker of condition B2 spliced suggests that there were more subjects with lower scores than in B1 spliced.

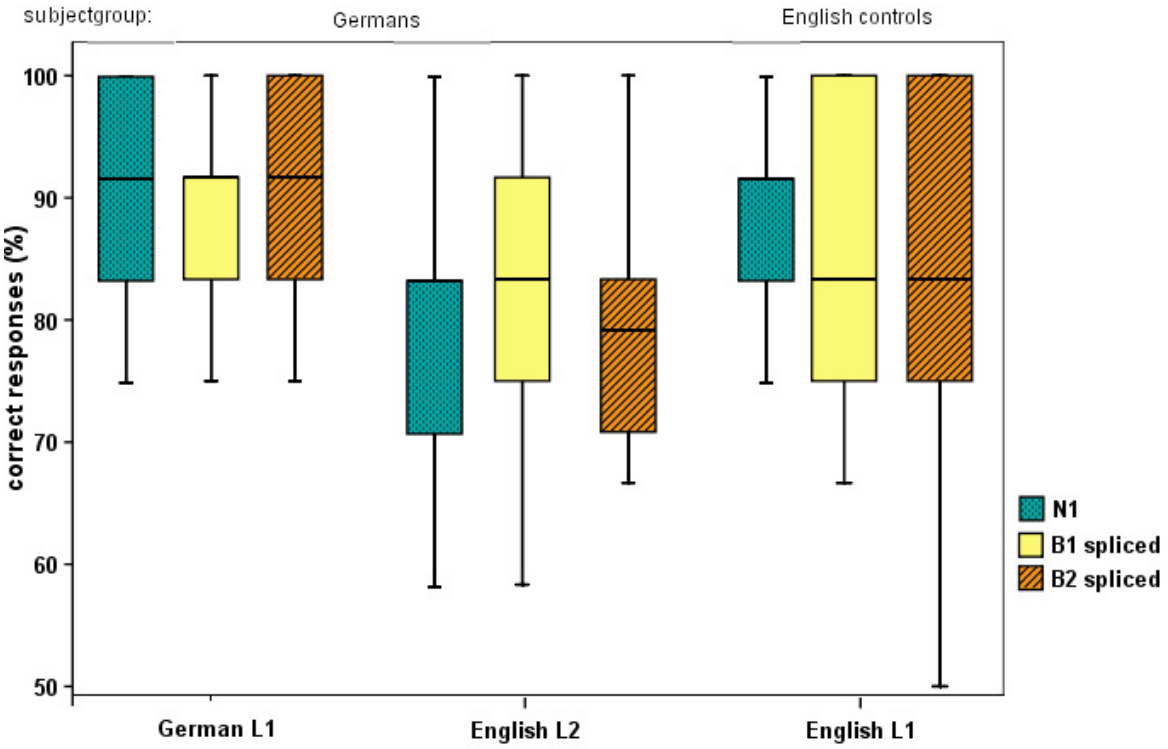

Fig. 2.8: *Boxplots of correct responses (%) obtained in conditions N1 (narrow focus on target), B1 spliced (target word of a B1 broad focus sentence spliced into the context of a N1 narrow focus sentence), and B2 spliced (target word of a B2 sentence with accent on a constituentother than the grammatical subject, spliced into a N1 narrow focus sentence).*

Effects of word length and word position were also examined in the spliced conditions, and data were subjected to the same analyses as in Experiment 1a (see 2.6.1).

There was a significant effect of target length in condition B1 spliced in the L1 task [$F(1,23)=26.763$, $p<.001$], indicating that one-syllabled words were more accurately represented that more-syllabled words. Analyses also revealed a significant effect of target position [$F(2,46)=3.253$, $p<.005$], with significant differences between initial and final position [$F(1,23)=5,087$, $p<.05$] and between medial and final position of the target [$F(1,23)=4,971$, $p<.05$]. There was no interaction between target length and target position.

In the L2 task of condition B1 spliced, only target position had a significant effect [$F(2,46)=5.153$, $p=.01$] and for this, paired comparisons revealed significant differences between initial and final position [$F(1,23)=8.013$, $p<.01$] and between medial and final position of the target [$F(1,23)=10.903$, $p<.005$]. The patterns of recognition accuracy in this condition are quite similar for the L1 and L2 task, as can be seen in Fig. 2.9:

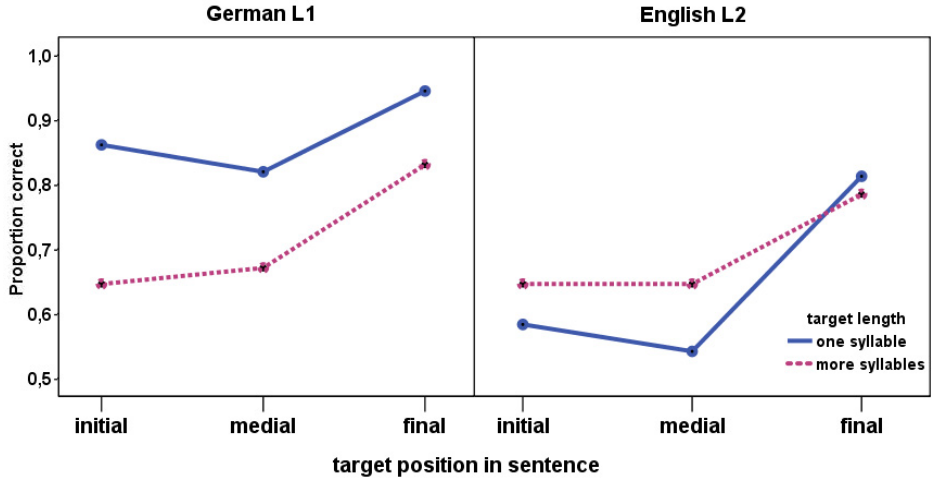

Fig. 2.9: *Accuracy rates of German subjects in condition B1 spliced.*

In condition B2 spliced (Fig. 2.10) there was no main effect for target position in the L1 task. There was a significant effect in the L1 task for word length [$F(1,19) = 5.391$, $p<.05$], indicating an advantage of one-syllabled words over two-or more syllabled words. Word length interacted with target position [$F(2,38)=6.027$, $p=.005$] in that longer words were better recognized than shorter words when occurring in sentence medial position (see left side of Fig. 2.9). In the L2 task, only target position had a significant effect [$F(2,38)=3.234$, $p = .05$]. This was due to a significant difference between the medial and final position [$F(1,19)=6.883$, $p<.05$]. It suggests that in nonnative listening, final position is more salient than sentence medial position.

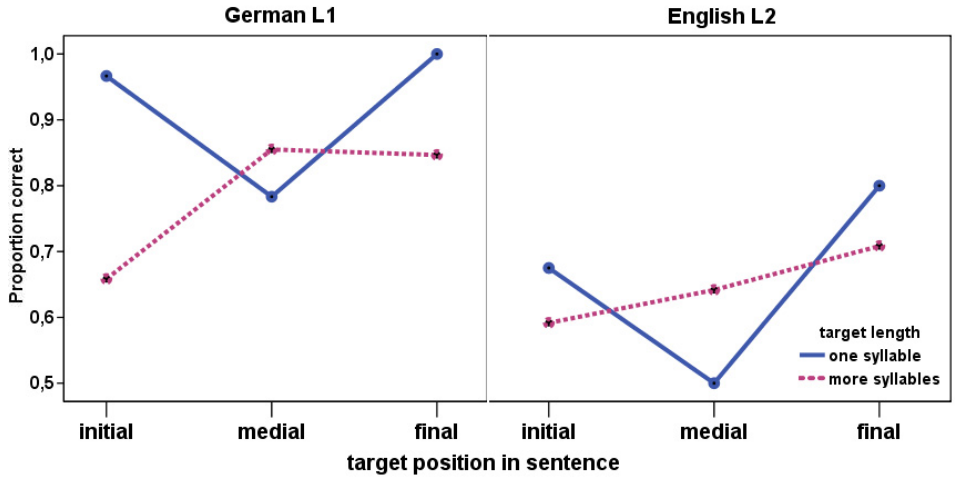

Fig. 2.10: *Accuracy rates of German subjects in condition B2 spliced.*

2.7.4 Discussion of Experiment 1b with spliced conditions

This experiment aimed to examine more closely the effect of global sentence contour and the effect of the local prosodic realization of the target word on word recognition in native and nonnative listening. Two conditions were tested in which targets were spliced from two different focus conditions (B1 and B2, see Experiment 1a) into a carrier sentence (N1, see Experiment 1a). For the resulting condition B1 spliced, target words were derived from the condition with broad sentence focus (B1), and for condition B2 spliced target words were cut from sentences with narrow focus on a constituent other than the one containing the target (B2).

Like in Experiment 1a, a basic observation was that the German participants performed better in their native language than in their second language. The main finding was that there seemed to be no difference between the two spliced conditions as subjects recognized words equally well in the two spliced conditions. This was the case in both native and nonnative listening. Similarly, there was no difference in recognition scores between the two conditions in the native English control group. Two competing hypotheses were formulated for the current experiment, namely that condition B1 spliced would yield higher recognition scores than condition B2 spliced, because the local realization of a B1 spliced target was assumed to be more consistent with the embedding global sentence contour than the realization of a B2 spliced target. The competing hypothesis was that there would be no difference between recognition scores because listeners pay more attention to the sentence contour instead of attending to the local phonetic realizations of the target word.

The common factor of the two spliced conditions was the surrounding sentence contour of a narrow focus sentence. Similar recognition scores obtained in spliced B1 and spliced B2 suggest that the actual difference of the two conditions, that lay in the realization of the targets in terms of pitch and of word accent contour (see Fig. 2.6 and 2.7), had no impact on the perception of the targets. This indicates that the surrounding prosodic sentence contour made listeners remember the targets and not the realization of the target itself. Cutler (1976) showed that prosody cues listeners to direct their attention to the sentence accent. The difference to the study of Cutler (1976) is that she used different embedding sentences with identical spliced-in targets, whereas the current experiment used an identical embedding sentence but different spliced-in targets. The current results can be linked to the findings of Cutler in that prosody seemed to indeed direct listeners' attention to the focus of the sentence where in our case the target word was situated. The local prosody of the target did not change its recognition.

Word length was used as a cue to efficient word recognition in both of the spliced conditions in German L1 as listeners remembered shorter words better than longer words. There was no such effect, however, when attending to sentences in the L2. The effect of word length in German L1 is in contrast to findings in Experiment 1a, where similar analyses had revealed no effect of word length. It could be that in the spliced conditions listeners reacted to possibly conflicting cues of sentence prosody and target realization by attending to word length as a cue that provided more information due to longer input. Interestingly, there was an interaction of word length with position in the German condition B2 spliced similar to that in the German conditions N1 and B2 of Experiment 1a. Given that condition spliced B2 was derived from N1 and B2, this is interpreted as a confirmation of the robustness of the effect: In German native listening, longer words get represented more accurately in the listeners' memory when occurring in sentence medial position, and shorter words get represented more accurately when occurring at the out end of the sentences.

There was a strong effect of word position in the German native condition of B1 spliced but not in B2 spliced. In B1 spliced, words in final position were better remembered than words in initial and words in medial position. This confirmed findings of Experiment 1, which had been interpreted as recency effect (Murdock, 1962). A similar effect was found for the nonnative listening condition of B1 spliced which suggests that the patterns for L1 and L2 processing are similar in this respect. Results of condition B2 spliced are less conclusive, as there was an effect of position (final > medial) in the nonnative condition but not in the native listening condition. However, in listening to the L2, the German participants took advantage of

the positional cue and remembered words occurring at the end of a sentence better than words occurring in the middle of a sentence.

With regard to word length and word position, results of the spliced conditions align in some aspects with the results of conditions tested in Experiment 1a, as for example the advantage of the final position, or the interaction of word length and word position. Overall, however, results do not consistently mirror findings of the conditions tested in Experiment 1a. This suggests that the spliced conditions were not seen as direct copy of one of the conditions they were devised from, but rather that listeners reacted to the new arrangement of sentence contour and spliced-in targets.

2.8. Conclusions

The experiments presented in this chapter were devised to evaluate the influence of prosodic realizations of focus, and to test whether focus marking as conveyed by prosodic accent facilitates L2 word segmentation. I hypothesized that the presentation of different focus conditions (broad focus, narrow focus, and narrow focus not on the target) would induce a focus effect, leading subjects to recognize words better when these occurred in the narrow focus of a sentence.

It turned out that focal accent did not seem to help the German subjects recognize accented words more accurately in both the L1 and the L2 as there was no significant effect of focus condition. Further analyses of a subset of data (medial items only) confirmed the lack of focal accent on word recognition scores. The absence of a focal accent effect partly confirms earlier findings of Akker & Cutler (2003) and of Pennington & Ellis (2000). Tests with spliced conditions showed that word recognition performances were not influenced by the local prosodic realization of the target words. The lack of focus effect could have been due to conditions not being acoustically distinctive enough; furthermore, testing methodology could have influenced results as Akker & Cutler (2003) argued that collecting comparable data in two languages from the same listener group is nearly impossible.

Target position yielded the most consistent results: In all of the native German language conditions it seemed that position, and here specifically the final position, was the strongest factor in the word recognition task (see Slobin, 1985; Klein, 1984). A trend, albeit not statistically significant, could be observed in English L2 of an advantage of items occurring at the outer ends of the sentence (Rast, 2003; Rast & Dommergues, 2003), with an indication of an advantage of initial over final position. The current results don't support the sentence location principle of VanPatten (2002; 2004) in its ranking of initial > final > medial position, and the

benefit of the final position was rather interpreted as recency effect (Murdock, 1962). In addition, the advantage of the final position could benefit from the convention that in communication, relevant background information is referred to first, and then what is novel (Haviland & Clark, 1974). This structure is assumed to cue the listener as to what the speaker considers to be important information, and listeners might have reacted according to this discourse convention. It is suggested that in the absence of a strong accent cue, the position of the word in the sentence is important to effectively commit a representation of a word to the memory.

The length of a word was not a main factor to determine its successful recognition, neither in native nor in nonnative listening. A similar lack of effect of word length was shown earlier in production tasks for French learners of Polish (Rast, 2003, and Rast & Dommergues, 2003). The current result thus extends their findings to a new language pairing of German L1 and English L2 and also to a new methodology, i.e. to word recognition. Further analyses per focus condition revealed that in German native listening, longer words were better recognized than shorter words, whereas in English L1 and L2 shorter words were better recognized. In the absence of other factors, word length seems to gain importance in German for an efficient recognition of words which are not highlighted by focal accent. However, given the lack of an overall main effect of word length, more investigation is needed for conclusive results.

Altogether, the findings of Experiments 1a and 1b indicate that in native and nonnative listening, prosodic focus marking does not seem to suffice as a means to facilitate word recognition. Strategies of exploiting prosodic realizations of focus for efficient word processing seem to partly use similar cues in first and second language processing, such as for example positional cues. However, strategies can also differ in their preferences as, for instance, in the case of longer words being at an advantage in L1 listening vs. short words in L2 listening.

The findings suggest that probably a flexible concept of prosodic, lexical and morpho-syntactic features conveys prominence to the listener. Effects of focus marking by syntactic and by lexical means will be investigated in the following two chapters.

CHAPTER 3

3. Cleft constructions in L1 and L2 word processing and word recall

Chapter 2 investigated the role of focus marking by prosodic means in L2 word recognition. In addition to prosodic cues, focus can be induced by syntactic means such as inversion, preposing, or cleft constructions. Of these means, cleft constructions will be examined in the present chapter.

The question is whether L2 learners use syntactic focus marking in the L2 for efficient word processing and word recall, and whether syntactic marking interacts with others means to mark focus. To this end, an experiment was conducted comprising the following factors: (1) syntactic markers, i.e., cleft vs. non-clefted constructions, (2) intonational markers, i.e., accent on a target word vs. no accent, and (3) context effects, i.e., context in the form of a question that induces focus. 80 German learners of English participated in a phoneme detection task, followed by a word recall task. The two tasks were presented in a German L1 and an English L2 condition. 30 native speakers of English (English L1) provided the native base line data for the condition in English. The main finding was that syntactic focus marking constitutes a means to facilitate word processing in native German and native English, but not in nonnative listening. It is suggested that the processing advantage of words in cleft constructions depends on the learners' familiarity with the cleft construction and their linguistic preference in the native language. Focus marking by cleft did not facilitate word recall in German L1 and English L2. Accent proved to be important for fast word processing only in German L1, whereas context facilitated word processing in both German L1 and English L2. Accent and context facilitated word recall in German L1 but not in English L2.

3.1. Introduction

Atypical structures often signal focus, as they deviate from canonical structures, and draw attention to certain information in an utterance. Research literature on the processing of different kinds of sentence structures confirms that surface structure influences word processing. For instance, Foss & Lynch (1969) investigated the effect of surface structure on decision times, taking the speed of auditory reaction times as a measure for the ease of sentence processing. They reported faster processing times for right-branching sentences than for doubly self-embedded sentences, which indicated that the former were easier to parse. The slower

processing times led the authors to suggest that processing atypical and complex syntactic structures requires more of the listeners' mental processing resources. This finding can be taken as evidence of a direct link between surface structure and comprehension.

Language comprehension does not only entail immediate processing, but also makes demands on the mental representation of what has been mentioned earlier, i.e, on our memory. With regard to the link of memory and syntactic constructions it was assumed that syntactic information itself is not remembered: once syntactic information has served its purpose of organizing different pieces of information, it is quickly forgotten (for a review, see McKoon *et al.*, 1993). The effect of the syntactic structure on reading comprehension was investigated by Langford & Holmes (1979). They found that attention is directed initially to the focus of a sentence which resulted in a better comprehension of syntactically focused constituents. Syntactic focus also seems to lead to better memory for parts of a text that are in the syntactically more prominent positions, for example, a main clause vs. a modifying phrase (McKoon et al., 1993). Birch & Garnsey (1995) proposed that syntactic focusing devices lead to better memory for focused words. They reasoned that people's memory for details of sentences they read or hear is quite limited and that surface information such as syntactic structure and exact wording is often less well remembered. Focusing on what is most salient, they argued, may be one way that comprehension proceeds in view of memory limitations. Consider the following example (from Birch & Garnsey, 1995, pp. 255, item no. 10):

(7a) Non-focus sentence: The donation from the singer would be used to buy food and medicine.

(7b) Focus sentence: It was the singer who attracted such large crowds to the nightclub.

The syntactic focus construction in sentence (7b) was expected to lead to a better retention of the surface form of the target *singer*. Results of three experiments with word recognition tasks provided strong evidence that focus enhanced memory for the words in focus, which were better remembered and more quickly retrieved. In addition, Birch & Garnsey hypothesized that syntactic focusing might differentially affect particular kinds of information about words, namely the phonological and semantic characteristics. As for the memory for general semantic information, this was not enhanced by focus. In addition, there was a lack of focus effect across the experiments for phonological targets. The authors concluded that syntactic cues to focus have a beneficial impact on sentence comprehension as well as on the representation of a discourse in the memory. Altogether, the experimental evidence above indicates that syntactic structure matters to the way that language is being processed and recalled. Whether syntactic focus marking facilitates word processing and word recall in the pair

of German L1/ English L2 will be examined in the current Experiment 2, using cleft structures as shown in sentence (7b).

3.2. Cleft constructions as focus marking device

To approach the role of cleft constructions, we start with its definition and then see how a cleft gets derived. Lambrecht (2001) gives the following definition of clefts:

"A cleft construction is a complex sentence structure consisting of a matrix clause headed by a copula and a relative or relative-like clause whose relativized argument is coindexed with the predicative argument of the copula. Taken together, the matrix and the relative express a logically simple proposition, which can also be expressed in the form of a single clause without a change in truth conditions" (Lambrecht, 2001, p. 467).

A cleft construction can get derived from a non-cleft construction by splitting a sentence into two clauses. Clefts thus express a simple proposition via biclausal syntax and it is this feature which distinguishes clefts from other complex constructions (Lambrecht 2001:466). Splitting a sentence into two clauses entails that a certain sentence constituent gets focused, i.e., the clefted element. Below, I will briefly outline the basic structure of clefts and then concentrate on the discourse-pragmatic functions of cleft constructions.

A cleft can be deduced by introducing one of its elements, say X, in a clause having the form *It be X*, and by turning the rest into a relative clause. Examples of three basic structural types of cleft versions of a canonical sentence (8) are given in (8a)-(8c) (capitalization indicates main sentence accent):[27]

(8)	We saw JOHN.	canonical sentence
(8a)	It was JOHN [who] we saw.	IT-cleft
(8b)	Who we saw, was JOHN.	WH-cleft
(8c)	JOHN was who we saw.	reverse WH-cleft

The most common types according to Smits (1989) are the it-cleft (8a), and the wh-cleft (8b). The so-called reversed or inverted wh-cleft (8c) is less frequent, as is another lexical variant, the *all-cleft*. This type of cleft is an "identifying construction with a nominal clause headed by *all*" (Collins, 1991, in: Callies, 2006, p. 57), which would turn sentence (8) into "ALL we saw was John". Note that in the examples accent placement is context dependent, as,

[27] Lambrecht (2001) uses the term *canonical sentence* for the "logically equivalent, syntactically unmarked, noncleft counterpart of a cleft sentence" (2001:467).

for example, in (8a) an accent could be also possible on '*was*', which would indicate a strong confirmation that it had been really John, when this had been questioned.

Clefting as a focusing device appears to be a common surface feature in a majority of languages, albeit with differences as to the range of the constituents that are permitted in the focus position (Lambrecht, 2001). There is also typological evidence that clefts and cleft-like constructions are widespread to mark focus (Ahlemeyer & Kohlhof, 1999). Benefits of focus marking were shown to lie in a more ready comprehension and a better memory (see Birch & Garnsey, 1995; see also p. 71). To make use of these advantages, the L2 learner would have to track down the relevant principles of the category of word-order rules in the L2, which could be different from those applying in the L1. Hence, syntactic focus marking might not be easily transferred from a native language onto a second language, unless the L2 principles of word-order rules are similar to the word-order rules in the learners L1.

Another factor that influences the use of clefts lies in the relative frequency of clefts in the learners' first and second language (see Ahlemeyer & Kohlhof, 1999), which is going to be discussed in the following section 3.3. Lambrecht (2001) argues that the cleft construction is one of several devices that languages can employ to express deviations from the unmarked predicate-focus type (2001:485f; the other devices mentioned are *prosodic shifts*, *syntactic shifts* and *morphological* focus marking). He correlates the occurrence of cleft constructions in languages with the degree of freedom the language offers in regard to placement of accents and syntactic constituents (Lambrecht, 2001:488). This makes syntactic focus marking a parameter par excellence for investigating the role of focus marking in L2 processing, as the two languages in the present study, i.e., English and German, differ in their degree of free word order: English with its rather fixed word order requires the subject to occur before the verb. In contrast, German is predominantly considered to be a verb-second language with greater flexibility in word order (see Thompson, 1978). The following section deals with differences in the use of cleft structures as focus marking options with regard to L2 learning.

3.3. Focusing by clefts in German and in English

In German, constituents within the clause can be moved easily due to a comparatively free word order. The word order flexibility of German means that information can be topicalized by moving it into first position within a sentence. This process requires only a subject-verb inversion, as shown in (9b):

(9a) Ich hatte Schwierigkeiten mit der mündlichen Prüfung. (SVO order)

(9b) Mit der mündlichen Prüfung hatte ich Schwierigkeiten. (OVS order)

Information can thus be moved into sentence-initial position for different reasons, for example, to put an element in focus, or to simply to introduce variation in the speaking style. Focus marking by an *it*-cleft, on the other hand, requires the more complex process of splitting a sentence and inserting '*es*' (Engl. 'it') as a dummy subject and turning the sentence into a relative clause *("Es war die mündliche Prüfung, mit der ich Schwierigkeiten hatte"*). According to E. Klein (1988), this makes clefting a dispreferred option to mark focus in German.

In English, word order is more rigid, with preposing and inversion being contextually highly restricted. Moreover, English rarely presents new and indefinite information in sentence initial position. Therefore, indefinite subjects do occur only seldom sentence-initially (Foley, 1994, p. 1682). Dummy subjects such as *there* (see 10a/10b) *or it* (see 11a/11b) often act as placeholders for subjects to move the new information further towards sentence final position:

(10a) Something must be wrong.

(10b) There must be something wrong.

(11a) I had problems with the oral exam.

(11b) It was the oral exam I had problems with.

Due to a more restricted word order, clefting is considered an important focusing option in English (Doherty, 1999, p. 312). This may explain the overall high textual frequency and the broader range of constituents that can be focused in it-clefts in English. Evidence for the difference between the use of syntactic focusing in English and German devices is provided by translation studies. In examining parallel corpora of English-German translations, Ahlemeyer & Kohlhof (1999) found that only about a third of English it-clefts were translated with the German equivalent, the *es*-cleft. Other constructions or features as, for example, focus particles were preferred even when a German cleft was a possible option (for further analyses on the frequency of clefts in English and German, see also Erdmann, 1990, and Doherty, 1999).

The mapping of focus onto it-clefts can thus be assumed a common and preferred focusing principle in English, whereas the mapping of focus onto it-clefts in German (*es-clefts*) has relative less strength and can be assumed a dispreferred option to mark focus. To be proficient in a second language, learners have to get a notion of which forms are used to realize which functions in the L2, and also what relative weight these forms have in performing specific functions. If cleft constructions were a dispreferred option to mark focus in the native L1, it could be that they are not transparent for learners of an L2. The mere understanding of the form of a cleft does not necessarily have to lead to a carry-over from one language to another, as a syntactic structure that might be used in the native language may be differently expressed in a second language. The question of what is seen as equivalent structure of a cleft construction was addressed in a contrastive study of focus phenomena in English and in German (E. Klein, 1988).

German University students were given English *it*- and *wh*-clefts along with potential German equivalents, including German clefts but also left- and right dislocations, as well as sentences with focus particles and typographical marking of the focused constituent. Participants had to rank sentences in an L1 according to their syntactic equivalence in the L2. Relevant for the current study is the result that learners ranked only pure L1 clefts as real syntactic equivalents of an L2 cleft. This finding illustrates that German L2 learners of English have an understanding of the linguistically appropriate equivalent of L2 cleft-constructions in the L1, regardless of differences in preferences in application between L1 and L2.

In summary: The question posed in the present experiment is whether focus marking as realized by clefts enables L2 learners to process words faster and more accurately when these occur in cleft structures than when they occur in non-clefted structures. Focus marking in general is assumed to result in faster processing and in a better recall of the focused item. Accordingly, cleft as a focus marking device is expected to speed up word processing times and to lead to a better word recall. A competing hypothesis is that due to dispreference of use, and due to lower occurrence in German, a processing advantage of cleft is not likely. A recall advantage for items in cleft sentences was found for English L1 (Birch & Garnsey, 1995). Would a similar effect also emerge in German? The mapping of focus onto it-clefts seems to be a dispreferred and comparatively infrequent option to mark focus in German, therefore a reduced effect seems probable. With regard to its use in the L2, it is also worth noting that clefts imply a higher level of processing complexity. Hence, the effect in the L2 might work in the opposite direction in that syntactic focus marking possibly requires longer processing time. The measure of word recall accuracy could employ different resources than the one used in the immediate online processing task and it is open as to whether or not focus marking by cleft facilitates word recall.

3.4. Accent effects

Language employs a complex set of features to express meaning, and in utterances several focus marking devices might be at work at the same time. The previous Experiment 1 examined the effect of *accent* as a main parameter to mark focus prosodically. In addition to investigations into the effect of cleft, the second question in the current Experiment 2 is how the two focusing devices of cleft construction and pitch accent work together in L2 processing. If both focus devices mark the same constituent in a sentence, it could be that they enhance each other and make the sentence processing easier. In case the pitch accent does not fall on the item focused by the cleft construction, there are two options: regardless of the sentence accent, the clefted item could either still emerge as a perceptually marked one, or, the pitch accent on a

different element might overshadow the syntactically marked element. A view promoted in Cutler & Isard (1980), and Cutler (1976) is that semantic factors will always override the syntactic factors. They argue that in natural utterances in context, the placement of pitch accent reflects the semantic structure of an utterance. According to Cutler & Isard (1980), the placement of accent can be seen as an expression of the following semantic and pragmatic effects: (1) the assignment of focus, (2) the expression of contrast, and (3) the deaccentuation of given information. Listeners use accent-related information to speed auditory reaction times and for an efficient comprehension of meaning (Cutler & Fodor, 1979; Pitt & Samuel, 1990).

In Experiment 1, the effect of word position seemed to be stronger than that of pitch accent. In the present experiment, cleft as syntactic focus marker could turn out to be a weaker cue to fast and accurat word processing and word recall than pitch accent because of cleft structuctures being a less preferred and rather infrequent option in German to highlight elements. In this case accent might be the foremost cue to indicate prominence, and syntactic cues to the perception of focus could function as supportive factors.

3.5. Context effects

The role of contextual information during learning and recall has been a significant area of research. The actual *form* in which contextual information is presented can vary, for example, *context* can be neutral sentences in which targets are embedded, or semantically related sentences; context can also be presented in the form of declarative sentences or in that of questions preceding a target sentence. Early, the influence of context on word processing was investigated by Foss & Jenkins (1973). They found faster reaction times in biased context versus neutral context. Cutler & Fodor (1979) induced semantic focus by asking a question before the sentence, and the part of the sentence which comprised the answer to the question was assumed to be focused. The results showed a processing advantage for words focused by a preceding question. Selkirk (1995) claimed for English that preceding an utterance with a wh-question can determine focus within that utterance. She outlined the relation of accent, question, and focus in a 'Grammar of Intonation': The presence of pitch accent implies that the word is focused, whereby different distributions of pitch accents imply different focus structures. A wh-expression focuses a constituent, and an appropriate answer to the wh-expression focuses the same constituent by assignment of a pitch accent. This facilitates the segmentation of the focused part of the answer sentence, and leads to faster understanding of the utterance (Selkirk, 2005). Akker & Cutler (2003) confirmed the benefit of question-induced focus for English L1 listening, for Dutch L1 listening, and for Dutch listening to English L2 (see also 2.2.3).

Other studies on the memory of words embedded in context concentrated on different processes involved in remembering a word, such as attention, encoding, rehearsal, and retrieval. Craik & Lockhart (1972) argued that word memory is the result from perceptual and cognitive analyses carried out on the stimulus. They suggested that memory performance depends on the depth to which the stimulus is analysed. This notion was explored in subsequent studies by Craik & Tulving (1975), who presented participants words together with context questions about those words. The questions involved different features with regard to their depth of processing, such as 'shallow' features like font, or 'deep' features involving meaning. Results showed that deeply encoded words were remembered better than shallowly encoded ones. Therefore, retention of words seems to depend on the qualitative nature of the encoding operations that are performed.

These findings combine to the assumption that presenting a focusing question with an appropriate answer statement draws listeners' attention to a specific part of the answer, i.e., the constituent focused by the question. The thus focused constituent is more readily available for immediate processing and for entry in the memory system.

In L2 word learning, the term *context* usually means the semantic context surrounding each word. Krashen (1989) claimed that the comprehension of context leads naturally to the acquisition of novel words. In the present experiment, *context* implies a preceding question which puts a certain part of the following utterance in focus and establishes a coherence relation between the sentences. Sentences in the experiment were about the topic of bird life and welfare. This common theme provides a coherent semantic network between the speech material. Such a network has been claimed by Lawson & Hogben (1996) a factor for long-term storage in vocabulary-learning strategies of L2 learners. In a study of direct vocabulary learning of words with an actual meaning, the authors took think-aloud protocols from learners to reconstruct learning patterns and strategies. It appeared that the learners relied more on the target words and definitions than they did on the context clues provided by sample sentences. Thus, when students used the cues in the sentences to generate possible meanings for the target words, this did not help them establish representations for the meanings of the words. There was, however, evidence that highest-scoring learners used a broader range of learning strategies, including the use of context. The authors saw two different uses of context for subsequent L2 word recall: the use of context for *generation* of meaning of a new word, and the use of context for *acquisition* of the meaning. Lawson & Hogben (1996) concluded that '[…] for long-term recall, the successful learner not only can analyze and rehearse the new word and its meanings, but also can elaborate the word-meaning complex and establish it within a suitable network of

meaning" (Lawson & Hogben, 1996, in: Huckin & Coady, 1999, p. 182). This suggests that cognitive processing is facilitated by the integration of the word into a broader lexical network. It is assumed that the questions presented in the current experiment indeed provide such a *network of meaning*, thus facilitating word recall in the L2.

3.6. Methodological issues

In the present study, L2 learning is operationalised as word processing and subsequent word recall, thus leaning on the immediate processing and also on the mental representation of what has been heard. New information gets connected to what was previously mentioned, and focus could also entail how well words are remembered. The way and the extent to which listeners benefit from syntactic focus marking in word processing and word memory in an L1/L2 setting are the core interest of the present experiment. To capture both the speed of word processing and also word recall accuracy, the current experiment employed two different tasks, i.e., a listening task with a phoneme detection paradigm and a word recall task which used a multiple choice test. The following four sections deal with theoretical and methodological issues concerning these experimental tasks. The first section 3.6.1 outlines the experimental paradigm used in the listening task, and in section 3.6.2 the concept of explicit and implicit learning is discussed. Section 3.6.3 addresses the use of a four-alternative forced choice task (4AFC task) in the recall part, and section 3.6.4 deals with possible effects of the switch between the two modes of presentation in the current experiment, i.e., the auditory and written presentation mode of the stimuli.

3.6.1. The Phoneme Monitoring Technique

The processes underlying speech comprehension cannot be directly captured but have to be indirectly observed by the use of tasks which can be expected to reflect the characteristics of processing. Response latency is the most commonly used dependent variable, as this measure is assumed to provide a better insight into processing difficulty than other measures that are taken after processing is complete (Cutler, 1976). The link between accent placement, semantic structure and sentence comprehension was established in investigations using the phoneme monitoring (PM) technique. The PM method provides a tool for examining the ease of speech processing. It is assumed to reflect processing at phonemic level, assuming that stress assignment to a word in a sentence will affect the role that the word takes in the comprehension process (Cutler, 1976; Cutler & Fodor, 1979). In the PM task, which was originally developed by Foss (1969), subjects listen to speech and are asked to press a button as soon as they hear a specified target sound. For example, the target sound may be specified as /b/ as in "bird", in

which case the subject would be expected to respond on hearing the word "beable", or "gabbets", or any other word containing the phoneme /b/. The task cannot be performed by storing an acoustic template of the target sound and searching for an acoustic match in the input, because a phoneme is represented by different acoustic patterns in different phonetic contexts; the listener therefore has to search for the phoneme /b/. The response time in this task reflects the difficulty of processing at the phonemic level in that a higher processing load is be expected to translate into slower phoneme detection, meaning a longer reaction time.

Cutler & Norris (1979) argued that phoneme detection can be the result of a detection process carried out either on the pre-lexical representation orbased on phoneme information associated with a lexical representation. They presented the modular Race model, in which these two procedures run in parallel, and whichever is the fastest, wins the race. This means that if the target is detected based on pre-lexical information before lexical access is completed, the pre-lexical route wins. If lexical access is achieved before detection via the pre-lexical representation, then the lexical route wins and the response is based on the lexical representation. This model was later revised in a new modular model of phonemic decision making, the *Merge model* (Norris *et al.*, 2000). In this, phonemic decisions are proposed to be based on the merger of pre-lexical and lexical information. Although phoneme monitoring cannot be claimed to be "a direct window onto normal comprehension processes … [it allows] to draw strong inferences about the general framework within which such processes are most satisfactorily modelled" (Cutler *et al.*, 1987, p. 174; for an extensive review of phoneme monitoring studies, see Connine & Titone, 1996).

3.6.2. Explicit and implicit memory in L2 word learning

To capture recall accuracy, the current study used a multiple choice task which was carried out after the listening part of the experiment. Psychological studies of memory have traditionally relied on tests such as free recall, cued recall, and recognition. These tests express the memory of a prior experience, which is known as *explicit memory* (see Ellis, 2004). The term is used to refer to conscious recollection of recently presented information. This is in contrast to the type of memory which is revealed by a facilitation or change in task performance that can be attributed to information acquired during a previous study episode. This type of unconscious recollection is labelled *implicit memory* (for a review, see Schacter, 1987; for effects of presentation mode on implicit memory, see Loveman *et al*., 2002).

In implicit memory tasks, subjects are simply required to perform a task, such as completing a graphemic fragment of a word, indicating a preference for one of several stimuli, or reading mirror-inverted script. Explicit memory, on the other hand, entails conscious

recollection of a previous learning episode (Hulstijn, 2002). Hulstijn (2003) integrates these accounts of implicit and explicit representation by saying that explicit learning is the deliberate construction of verbalizable knowledge in the form of symbols (concepts) and rules, and that implicit learning is the construction of knowledge in the form of networks. For a theory of L2 learning he argues that explicit learning and practice often form efficient ways of mastering an L2 by creating opportunities for implicit learning (for a review of studies of intentional L2 vocabulary learning, see also Hulstijn, 2003, p. 367ff).

3.6.3. From word probe detection to multiple choice task

In Experiment 1 on the influence of prosodic prominence, listeners were prompted with a word immediately after having heard a block of four sentences. This task was deployed as an instrument to indicate a first phonological representation of the word in the listeners' memory. For the present Experiment 2, a word recall part was introduced after the listening experiment had been completed. This was done in order to get a better indication of accurate word retention by somewhat delaying word recall. The resulting longer time span between listening and recall made the memory task for the listeners more demanding. A further change in the methodology of the recall part concerned the number of word options presented. In Experiment 1, listeners were presented one word probe only, which was changed now, inspired by findings of Birch & Garnsey (1995). Their investigations into syntactic focus effects on word memory showed that in immediate word recognition tasks, phonologically related targets were rejected more slowly than unrelated targets, but that this effect did not interact with focus. However, there had been an interaction of focus with phonological relatedness in a delayed recognition task, in that focused word primes were recognized more slowly than non-focused ones. Thus, in some cases focus was found to enhance phonological information. This led to extend the number of word options presented to the listeners in the present recall part: instead of one word probe immediately after the auditory presentation of the sentence, a choice of four words was presented in the recall part. In this, one option indicated the target, a second option a phonologically closely related word, and two more options denoted unrelated words. This was done in order to see whether the findings of Birch & Garnsey (1995) can be transferred to L2 processing, thus determining whether in an L2 the rate of accurate word recall would turn out to be higher for phonologically related word probes than for phonologically unrelated items.

3.6.4. Switching modalities between listening task and recall test

The present experiment employed two different presentation modalities: stimuli in the phoneme detection task were presented aurally, and in the recall task speech materials were presented in written form. This was due to experimental feasibility, i.e., if word recall were

tested by auditory presentation of the stimuli, all answer possibilities would have had to be included. This would have exceeded the timeframe available for testing and also the concentration capacity of the subjects. The two modes of presentation yielded two different measurements, .i.e., reaction time in the phoneme detection task and rate of accuracy in the recall task. In the recall task, the sentences from the phoneme detection task were presented in writing. The written presentation could imply that orthography influences the retrieval of the word form from the memory. The influence of different presentation modes on subject performance is the topic of the present section.

The use of different modalities in speech perception research, such as auditory, visual, or even tactile modes, has an impact not only on the comparability of results within a study, for example in the case of cross-modal testing, but also on the comparability of findings between studies.[28] Rüschemeyer et al. (2005) claimed that studies focusing on L2 comprehension are more heterogeneous in their results than those investigating production. They ascribed this partly to the difference of presentation modalities, for instance, when different linguistic dimensions like semantics or syntax are investigated and compared, or when auditory testing results are compared with results obtained from visual presentation. Few studies, such as Bassili *et al.* (1989) and Berry *et al.* (1997) investigated modality effects in a balanced design, using both visual and auditory test conditions. Bassili *et al.* (1989) found in a word stem completion task that regardless of the test modality, there was more priming when the modality of study and test were the same than when they were different. More specifically (and to a lesser extent with regard to the magnitude of effect), cross-modality priming appeared to be greater from visual study to auditory test than from auditory study to visual test. As a result the authors propose a concept of additivity of components, in that greatest effect is obtained by employing both auditory and visual types of processing. A similar pattern of results was reported by Berry *et al.* (1997, Experiment 1). They found that in a visual word stem completion task the same-modality priming was larger than cross-modality priming, whereas in the auditory version of the word stem completion task same-modality and cross-modality priming were about equal. Loveman *et al* (2002) reported best results if presentation modes were kept constant. In a word stem completion task, the highest priming scores were obtained for aurally presented words in a test using an auditory presentation format and spoken responses. Keeping presentation modalities constant seems, therefore, advisable in experimental tasks, albeit not mandatory as the conclusions of Bassili *et al.* (1989) suggest.

Investigations by Tulving & Thomson (1973) included approaches which emphasize a match of conditions between encoding and recall. They reasoned that specific encoding

[28] For a review on the multisensory nature of speech perception see Bernstein & Benoît, 1996.

operations performed on what is perceived would determine what is stored. Consequently, Watkins & Tulving (1975, p. 369) reasoned that what is stored would then determine what retrieval cues are effective in providing access to what is stored. Surprisingly, Tulving & Thomson (1973) also found repeatedly that words may be recalled although they cannot be recognized. This discrepancy between recognition and recall indicates a recognition failure of recallable words: Although the immediate recognition may not have been (recorded as) successful, later recall performance may be successful.

A theoretical interpretation of this phenomenon of recognition is given in the framework of *episodic theory* (Tulving & Thomson, 1973; Watkins & Tulving, 1975; Postman, 1975). According to episodic theory, a unique episodic memory trace is formed at the time of input, and whether a retrieval cue will be effective depends on the relation between the cue and this episodic trace. If the information in the retrieval cue matches the information in the episodic trace, the item will be remembered. That is, it is *recognized*, if the cue is a copy of the target, and *recalled* if the cue is not. Under some circumstances it happens that a target item is encoded in such a way that a copy cue is not effective, but a noncopy cue is (Watkins & Tulving, 1975, p.6f). This view was challenged by Jared (1997), who showed in her 2nd Experiment that encoding cues (here: phonological cues) do not necessarily have to match retrieval cues (here: orthographic cues) (1997:515). The discussion remains lively and unsolved, and shows for the present study that the modality of input does not necessarily have to match the modality of retrieval.

It could be that for the German subjects in the L2 condition the switch from auditory to written presentation posed a problem due to the spelling-to-sound inconsistency: in English, where spelling and phonemic realization don't match, the mental representation of a word might not align with the written form of the word (see Treiman *et al.*, 1995; also Cutler *et al.*, 1998). Alphabetically literate participants, however, are more used to explicit representations of letters than of phonemes. The following section is devoted to illustrating the confusion of phoneme-to-grapheme conversion that German listeners might encounter, which could constrain word recall performance. Consider, for instance, the words *dintings*, *merbens*, *tudgers*, *shearwa,* and *thrasher* which were all presented in sentences in the listening part. Let's assume that the auditory input was the representation that learners had of these words. In the recall part, these words appeared in written form and a correct choice had to be made based on phonemic representations, although the grapheme might not match the phoneme.

To illustrate the problem of spelling-to-sound inconsistency, consider examples (12a-12e) from word material of the English condition of the current experiment.

item	auditory presentation (transcription in IPA symbols)	written presentation
(12a)	d'IntIŋʐ	dintings
(12b)	m'œ:bəns	merbens
(12c)	t'ʌdʒəz	tudgers
(12d)	ʃ'ɛ:əwʁ	shearwa
(12e)	θɹ'æʃə	thrasher

For native speakers of German, the spelling could suggest a different pronunciation of segments. In (12a) for example, auditory and written representations match for German native speakers. In (12b), the front open-mid rounded vowel /œ:/ is different from the German realization of the written token /e/ with regard to length, rounding and degree of backness. Presentations in example (12c) don't match with regard to realization of the first vowel and medial cluster with the voiced postalveolar affricate /dʒ/. In (12d), the lax close back rounded approximant /w/ is not part of the German phoneme inventory, and the written token would be pronounced as a /v/ in German. In (12e), the phonetic realization of the complete first syllable /θɹ/ differs from the written /$t^{h}ʁ$/. This illustrates the varying degree to which phonetic and written representations match. Therefore, the switch between auditory and written modality might introduce a degree of difficulty that requires L2 knowledge from the learner.

The influence of spelling on phonological encoding, or vice versa, was examined in both spoken word production and perception experiments (e.g., Dijkstra *et al.*, 1995; Roelofs, 2006; Roelofs). Roelofs (2006) investigated the influence of spelling on phonological encoding in production for Dutch. He tested for spelling effects using word production tasks in which spelling was relevant (oral reading in Experiment 1) or irrelevant (picture naming in Experiment 2 and word generation in Experiment 3). He found that response preparation was disrupted by spelling inconsistency only in reading, and concluded that the spelling of a word constrains word production only when this is relevant for the task at hand. For the present experiment this means that L2 learners ought to be aware of phoneme-to-grapheme conversion principles in the L2 in order to master the task. Therefore, L2 beginners were excluded as subjects.

Dijkstra et al. (1995) investigated the influence of spelling on speech perception tasks. They observed that in a phoneme monitoring task performed on Dutch spoken words, the response latencies were affected by the spelling of the words. Cutler et al. (1998) conducted further investigations into whether phoneme detection is sensitive to how target phonemes are orthographically realised. Interestingly, their results showed that the effect of spelling on

phoneme monitoring disappeared when listeners' attention was drawn to spelling by the presence of many irregularly spelled filler items. They concluded that performance in the phoneme detection task is not necessarily sensitive to orthographic effects, but that salient orthographic manipulation can induce such sensitivity. Even though the order of the present experiment is reversed, that is, phoneme monitoring first and then recall, it was felt that the spelling-to-sound inconsistency in English ought to be taken into account. An attempt was made, therefore, to avoid sequences as, for example, '*ough*' (which can be realized as /ɑʊ/ ("drought"), /ɔ/ ("cough"), /u:/ ("through"), or as /oʊ/ ("dough")) in the choice of target words because of strong inconsistencies between phonetic realization and written representation.

3.7. Research hypotheses

The present experiment examined the effect of cleft constructions on word processing and word recall in L1 and L2 processing. The cleft construction is assumed to be transparent for the participants because they are medium to advanced learners of English. Therefore, successful processing cleft constructions is considered a feasible task.

The first question is whether cleft structures facilitate word processing for German learners of English in both German (L1) and English (L2). And, do L2 learners recall new words marked by clefting more accurately than those without syntactic marking? There are two competing hypotheses: On one hand, cleft structures could show an immediate processing advantage due to the inherent function of focus making the clefted element prominent to the listener. On the other, since cleft constructions were found to be a dispreferred and infrequent option to express focus in German, the effect of a cleft construction might not be that strong in German L1. Furthermore, it is assumed that for German learners of English that clefting is a dispreferred option in the nonnative L2 in the very same way: The complexity of the constructions and the experience from the native language might work against an advantage of the focus effect in the L2. I hypothesize that learners rely on the canonical SVO word order structure of English and that they exhibit more processing difficulties with cleft constructions. Thus, they process items in cleft constructions slower than items occurring in sentences with canonical order.

Previous studies in English L1 suggested regarding the recall performance an advantage of recall for those parts of an utterance that are in syntactically more prominent positions (McKoon, 1993), and for words that are focused by clefts as a focus marking option (Birch & Garnsey, 1995). A processing benefit of cleft is, therefore, probable in native English L1. In German L1 and English L2, cleft constructions might not facilitate word recall due to

clefts being a dispreferred option in the L1, and due to the complexity of processing they require. A competing hypothesis is that the focus conveyed by cleft leads to an advantage in the mental representation of a word. The differing expectations per task suggest that the phoneme detection task and the recall task reflect different language processing strategies, and that recall might employ different mechanisms of encoding than online word processing.

The second research question concerns the interaction of pitch accent and cleft construction. Does pitch accent facilitate the processing and the recall of words which are in the scope of a syntactic focus marker? Accent expresses the assignment of focus to an element (Cutler & Isard, 1980), and attention to accent was found to facilitate word processing, and to advance an efficient comprehension (Cutler, 1976; Cutler & Fodor, 1979; Pitt & Samuel, 1990). This motivates the hypothesis that pitch accent is a general device to facilitate both word processing and word recall in the L1 and the L2. Cleft structures were found to be a dispreferred option to highlight elements in German (E. Klein, 1988), and the syntactic expression of focus is expected to complement accentual information. Thus, accent effects are expected to occur in combination with cleft effects. Altogether, an integrative use of speech parameters is expected to emerge as the pattern the most beneficial to efficient word processing and accurate word recall.

The third question deals with the role of context. Do L2 learners process novel words faster and recall them more accurately in the L2 when these are focused by a preceding context question? The hypothesis is that context questions draw listeners' attention to a specific part of the following answer sentence and helps the learner to segment the noun in focus, regardless of the syntctic structure of the sentence. Thus, faster processing times are expected for presentations with context. Based on both findings for English L1 and on claims for L2 learning it is also probable that context supports a better memory of novel words: Context is expected to facilitate word recall in both native and nonnative word recall.

3.8. Experiment 2: Effect of clefts on L1/L2 word processing

3.8.1. Speech materials

Comparable stimuli were constructed in German and in English.[29] In each language, forty sentences were constructed, varying in length between 14 and 17 syllables. Half of the sentences were target sentences and the other half were filler sentences. In each target sentence, a two-syllabled target word occurred in sentence medial position. The target word contained the target phoneme /b/ at the beginning of the second syllable, for example the word *harbeck* (for

[29] I thank Ruben van de Vijver for constructing the English materials and Anne Zimmer-Stahl for constructing the materials in German.

English), or *Trubal* (for German). In the filler sentences, the target-corresponding words had different consonants at the place where the target words had a /b/, for example *trogon* (for English) or *Teida* (for German). All target and filler items consisted of two syllables, and the syllable in which the target sound occurred was always lexically unstressed. The target and filler words were made-up words intended to indicate bird names. The pseudo-words were chosen to control the materials and to avoid of possible frequency effects (although frequency effects of target-bearing words have not been observed in this kind of task, see Foss, Harwood & Blank, 1980; Eimas & Nygaard, 1992).

Sentences were presented either with preceding question (with-context condition), or without preceding question (no-context condition). The type of question was a cleft-question in the form of *Is it the…?* (German: *Ist es der/die...?*). Apart from the preceding question, the two experimental conditions had an otherwise identical set-up.

Two types of sentence structures were used: clefted and non-clefted (i.e., canonical order). The accent placement in the sentence was manipulated in that either the target word or the preceding adjective bore the main sentence accent. The non-clefted sentences were narrow focus sentences with accent realized on the grammatical subject or the preceding adjective thereof. In the cleft sentences, pitch accent was realized on the subject of the clefted construction or on the preceding adjective. To achieve plausible coherence within the question-answer pair, the target words always received accent by contrastive focus. Within each context condition, sentences were balanced for syntactic structure (clefted/non-clefted) and for accent (+/- accent on the target). The complete set of sentences is listed in Appendix 8a (for the English language condition) and in Appendix 8b (for the German language condition). The sentence *The frail tulbul is now looking for juicy fruit* is given as an example in all eight conditions in English (Tab. 3.1, capitals indicate main sentence accent). The sentence *Der faule Kabu steht stundenlang auf einem Fuß* is given as example for German (Tab. 3.2).

Tab. 3.1: *Example of an English sentence with target phoneme /b/, all eight conditions.*

		non-cleft	cleft construction
No context	target not accented	The FRAIL tulbul is now looking for juicy fruit.	It's the FRAIL tulbul that is now looking for juicy fruit.
	target accented	The frail TULBUL is now looking for juicy fruit.	It's the frail TULBUL that is now looking for juicy fruit.
With context	target not accented, not focused	Is it a strong animal that is now looking for juicy fruit? The FRAIL tulbul is now looking for juicy fruit.	Is it a strong animal that is now looking for juicy fruit? It's the FRAIL tulbul that is now looking for juicy fruit.

With context	target accented, focused	Is it the frail skua that is now looking for juicy fruit? The frail TULBUL is now looking for juicy fruit.	Is it the frail skua that is now looking for juicy fruit? It's the frail TULBUL that is now looking for juicy fruit.

Tab. 3.2: *Example of sentence in German with target phoneme /b/ in all eight conditions.*

		non-cleft	cleft construction
No context	target not accented	Der FAULE Kabu steht stundenlang auf einem Fuβ.	Es ist der FAULE Kabu, der stundenlang auf einem Fuβ steht.
	target accented	Der faule KABU steht stundenlang auf einem Fuβ.	Es ist der faule KABU, der stundenlang auf einem Fuβ steht.
With context	target not accented, not focused	Ist es der fleissige Vogel, der stundenlang auf einem Fuβ steht? Der FAULE Kabu steht stundenlang auf einem Fuβ.	Ist es der fleissige Vogel, der stundenlang auf einem Fuβ steht? Es ist der FAULE Kabu, der stundenlang auf einem Fuβ steht.
	target accented, focused	Ist es der faule Närig, der stundenlang auf einem Fuβ steht? Der faule KABU steht stundenlang auf einem Fuβ.	Ist es der faule Närig, der stundenlang auf einem Fuβ steht? Es ist der faule KABU, der stundenlang auf einem Fuβ steht.

In each context condition, this yielded five sentences for the two experimental languages German and English (Tab. 3.3):

Tab. 3.3: *Distribution of 20 targets over accent and syntactic structure per language condition.*

			language	
			German	English
structure	cleft	accented	5	5
		not accented	5	5
	non-cleft	accented	5	5
		not accented	5	5

In the recall test, the sentences were presented to the participants in writing. At the position of the target words, four options were presented, and participants had to choose the one which they thought they had heard in the listening part.

Of these four choices, one option was the target, one item differed from the target item in one phoneme but was otherwise identical, and the other two choices were unrelated but with identical length (number of syllables) and word stress as the target word. This resulted in three categories of answer choice: correct, similar, and false. All options fitted equally well in

the sentences with regard to grammatical constraints. Because German is a language with inflexion, care was taken that the endings of the choices matched in their assumed gender. Examples of choices presented in the recall test are given (see Tab. 3.4) for the target-bearing word *tulbul* (for English), and for *Kabu* (for German). A complete list of the recall items (targets and fillers in English and in German) is listed in Appendix 9a-9d.

Tab. 3.4: *Choices offered in the recall task, with corresponding classification.*

classification		correct	similar	false	false
item	English:	tulbul	tulkul	alcid	thrasher
	German:	Kabu	Katu	Schmainor	Tolko

3.8.2. Speakers and recording procedure

A male native speaker of British English recorded the English stimuli, and a male native speaker of Standard German recorded the stimuli in German. Per language, 40 sentences with preceding questions were recorded, and an additional five sentences for a familiarization part at the beginning of the experiment. Digital recordings were made in a soundproof booth, using an Audiotechnica 4033a microphone, with an audio sampling frequency of 22.05 kHz, 16-bit samples per second. Speech materials were recorded directly onto hard disk and transferred for editing. Materials were edited in separate sentences using PRAAT (version 4.4.16, Boersma & Weenink, 2006) so that start and end frames of each token were in silence.

3.8.3. Participants

80 adult native German L2 learners of English participated in the experiment. They participated either for course credit or were paid a small sum. None of the participants had taken part in the previous Experiment 2. They were mostly undergraduate students of Linguistics at the University of Potsdam and aged between 19 and 41, with a mean age of 23.5 years (median: 23 years). Most of them had started learning English at the age of 11. They had had English classes for 8.8 years at average; none of them had lived in an English speaking country for more than one year. They reported normal hearing and normal or corrected vision at the time of testing.

A prerequisite for the current experiment was that the linguistic structure of a cleft is known to the participants, and therefore the language background was checked. All of them had English as L2 at school at least for 7 years as part of their formal education. An appropriate

level of proficiency regarding the task could therefore be expected and it was assumed that cleft structures were present in the participants' grammar.

A control group of 30 native speakers of Southern British English participated in the experiment. They were tested in London. They were mostly students at University College London, and aged between 19 and 41 with a mean age of 26.3 (median 25). They reported no speech or hearing impediments at the time of the testing. Subjects were paid a small sum for their participation in the study.

3.8.4. Experimental procedure

The experiment was conducted at the Linguistics laboratory of the University of Potsdam, the English controls were tested at University College London. Participants were tested individually and in a quiet room. The subjects were divided into two groups: One group listened to a condition with context (with-context condition), and the other group to a condition containing single sentences only (no-context condition). In each context condition, subjects were balanced for order of language (*test order*): half of the subjects started with the German language condition and continued after a short break with the English condition, the other half started with the English condition and continued after a short with the German one.

Before the experiment started, subjects completed a questionnaire on their language background (see Appendix 5). At the start of the experiment, written instructions were displayed on the computer screen, asking them to listen within the sentences for words that contained the sound /b/, and to press a button as soon as they heard it. Listeners were instructed to react as quickly as possible. They were also asked to pay attention to the contents of the sentences because they would be tested on this at a later stage of the experiment. The participants then entered a brief trial part designed to make them acquainted with the task and the speech materials of the experiment.

The items were presented via headphones at a comfortable listening level which could be further adjusted individually. In the training session listeners heard five sentences, of which two of them contained the target phoneme /b/. In the trial part feedback was given on the correctness of their /b/-detection but no feedback was given during the actual test. In the experiment, listeners were presented 40 sentences in random order, and they could listen to the stimuli only once. This part of the experiment took subjects about 15 minutes to complete.

The listening part of the experiment was programmed using DMDX testing software, version 3.0.2.4. In the no-context condition, sentences were presented with a five seconds interstimulus interval. In the with-context condition there was one second interval between the

questions and the answers, and the next question-answer pair started five seconds after the previous stimulus had finished. A timer in the software control was set to start automatically when the answer sentence was played and to stop when the subject pressed the detection button. The program recorded the time of each response, and the accuracy of /b/-detection.

If listeners pressed the detection button earlier than that the target word was played, a negative detection was recorded.[30] The maximum time allotted for detection was 5000ms. If the listeners did not respond within 5000 ms (in case of a sentence containing a target item), then they were timed out and a negative detection was recorded. In case of a false hit, i.e., the detection button was pressed but there had been no /b/ in the sentence, the reaction time was recorded as negative value (e.g., '-670'). This was done in order to be able to distinguish between false hits and negative detections.

After the listening part, the experimenter started the recall test. It consisted of the 40 experimental sentences (without questions) which were presented on a written form on the monitor (Fig. 3.1).

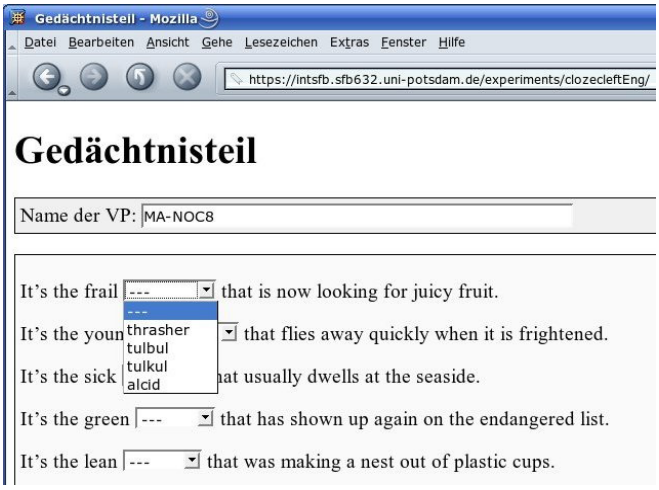

Fig. 3.1: *Screenshot of the recall test, showing the drop-down menu for the 4AFC task (English language condition).*

The sentences were listed in random order. At the location of the target word, a drop-down menu folded out a choice of four words at mouse-click. Subjects were asked to read each sentence and to click on the word out of the four choices which they thought they had heard in this particular sentence in the previous listening part.

The task was self-monitored and there was no time restriction. It took subjects about 10 minutes to complete the recall part.

[30] This was indicated as value '-5000'.

A summary of the total number of subjects per context condition with the distribution of the targets across syntactic structure and accent is given in Tab. 3.5.

Tab. 3.5: *Distribution of subjects across context conditions.*

Condition with context:
40 subjects * (5 targets cleft, +accent; 5 targets cleft, -accent;
5 targets non-cleft +accent; 5 targets non-cleft, -accent)
split for order of languages: 20 subjects in the order German-English,
20 subjects in the order English-German
Condition without context:
40 subjects * (5 targets cleft, +accent; 5 targets cleft, -accent;
5 targets non-cleft +accent; 5 targets non-cleft, -accent)
split for order of languages: 20 subjects in the order German-English,
20 subjects in the order English-German
English native controls:
30 subjects, distributed across context condition (=15 with context / 15 no context):
5 targets cleft, +accent; 5 targets cleft, -accent;
5 targets non-cleft +accent; 5 targets non-cleft, -accent)
in the English language condition only

Altogether, the distribution shown in Tab. 3.5 yielded for statistical data analysis of the German test group:
40 subjects*2 (+/- context)* 2 (L1/L2)* 2 (+/- cleft)* 2 (+/- accent)* 5 = 1600 cases.
For data analysis of the English control group, the distribution yielded:
12 subjects*2 (+/- context)* 2 (+/- cleft)* 2 (+/- accent)* 5 = 480 cases.

3.9. Results

The analyses focused on effects of *cleft construction*, of *accent*, and of *context*. I report the findings in two parts: results of the phoneme detection task will be presented in section 3.9.1, and results of the recall task in section 3.9.2.

3.9.1. Results of the phoneme detection task

The data underwent the following procedures before analyses: Before the statistical analyses, the time interval between the onset of the sentence and the onset of the target-bearing word was subtracted from individual data value. The reaction time therefore indicated the time

from the onset of the target word to the response.[31] Responses shorter than 150 ms and responses slower than 5000 ms were discarded from analyses. In the data there were no false responses, that is, a /b/-detection when there had been no /b/ sound in the sentence. Out of 20 possible responses, no subject in the German L1 task had more than seven missed or discarded responses, and no subject in the English L2 task had more than eight missed or discarded responses. In the English control group (English L1), no subject had more than six missed or discarded responses. In the condition *no context* of the German L1 task, 733 responses (91.6 % of all responses) were valid for analyses and in the English L2 condition *no context*, 681 responses (85.1 %) were valid for analyses. In the German L1 condition *with context*, a total of 764 responses (95.5% of all responses) were valid for analyses and in English L2 a total of 724 responses (90.5 %). In the English control group, condition *no context*, 278 responses (92.7 % of all responses) were valid for analyses and in the condition with context this was a total of 285 responses (95.0 %).

The overview of the results (see Tab. 3.6) shows mean reaction times per language condition in the two context conditions for the variables *cleft construction* and *accent*:

Tab. 3.6: *Mean RT (ms) per context condition, with standard deviations (s.d.).*

		German L1		English L2		English L1	
		- cleft	+ cleft	- cleft	+ cleft	- cleft	+ cleft
no context	no accent	1287.3 *(519)*	1276.0 *(591)*	1324.3 *(647)*	1282.8 *(574)*	970.1 *(456)*	988.6 *(383)*
	accent	1243.7 *(559)*	1051.9 *(532)*	1346.9 *(695)*	1322.8 *(684)*	964.3 *(416)*	810.1 *(444)*
with context	no accent	1140.0 *(254)*	1033.3 *(274)*	1254.3 *(453)*	1094.8 *(372)*	815.9 *(181)*	862.4 *(230)*
	accent	997.0 *(287)*	850.7 *(215)*	1196.8 *(497)*	1012.1 *(371)*	825.3 *(192)*	685.0 *(124)*

Some general observations concerning the variables *cleft, accent* and *context* can be made from Tab.3.6 with regard to the research questions proposed. The means obtained for *cleft construction* suggest that the cleft construction leads to faster responses in phoneme detection

[31] The reason for not measuring from the onset of the target but from the onset of the word was that listeners were assumed to expect the word because of focal accent assignment, resulting in a heightened level of attention even before occurrence of the target phoneme.

than the non-cleft construction in German L1 and in English L2. The benefit of cleft in English L2 shows particularly in the condition with context.

In English L1, a benefit of the cleft structure seems to be related with the presence of accent. The presence of accent also seems to facilitate phoneme detection in German L1. In English L2, a beneficial effect of accent seems to show only in the presentation with context. A benefit of accent also shows in English L1.

The presentation with context seems to speed up phoneme detection times in German L1, English L2 and in English L1. Generally speaking, the means for *cleft construction* and for *accent* suggest different patterns between L1 and L2 language processing, particularly with regard to the combinations of factors involved. Context, however, seems to work in similar ways for native and nonnative word processing.

An analysis of variance for repeated measures was applied to the data with *language* (German L1 and English L2), *cleft construction* (non-cleft/cleft), and *accent* (accented/ not accented) as within-subject factors, and *context* (no context/with context) as between-subject factor. At first, this was done for the combined German data (German L1 and English L2) in order to reveal general effects or tendencies of the factors in the German subject group. After this, separate analyses per language condition were carried out.

The following structure is used to report on the statistics conducted for each factor: Analyses of the three factors and their interactions are presented separately, in the order of (1) the effect of cleft construction, (2) the effect of accent, (3) the effect of context. A comparison between language conditions concludes the analyses.

Effect of syntactic structure

In the German data across language conditions (German L1 and English L2), there was a main effect of *cleft construction* [$F(1,78)=49.875$; $p<.001$], in that RTs for targets occurring in sentences with cleft structure (mean RT 1115 ms; s.d. 496) were faster than RTs for targets in sentences with non-clefted structure (mean RT 1223 ms; s.d. 516).

There was also a two-way interaction of *cleft construction* with *context condition* [$F(1,78)=7.119$; $p<.05$]. This interaction is shown in Fig. 3.2:

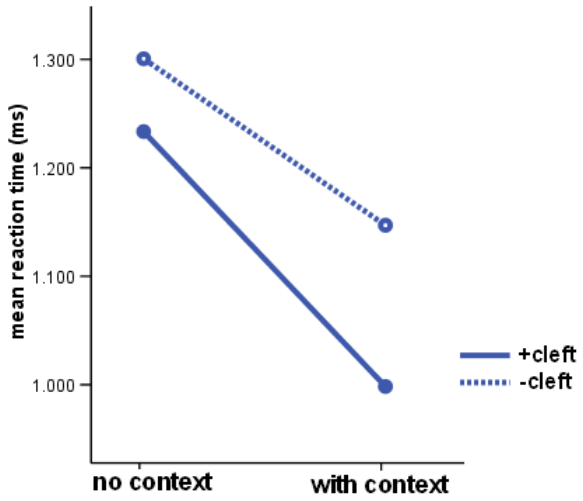

Fig. 3.2: *Interaction of cleft construction with context condition (German data).*

The interaction depicted in Fig. 3.2 suggests that the difference between clefts and non-clefts is more pronounced in the condition with context: there is a significant advantage in reaction time of cleft sentences when presented with additional context question. Thus, across language conditions, German subjects use cleft constructions to efficiently process words especially when cleft constructions appear in combination with context.

In the data of English L1, an ANOVA with repeated measures revealed also a main effect of *cleft construction* [F(1,28)=14.300; p<.005], indicating that items occurring in clefts (mean RT 836,5 ms, s.d. 331) were faster processed than items occurring in non-cleft sentences (mean RT 893,9 ms, s.d. 223). This is statistical evidence for the observation based on values listed in Tab. 3.6, namely that cleft and accent seem to be related in English L1.

The main interest of the present study was to examine differences between L1 and L2 word processing in cleft and non-cleft constructions, therefore the German data was analyzed per language condition. Mean values (see Tab. 3.6) suggested that the cleft construction facilitates phoneme detection in both the +accent and -accent condition for German L1 and English L2. In the following, the data are examined across accent conditions in order to focus on the cleft effect. In the German L1 data, the mean reaction time for non-cleft sentences was 1156.3 ms (s.d. 587), and 1048.2 ms (s.d. 554) for cleft sentences. Due to fewer entries per cell than in the previous ANOVA with repeated measures, this was examined in an ANOVA with univariate procedure, with *cleft*, *context condition*, and *accent* as fixed factors. The effect of cleft construction proved to be significant [F(1, 319)=5.550, p<.05], suggesting a faster reaction to items occurring in clefted sentences than in non-clefted sentences. In English L2, the mean

reaction time for non-cleft sentences was 1235.4 ms (s.d. 711), and 1162.6 ms (s.d. 642) for cleft sentences. The difference was not significant in a univariate ANOVA.

Next, mean reaction times were examined for *cleft construction* per *context condition* per language conditions. Resulting overall means are given in Tab. 3.7:

Tab. 3.7: *Mean reaction times (ms) with standard deviations (s.d.) per context condition, for cleft construction.*

	German L1 mean RT (ms)		English L2 mean RT (ms)		English L1 mean RT (ms)	
	- cleft	+ cleft	- cleft	+ cleft	- cleft	+ cleft
no context	1267.6 *(528.1)*	1157.9 *(540.4)*	1335.8 *(656.2)*	1318.0 *(622.7)*	966.6 *(433.6)*	894.0 *(381.7)*
with context	1067.8 *(471.8)*	939.4 *(207.5)*	1220.4 *(423.2)*	1054.9 *(349.8)*	818.0 *(153.6)*	773.7 *(172.9)*

One-way ANOVAs examined the main effect found for *cleft construction* separately per context condition. This revealed a significant effect only in the German L1 condition with context: targets occurring in cleft sentences were faster processed than those occurring in non-clefts [F(1,78)=6,64, p<.05]. No effects of syntactic structure were observed in either the German no-context version or in the two context conditions of the English L2 data.

However, a trend could be observed in the English L2 with-context condition that cleft sentences tended to be processed faster than non-clefts [F(1,78)=3,890, p=.052]. Figure 3.3 depicts mean reaction times for the variable *cleft construction* in the two context conditions in the three language groups.

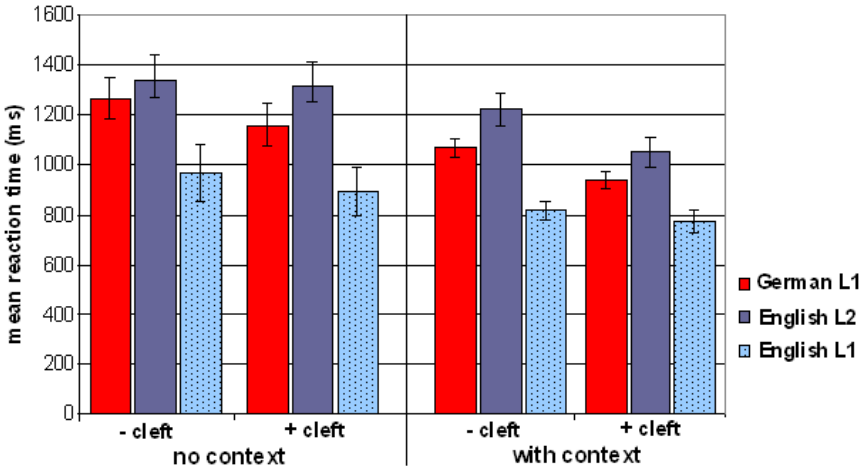

Fig. 3.3: *Mean RT (ms) per context condition and cleft construction (with SE bars).*

As can be seen in Fig. 3.3, the data obtained in conditions with context have smaller error bars.[32] This suggests that responses in the with-context conditions are more balanced and consistent.

Effect of pitch accent

At first, the difference in reaction times with regard to items being accented or not accented was examined in an ANOVA with repeated measures. In the combined German data, this revealed a main effect of accent [$F(1,78)=22.032$; $p<.001$], indicating that accented words across language conditions were faster responded to (mean RT 1127 ms; s.d. 933) than unaccented words (mean RT 1211 ms, s.d. 1080).

Interestingly, there was a two-way interaction of *accent* with *language* [$F(1,78)=9.109$; $p<.005$]. The RTs of conditions German L1 and English L2 are compared with regard to the effect of accented targets vs. not accented targets (see Fig. 3.4). The interaction of *accent* with *language* suggests that accent gives more of a processing advantage in the German native language condition than in the English L2. There was no significant difference between accent conditions in English L2.

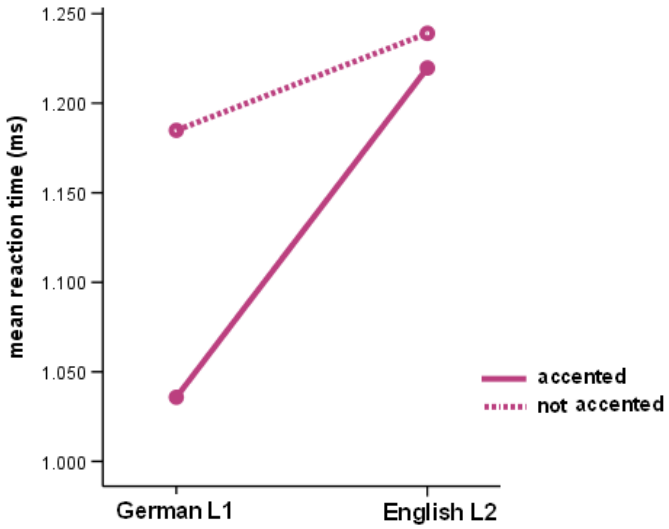

Fig. 3.4: *Two-way interaction of accent with language (German data).*

[32] The standard error is a measure of how much the value of the mean may vary from sample to sample taken from the same distribution. It is defined as the standard deviation of scores an individual might be expected to obtain on a larger number of parallel test forms (Ferguson & Takane, 1989). They are used here to visually compare observed measurements on reaction time under the assumption that the ability of the individual listeners remains unchanged. Hence, reaction times obtained in the with-context conditions can be expected to have a good fit to hypothesized values of similar experimental measurements. The smaller standard deviations in with-context conditions (see Tab. 3.7) indicate that values are clustered more closely around the mean, or in any case are less widely spread in the data set.

There was also a main effect of *accent* in the data of the English controls (English L1), [F(1,28)=12.069; p<.005], showing that accented targets (mean RT 821.2 ms, s.d. 332) were faster responded to than unaccented targets (mean RT 909.2 ms, s.d. 331).

Let us now turn to the interaction of *accent* and *cleft construction*. This interaction was significant in the condition English L1 [F(1,28)=8.521; p<.05], but not in conditions German L1 and English L2. The interaction in the English control data (Fig. 3.5) indicates that accented items were much faster responded to in cleft sentences than in non-clefts: Accent gives rise to an immense advantage in cleft constructions.

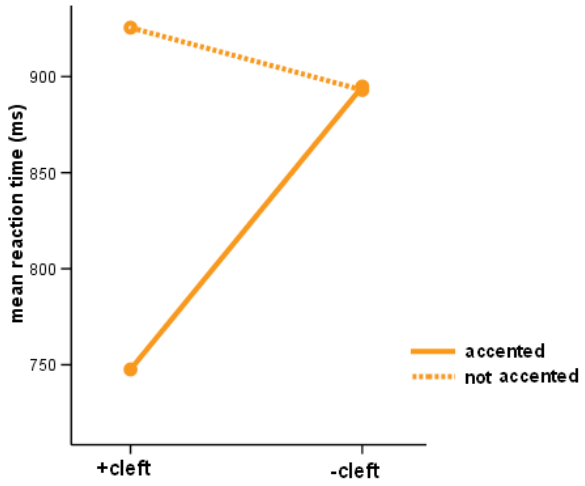

Fig. 3.5: *Interaction of syntactic structure with accent (English L1).*

Next, the German data was split per language condition, and mean RTs of correct phoneme detection per accent condition were calculated. In German L1, the mean RT for unaccented items was 1182.0 ms (s.d. 594.2), and 1035.3 ms (s.d. 544.4) for accented items. In a univariate ANOVA with *cleft*, *context condition*, and *accent* as fixed factors, this proved to be a significant difference [F(1, 319)=9.588, p<.005], suggesting that subjects reacted faster to items when these were accented than when they were not. In English L2, the mean reaction time for unaccented items was 1196.5 ms (s.d. 652), and 1199.4 ms (s.d. 699) for accented items, which was not a significant difference.

Mean RTs per listener were computed per context condition and language across cleft structure (Tab. 3.8). Separate ANOVAs were carried out per context condition and language. There was an effect of accent in condition German L1 with context [F(1,78)=10.338, p<.005], indicating that accented items were detected faster than unaccented items.

Tab. 3.8: *Mean reaction times (ms) with standard deviations (s.d.) per context, for -/+ accent.*

	German L1 mean RT (ms)		English L2 mean RT (ms)		English L1 mean RT (ms)	
	- accent	+ accent	- accent	+ accent	- accent	+ accent
no context	1285.0 *(543.4)*	1147.5 *(536.9)*	1313.0 *(602.5)*	1336.8 *(679.8)*	976.2 *(409.2)*	886.2 *(413.3)*
with context	1088.7 *(226.9)*	923.1 *(233.7)*	1168.5 *(373.3)*	1054.9 *(349.8)*	838.8 *(196.4)*	752.0 *(144.2)*

Accent had no significant effect in condition German L1 without context. There was also no effect of accent in both context conditions of English L2, and no effect of accent in the two context conditions of English L1.

Effect of context condition

The mean reaction times of correct phoneme detection for items presented with context and without context were calculated for each language condition, and resulting mean values are given in Tab. 3.9.

Tab. 3.9: *Mean reaction times (ms) with standard deviations (s.d.) per context condition.*

	German L1 mean RT (ms)	English L2 mean RT (ms)	English L1 mean RT (ms)
no context	1211.7 *(529.2)*	1326.1 *(633.7)*	930.3 (405.8)
with context	1003.5 *(211.6)*	1132.0 *(366.7)*	795.2 *(158.5)*

In the combined German data across language conditions (German L1 and English L2), an ANOVA with repeated measures yielded a significant difference between the two context conditions [$F(1,78)=4.339$; $p<.05$]. This indicates that the German subjects responded faster in the condition with context (mean RT 1064,3 ms; s.d. 264) than in the no-context condition (mean RT 1262.7 ms; s.d. 540).

In English L1, the effect of context was not significant with means of 930.3 ms (s.d. 406) in the no-context condition, and of 795.2 (s.d. 159) in the condition with context. Given the apparent difference in mean values, the lack of a context effect in English L1 is surprising. Therefore, the data were more closely inspected in their distribution, using the graphic display of boxplots (Fig. 3.6).

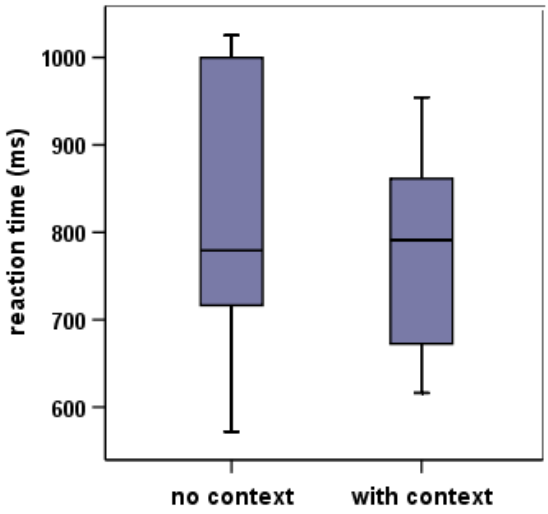

Fig. 3.6: *Boxplots of reaction times (ms) for -/+ context in condition English L1.*

The boxes in the graph each contain 50% of the cases, with the black middle line indicating the median value. It can be seen that reaction times in the no-context condition (upper box of boxplot to the left) are indeed slower than in the condition with context (upper box of boxplot to the right). However, the median RT in the with-context condition is slightly higher, and the fastest RTs in the no-context condition are very fast. Thus, despite figures in Tab. 3.9 suggesting otherwise, there is no evidence of difference between the two context conditions in English L1.

A univariate ANOVA with *cleft*, *context*, and *accent* as fixed factors was carried out on the data of German L1 and English L2.[33] In the condition German L1, the effect of *context* proved to be significant [$F(1, 319)=18.832$, $p<.001$], suggesting a faster reaction to items presented with context question. In the condition English L2, this was also a significant difference [$F(1,318)=8.479$, $p<.005$], likewise suggesting an advantage of items presented with context (for mean values, see Tab. 3.9 above).

Effect of language

At first, results of the German subjects in condition German L1 and English L2 are compared, followed by a comparison of results obtained by the German listeners (English L2) with the English controls (English L1). The reaction times of conditions German L1 and English L2 were compared in a one-way ANOVA. There was a significant effect of language [$F(1,78)=8.398$; $p =.005$], indicating that items in German were faster processed (mean RT 1110 ms, s.d. 450) than items in English (mean RT 1229 ms, s.d. 556). Given that RTs were

[33] The data of English L1 were analyzed in an ANOVA with repeated measures (see p. 96).

measured from the onset of the word, additional measurements of word length from the onset of the word to the beginning of the target phoneme (onset-to-target) in the German and English materials was needed to see whether this could have caused the difference between language conditions. Acoustic measurements of the 20 target items in each language were conducted (van de Vijver *et al.*, 2006).[34] This revealed a mean onset-to-target time of 641 ms (sd. 113) for English and of 829 ms (s.d. 227) for German. A t-test showed that this difference between the two language conditions was significant [t (28)=3.313; p<.005]. Putting the two findings together it shows that although the English target phonemes were even closer to the word onset than their German counterparts, the German listeners still reacted slower in English L2 than they did in German L1.

The next step was to compare German and English listeners in the English language task. A t-test revealed that reaction times were significantly slower in English L2 (mean RT 1229.1 ms, s.d. 523) than in English L1 (mean RT 862.8 ms, s.d. 310) [t (108)=3.596; p<.001]. This effect held in a further split by context conditions: in the no-context condition, latencies between English L2 (mean RT 1326.1 ms, s.d. 633), and English L1 (mean RT 930.3 ms, s.d. 405) differed significantly [t (53)=2.245; p<.05]; latencies also differed between the two subject groups in the with-context condition [t (53)=3.424; p=.001] (English L2: mean RT 1332.0 ms, s.d. 366; English L1: mean RT 795.2 ms, s.d. 158). Thus, at all levels, the processing of English items was slower in the L2 group than in the L1 group.

Summary of results of the phoneme detection task

The complex relation of accent and syntactic structure in each language task is shown per two context condition (see Fig. 3.7, based on Tab. 3.6, p. 92). In the graph, squares indicate German L1 and triangles English L2. The data of the English control group is indicated by circles. Blank symbols indicate the no-cleft condition, and filled symbols the cleft-condition.

Higher values in condition *no context* indicate that this condition seems to be more difficult than the condition *with context*. In German L1 and English L2, the presentation with context leads to (significantly) faster phoneme detection; a similar tendency also shows in English L1, but not significant. In the German no-context data, the effect of accent depends on the syntactic structure of the sentence: accent is beneficial only in clefted sentences (filled squares vs. blank squares). This is different from condition with context.

[34] The acoustic measurements were part of the work of SFB 632 Project C4, carried out at Potsdam University, Germany. The study on the acoustic realizations of syntactic focus marking is published in van de Vijver *et al.*, 2006.

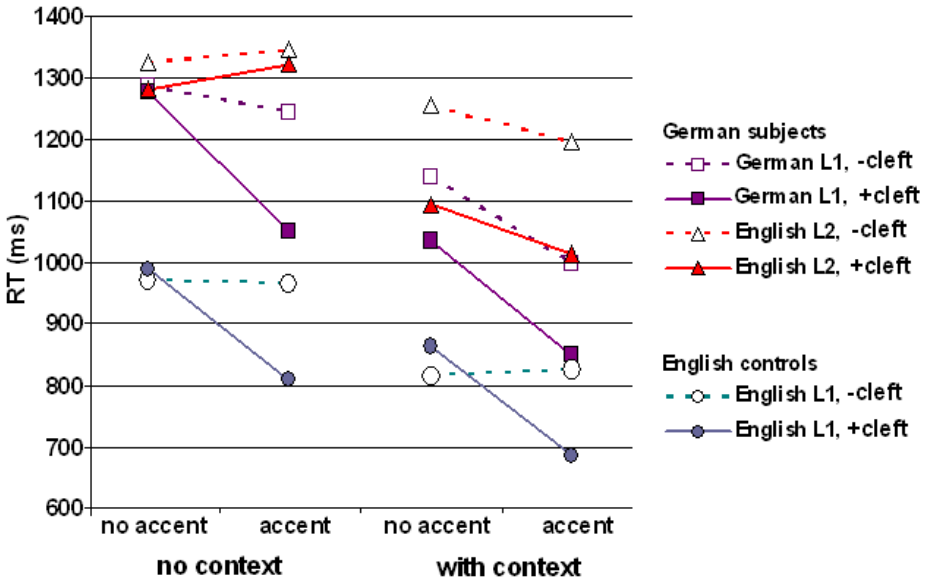

Fig. 3.7: *Mean RT (ms) for the two subject groups in the two context conditions, for the factors accent and syntactic structure.*

It can be seen in Fig. 3.7 that presentation with context leads to similar patterns regarding the influence of accent in German L1 and English L2: Accent reduces reaction times, regardless of the syntactic structure. In English L1, the patterns of cleft and accent in the two context conditions are similar. Accent leads to faster reaction times in clefted structures (filled circles vs. blank circles), but whether an item is accented or not does seem to make any further difference when examined separately in the two context conditions (comparison between blank circles within each context condition).

The following Tab. 3.10 summarizes the main effects of the phoneme detection task of Experiment 2. In case of an effect, an indication of its direction is given, with '>' indicating an advantage of the left condition over the right condition.[35] It can be seen that, where present, the main effects listed in Tab. 3.10 show the same direction for the German data as for the English controls.

[35] The asterisk* indicates the probability level (*p*) with which the observed differences are treated as significant. This indicates the level of probability with the null hypothesis can be rejected. Three levels of significance are widely recognized in statistics (see Ferguson & Takane, 1989, p. 182):
- p = 0.05 = significant (the null hypothesis can be rejected at the 5 per cent level)
- p = 0.01 = very significant (the null hypothesis can be rejected at the 1 per cent level)
- p = 0.001 = highly significant (the null hypothesis can be rejected at the 0.1 per cent level).
The probability level of p= 0.05 is commonly interpreted as justification for rejecting the null hypothesis. In the summary tables, the asterisk indicates an effect of at least p= 0.05, the precise numerical significance levels are reported in the result sections resp. throughout the study.

Tab. 3.10: *Overview of main effects of the listening part for the German subject group (German L1 and English L2), and the English controls (English L1).*

	German data (German L1 and English L2)	English L1 data
cleft	* cleft > non-cleft	* cleft > non-cleft
accent	* accent > no accent	* accent > no accent
context	* context > no context	_
cleft x context	* bigger advantage of cleft vs. non-cleft in *with-context*	_
cleft x accent	_	* bigger advantage of accent in cleft than in non-cleft
accent x language	* bigger advantage of accent in German L1 than in Engl. L2	_

It can be observed that (1) the marked cleft construction is processed faster than the unmarked non-cleft construction; (2) accented items are faster detected than unaccented items; (3) additional context helps to process items faster.

Similar directions of effects were found in separate analyses per language condition for German L1 and English L2 (Tab 3.11):

Tab. 3.11: *Effects per language task for German L1 and English L2.*

	German L1	English L2
cleft	* cleft > non-cleft	_
accent	* accent > no accent	_
context	* context > no context	* context > no context

Tab. 3.11 shows that the main effects of cleft and accent found in the combined German data (see Tab. 3.10) remain only in the data of German L1 and not in the English L2 condition. The effect of context, however, is present in both German L1 and English L2.

A further split for context conditions seems to weaken the statistical power, as former effects do not hold in the separate analyses per context condition. Effects of cleft and accent evolve only in condition German L1 with context (see Tab. 3.12).

Tab. 3.12: *Effects per language task and context condition.*

	German L1		English L2		English L1	
	no context	context	no context	context	no context	context
cleft	–	* cleft > non-cleft	–	–	–	–
accent	–	* accent > no accent	–	–	–	–

Finally, significant comparisons between the three language conditions (Tab. 3.13) show that, regardless of context condition, native language processing is always faster than nonnative language processing (L1 > L2). This clearly suggests native language dominance in the phoneme detection task.

Tab. 3.13: *Comparisons between language conditions.*

		English L1	English L1		English L2
			no context	context	
English L2		* Engl. L1 > Engl. L2			
English L2	- context		* Engl. L1 > Engl. L2		
	+ context			* Engl. L1 > Engl. L2	
German L1					* Ger. L1 > Engl. L2

This overview concludes the summary of the results of the phoneme detection task. Section 3.9.2 reports on the results of the word recall task which tested subjects' memory of words occurring in sentences of the listening part.

3.9.2. Results of the word recall task

The second part of the experiment investigated the effect of *cleft construction, accent* and *context* on word recall. To begin with, percentages of correct word recall are given per language and context condition for *cleft* and *accent* (Tab. 3.14). A univariate ANOVA was carried out, with *correct recall* as independent variable, and *language* (German L1 / English L2), *cleft construction* (no cleft, cleft) and *accent* (+/- accent) and *context* (+/- context) as fixed factors. Results will be presented per factor and then summarized at the end of this chapter.

Tab. 3.14: *Correct word recall (mean %) per language and context condition, for cleft construction and accent.*

		German L1 (% correct)		English L2 (% correct)		English L1 (% correct)	
		- cleft	+ cleft	- cleft	+ cleft	- cleft	+ cleft
no context	no accent	39.5	43.0	52.5	52.5	58.7	57.3
	accent	47.5	55.0	62.0	48.5	80.0	62.7
context	no accent	41.0	39.5	51.0	51.5	54.7	50.7
	accent	44.5	45.0	56.5	46.0	74.7	41.3

Effect of cleft construction

An ANOVA with univariate procedure revealed no main effect of *cleft construction* in the combined German recall data (German L1 and English L2). There was a significant three-way interaction of interaction of language by structure by accent [$F(1,116)=10.998$, $p<.005$]. A univariate ANOVA on the English L1 data revealed a significant main effect of *cleft construction* [$F(1,116)=10.536$, $p<.005$], indicating that items occurring in non-cleft sentences were significantly better recalled (67.0%) than items in cleft sentences (53.0%).

Across the two context conditions, correct recall in condition German L1 for cleft was 45.9% vs. 42.9% for items in non-cleft sentences; in English L2, there was a 49.6% correct recall of items in cleft sentences versus 55.5% for items in non-cleft sentences. Univariate ANOVAs were carried out on the data of conditions German L1 and English L2.[36] This revealed no effect of syntactic structure on word recall in German L1. In the condition English L2 the effect of syntactic structure on word recall failed to reach significance [$F(1,311)=3.539$, $p=.061$]. Next, percentages of correct recall for clefted and non-clefted items were computed for the two context conditions (Tab. 3.15).

Tab. 3.15: *Correct recall (%) in the two context conditions of German L1, English L2, and English L2, for cleft construction.*

	German L1 (%)		English L2 (%)		English L1 (%)	
	- cleft	+ cleft	- cleft	+ cleft	- cleft	+ cleft
no context	43.5	49.0	57.3	50.5	69.3	60.0
context	42.3	42.8	53.8	48.8	64.7	46.0[37]

[36] In the English L1, the univariate ANOVA already showed an effect of cleft (see previous paragraph).
[37] The value is correct: Out of 100%, there were 46% correct, 21.3% similar, and 32% false answers.

Separate ANOVAs were carried out per language and context condition with *correct recall* as dependent variable and *cleft construction* as independent variable. The differences between recall scores for cleft were not significant in either combination of language and context condition. This was also true for condition English L1, despite means in Tab. 3.15 suggesting otherwise. The distribution of the English L1 data is displayed in boxplots (Fig. 3.8).

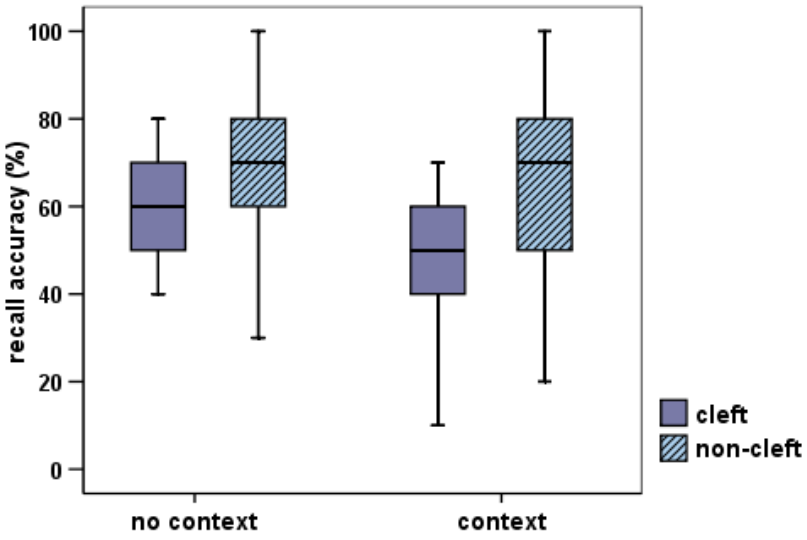

Fig. 3.8: *Recall (% correct) per context condition for cleft construction (English L1).*

The visual presentation in boxplots shows the lack of effect of cleft: the length of the boxes and the whiskers indicates that word recall varied between subjects. The large overlap of the boxes suggests no difference between word recall accuracy rates of cleft and non-cleft condition.

The main interest of the current experiment focused on the effect of the cleft construction on word processing and word recall in L2 learners. Hence, the multiple choice task of the recall test was examined for this subject group in more detail with regard to the effect of clefts. Remember that in the multiple choice task, items were divided into the three categories correct-similar-false (see Tab. 3.4, p. 88). The term 'correct' referred to the target items, 'similar' indicated items that differed from the target item in one phoneme but were otherwise identical, and 'false' indicated items that were unrelated to the target. The percentages of answers given in the three answer categories are shown in Fig. 3.9.

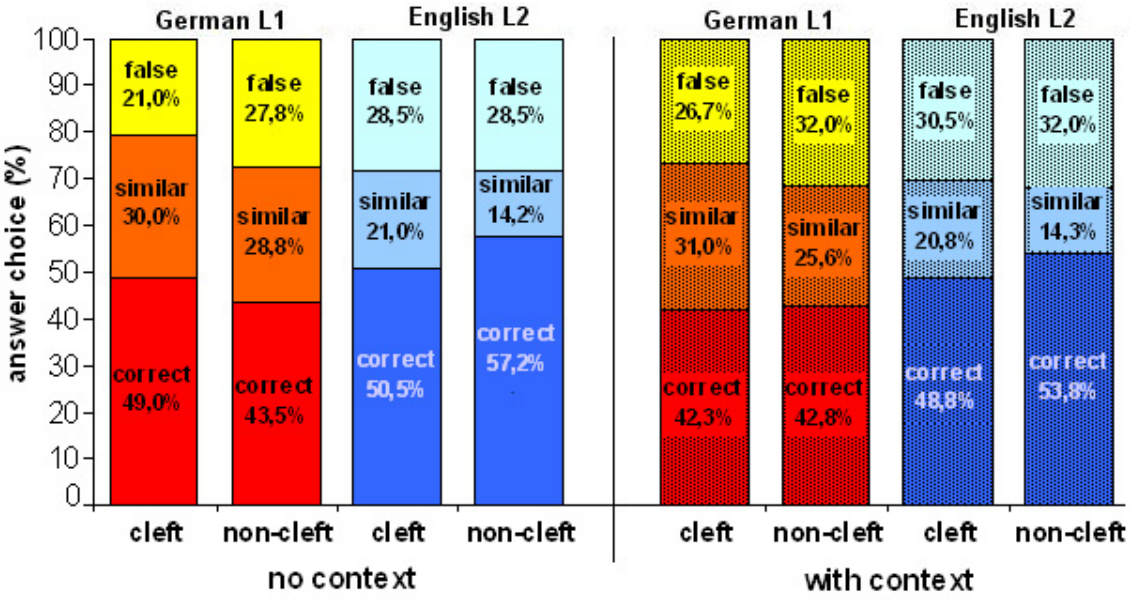

Fig. 3.9: *Distribution of answers over the three categories in the recall test, per context condition and cleft construction (German subject group).*

The recall performance in condition German L1was best for items occurring in cleft structures without preceding context question (49.0% correct, lower part of the red bar to the left). Highest false recall was for items in non-clefted structures with context (32.0% false answers). Compared to English L2, there was a relatively high recall of phonemically similar items in German L1, indicated by the middle parts of the bars. In the condition English L2, recall performance was best for items occurring in non-clefted structures in the no-context condition (57.2% correct), followed by items in non-clefted structures with context (53.8% correct). The learners did worst in recalling items that occurred in clefted structures with context (48.8% false answers). There seemed to be a tendency in English L2 towards either correct or false recall, whereas participants in condition German L1 opted more often for a phonemically similar choice.

There had been no effect of cleft construction on word recall in the statistical analyses of German L1 and English L2 (see p. 104). The correct and similar answer choices in the recall test differed in one phoneme only which was maybe a difference too subtle to be captured in the recall task. Therefore, a further analysis examined the difference between the combined data of correct and similar answers versus false answers. Across context conditions, a univariate ANOVA revealed an effect of syntactic structure in the native German language condition [$F(1,159)=6.576$, $p<.05$], with a combined score of correct and similar answers of 76.1% for items in cleft sentences, and 70.1% combined score correct of correct and similar answers for items in non-cleft sentences. This can be interpreted as a trend towards a recall benefit of items

occurring in clefts in German L1: Listeners broadly remembered words better when they had heard them in a marked structure. There was no such effect in the combined data (correct and similar answers) of English L2 (70.5% for items in clefts and 69.8 % for items in non-clefts).

In condition English L1, this analysis revealed a significant effect of cleft [F(1,59)=13.322, p<.005], with combined scores of correct and similar answers indicating that items in non-clefts were better recalled (86%) than items in clefts (72%). This confirmed the main effect of advantage of non-clefts (see *Effect of cleft construction*, English L1, p. 104).

Effect of accent

An analysis of variance with univariate procedure carried out on the data revealed a main effect of *accent* in the combined German data (German L1 with English L2) [F(1,615)=6.336, p<.05], showing that accented items were significantly better recalled than unaccented items. A similar main effect was found in the data of English L1 [F(1,116)=4.470, p<.05], again suggesting an advantage of accented items (64.7%) over unaccented items (55.3%).

Next, the German recall data was examined per language task, and univariate ANOVAs were carried out on German L1 and English L2. This revealed a significant effect of *accent* in German L1 [F(1,303)=9.853, p<.005] in that accented items were better recalled (48.0%) than unaccented items (40.8%). In English L2, mean recall of accented items was 53.3% and 51.9% for unaccented items, which was not a significant difference. There were interactions of *cleft* by *accent* in the data of English L2 (Fig. 3.10) and English L1 (Fig. 3.11):

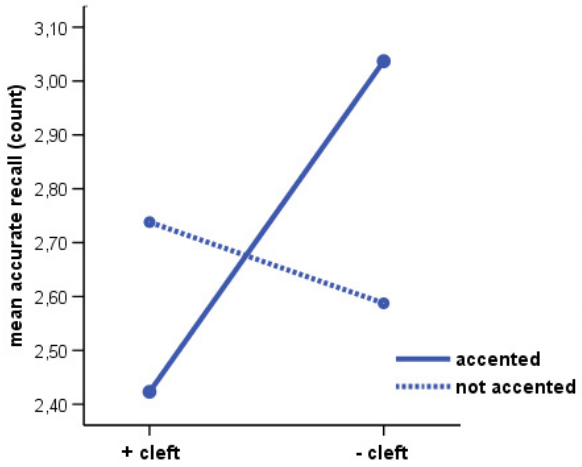

Fig. 3.10: *Interaction of syntactic structure with accent for English L2 (mean correct recall of items on a scale of 0-5).*

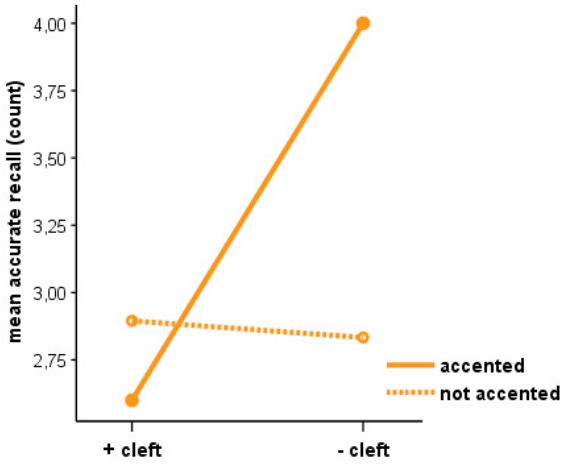

Fig. 3.11*: Interaction of syntactic structure with accent for English L1 (mean correct recall of items on a scale of 0-5).*

The interaction of *cleft* by *accent* in English L2 was significant [F(1,311)=9.636, p<.005], as was the similar interaction in English L1 [F(1,116)=12.563, p<.005]. A comparable interaction didwas not shown in the recall data of German L1. The interactions indicate that accented items were better recalled when occurring in non-clefted structures. With regard to recall it could be that the benefit of accent gets inhibited by cleft constructions. It has to be noted that an interaction of accent and cleft showed in the English L1 data of the listening part (see Fig. 3.5, p. 97), albeit in reverse direction: in listening, cleft constructions seemed to advance beneficiary effect of accent.

The percentages of accurate recall were calculated per language task and accent condition for the two context conditions (Tab. 3.16):

Tab. 3.16: *Accurate recall (% correct) per language condition, for accent and context*

	German L1 (%)		English L2 (%)		English L1 (%)	
	no accent	accent	no accent	accent	no accent	accent
no context	41.3	51.3	52.5	55.3	58.0	71.3
context	40.3	44.8	51.3	51.3	52.7	58.0

The effect of accent was examined in separate one-way ANOVAs per context condition in each of the three language tasks. This revealed a significant effect [F(1,77)=4.417, p<.05] in condition German L1 no-context, indicating that accented targets were better recalled than unaccented ones. There was no such effect in the context condition of German L1. There was no effect of accent in the two context conditions in English L2. In the data of English L1, accent had an effect only in the no-context condition [F(1,28)=5.036, p<.05], suggesting an advantage in word recall of accented items over unaccented ones.

Effect of context

Across the combined German data (German L1 and English L2), percentage of correct recall in the condition no context was 50.1%, and in condition with context 46.9%. ANOVAs with univariate procedure showed that this was not a significant difference. There was also no main effect of context on word recall in English L1, with 64.7% correct recall of items in the no-context condition, and 55.3% correct recall of items presented with context. The German data was then split per language task. ANOVAs with univariate procedure showed a significant effect of context condition in German L1 [F(1,303)=5.316, p<.05], suggesting that items presented without context were better recalled (46.3%) than items with context (42.5%).

In English L2, there was 53.9 % correct recall in the condition no-context, and 51.3% correct recall in the condition with context, which was not a significant difference.

Effect of language

To compare percentages of correct word recall between the conditions of German L1 and English L2, an ANOVA with univariate procedure was used. This showed a significant main effect of language [$F(1,115)=18.410$, $p<.005$], in that the German participants recalled the English items significantly better (52.6%) than that they did recall the German items (44.4%).

The recall scores obtained by the German learners in the English L2 condition were compared to the scores obtained by the English controls (English L1). A t-test revealed a significant difference [$t(108)=-2.34$; $p<.05$] between English L2 and English L1, suggesting that out of the in total 20 words, the controls remembered more words correctly (mean 12.0 items) than the German learners (mean 10.5 items).

A similar analysis was conducted per context condition. This showed an effect in the no-context condition [$t(53)=-2.62$; $p<.05$], indicating that the English L1 group recalled significantly more items (mean 12.9 items) than the English L2 learners (mean 10.8 items). There was no significant difference between the conditions with context (English L1: mean 11.1 items; English L2: mean 10.3 items). This result is mainly due to the fact that the English controls seemed to recall items better in the no-context condition, although this had been no significant difference in the analysis of context effects in the English L1 data (see *Effect of context*, p. 108).

Effect of test order

It was a concern in the current experiment that the order in which the language conditions are presented (German first or English first) might influence the test results. Test order thus could, for rexample, cause a bias through learning: whichever task was presented second might be at advantage because of possible learning effects in the first task. Therefore, the 80 German participants were balanced over two test orders so that there were 40 subjects tested in each order. Although this in itself is not relevant to the present study, results are presented here to warrant this decision of experimental procedure.

Fig. 3.12 shows mean reaction times per test order, and Fig. 3.13 depicts the percentages of false recall per test order.

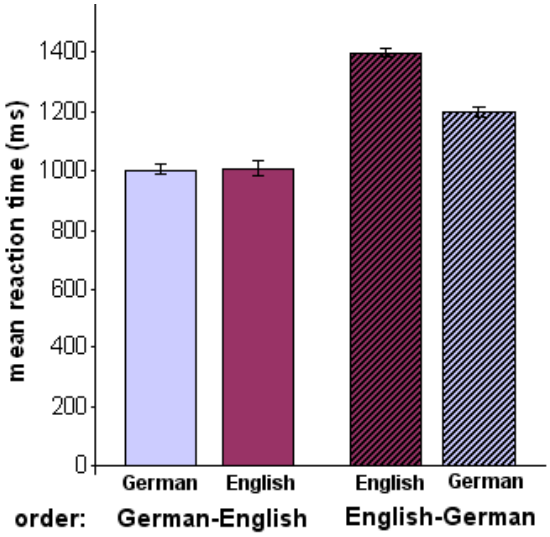

Fig. 3.12: Mean reaction times (ms) of the language tasks per test order (German data).

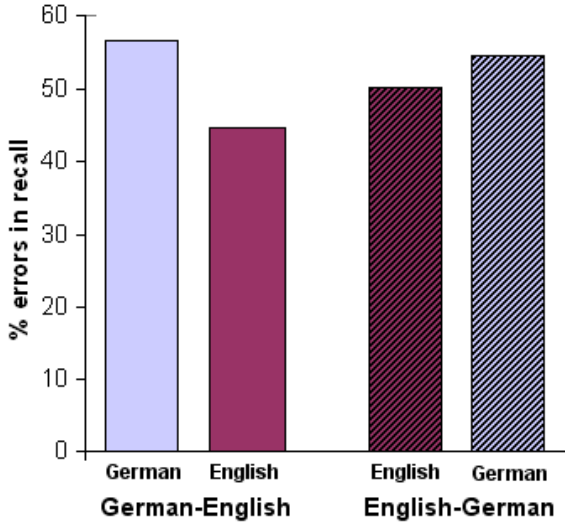

Fig. 3.13: Error rate (%) in the two language tasks per test order (German data).

The order L1-L2 resulted in the listening part in similar latencies in both language tasks, the order L2 - L1 resulted in longer reaction times in the English L2 condition. One-way ANOVAs showed that test order made a significant difference to latencies: reaction times were faster in the German L1 task when tested in the order German–English, compared to German L1 latencies in the test order English-German [$F(1,78)= 4.564$, $p<.05$]. Latencies in English L2 differed also significantly with regard to test order [$F(1,78)= 15.019$, $p<.001$], suggesting that subjects were faster in condition English L2 when tested in the order German–English.

In word recall, similar error rates showed for the two test orders in word recall of German items. The order L1-L2 resulted in a lower error rate in the recall part in English L2, and the order L2–L1 in a higher error rate in English L2. One-way ANOVAs examining the effect of order on accuracy rates showed that this difference was not significant. Thus, the nonnative task was at advantage when tested after German L1, albeit only in the phoneme detection task. This suggests a learning effect due to the order in which the languages were tested.

On the link between listening and recall

To conclude the analyses, the number of items was calculated that were not detected in the listening task but nevertheless remembered in recall part. In condition German L1, there were 670 items (94.4%) that were both detected and recalled, and 40 items (5.6%) that were not detected, yet correctly recalled. In condition English L2, 746 items (88.7%) were both detected and correctly recalled, and 95 items (11.3%) were not detected but nevertheless correctly

recalled. In condition English L1, there were 337 items (93.6%) detected and correctly recalled, and 23 items (6.4%) that were not detected but correctly recalled.

Summary of results of the recall task

Accuracy rates of *accent* and *cleft construction* are shown in the three language tasks per context condition in Fig. 3.14 (based Tab. 3.14). Results are displayed in a similar way as the results of the phoneme detection task (see Fig. 3.7, p. 101): squares indicate German L1, triangles English L2, and circles indicate condition English L1. Blank symbols indicate the no-cleft condition, and filled symbols the cleft condition.

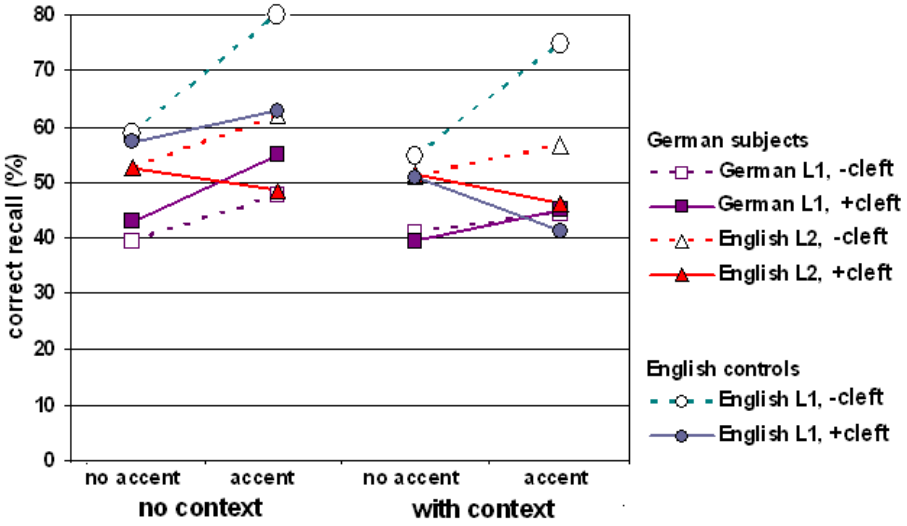

Fig. 3.14: *Recall accuracy (%) per language and context condition, for syntactic construction and accent.*

General impressions from Fig. 3.14 are that the data of German L1 and English L2 seem to be more clustered than results obtained in English L1, and that accent facilitates recall which is indicated by the rise in each context condition from left to right. Overall, the result patterns of the two context conditions do not seem to differ much: Accent in clefted sentences facilitates recall when no further context is presented, whereas accent in clefted sentences results in a lower recall score when additional context is presented (this with exception of English L1 condition +cleft, comparison between conditions +/- context: direction of filled blue circles). Best results are achieved in condition English L1 when items are accented and occur in non-clefted sentences (blank circles). In condition German L1 (squares), items are significantly better recalled when presented in single sentences than with context. Best results are achieved for accented items in clefted structures that are presented without context. In English L2 (triangles), items in non-cleft sentences seem to benefit from accent, in that accented items are

better recalled when occurring in non-cleft sentences than in clefted sentences (blank vs. filled triangles). German subjects recalled items in condition English L2 significantly better than in their native language (triangles vs. squares).

A summary of the main effects that showed in the word recall task is given in Tab. 3.17, with '>' indicating an advantage of the left over the right condition.

Tab. 3.17: *Main effects of the recall part per subject group.*

	German data (German L1 and English L2)	English L1
cleft	_	* non-cleft > cleft
accent	* accent > no accent	* accent > no accent
accent x cleft	_	* advantage of accent in non-clefts
context	_	_

For the German subject group, the effects found in the two language tasks across context conditions are listed in Tab. 3.18. It appears that accent had the strongest impact on word recall performance.

Tab. 3.18: *Effects per language task for German L1 and English L2 (recall task).*

	German L1	English L2
cleft	_	_
accent	* accent > no accent	_
accent x cleft	_	* advantage of accent in non-clefts
context	* no context > context	_

A further split of the data by examinations per context condition seemed to take away much of the statistical power, as the effect of *accent* remained significant only in the no-context conditions of German L1 and English L1 (Tab. 3.19).

Tab. 3.19: *Effects per language task and context condition (recall task).*

	German L1		English L2		English L1	
	no context	context	no context	context	no context	context
cleft	_	_	_	_	_	_
accent	* accent > no accent	_	_	_	* accent > no accent	_

3.10. Discussion

The main aim of the present experiment was to investigate whether German L2 learners of English process words faster and recall words more accurately when focus marking is realized by a cleft construction. Furthermore, the function of accent was examined in its interaction with focus marking by cleft, and it was investigated if context in the form of a preceding question would reduce phoneme detection times and facilitate word recall. The experiment used two measures to capture processing efficiency, i.e., reaction times and rate of accurate word recall. The two measures yielded different results regarding the effect of clefts, so each shed light from a different angle on L2 learners' use of syntactic focus marking. At first, the results of the phoneme detection task are discussed and I will then move on to findings of the word recall task.

It was assumed that focus marking by cleft is an efficient option to highlight information which in turn speeds up auditory reaction times. This measure is regarded to reflect the ease of word processing (Foss & Lynch, 1969; Cutler, 1976). A main effect of cleft benefit in the German group (combined L1 and L2 data) confirmed this function of focus in word processing of native German listeners. The result can also be seen as empirical confirmation of Lambrecht's notion (2001) that cleft constructions are both understood and used by German listeners as a means to mark focus. The processing advantage that cleft structures brought about across language conditions in the German group seemed to be enhanced when sentences were presented with context. Context clearly helped the German listeners to process information, and the coalition of context and cleft brought about a substantial benefit by integrating surface structure and the coherence relation between sentences. Next, the results will be discussed per language condition.

Two competing hypotheses were formulated for German L1 processing, i.e., a benefit of cleft constructions due to the function of focus to speed up processing vs. lack of effect due to the dispreference of clefts in German. Results of the phoneme detection task clearly support the first hypothesis, and indicate an efficient processing of syntactic focus: German listeners accessed words that were focused by cleft structures faster than words occurring in non-clefted structures. The hypothesis that due to the dispreference and low occurrence of clefts in German (see E. Klein, 1988; Ahlemeyer & Kohlhof, 1999), German listeners would not process syntactically focused items faster must therefore be rejected.

The benefit of cleft in German L1 can be explained by the degree of structural markedness of cleft structures: listeners use the focus function of sentence types headed by the dummy subject *es* (English: *it*) due to reliance on 'safe' subject-prominent SVO-structures. Thus,

the cleft-advantage might be ascribed to the linguistic aspect that subject-prominence is a heavy constraint on processing efficiency, as German listeners seem to rely on the prominence of the subject in canonical position. In relation to other syntactic focusing means, clefts show a comparatively low degree of structural markedness because the SVO word order is retained. In contrast to this, inversion, for example, is a syntactic means of moving the subject containing new information to sentence-final position. Callies (2006) found in an L2-production study that German learners of English did not use inversion but preferred it-clefts instead. It-clefts have a canonical, subject-initial position, which learners seem to be more familiar with in their native German language (Callies, 2006:296). The finding that cleft facilitates processing of focused elements can be explained by the typological parameter of subject-prominence, and the thereby associated focus effect. More than sentence structures with canonical word order, cleft structures enforces subject-prominence by assigning focus to the highlighted constituent.

A similar beneficial effect of cleft was found for the English controls, who detected words much faster when these were marked by cleft. The native English listening results assert the assumption of Doherty (1999) that cleft is an important focusing option in English. Results also complement earlier findings obtained in a reading comprehension study by Langford & Holmes (1979), who reported a better comprehension of syntactically focused constituents with written materials. Furthermore, an interaction of cleft and accent was observed in English L1, that listeners seem to use accent better in cleft sentences than in sentences with canonical word order. This suggests for immediate word processing an optimum of performance when information structural means of accent information and cleft construction coincide. Strikingly, this interaction took a reverse direction in the recall of words, in that listeners remembered accented words better in sentences with canonical structure (see discussion of recall results obtained in English L1, p. 118).

Regarding the use of syntactic focus in L2 processing it was hypothesized that due to the complexity of the split constructions, and due to the experience from the native language, German learners of English may be faster in the processing of non-clefted sentences. Indeed, when German subjects were presented with the materials in the second language, syntactically marked items were not faster detected. As much as this result was expected, in the light of the findings in German L1 (i.e., advantage of cleft) it raises questions with regard to the initial motivation (i.e., dispreference and infrequent use in L1) of the research hypothesis. It was argued for German L1 that a cleft construction promotes subject-prominence which in turn enforces a focus effect and outweighs adverse frequency effects. Thus, another explanation ought to account for the lack of effect of cleft in L2 processing. Why would listeners, who had

benefited from cleft structures in their native L1 not process clefts according to a similar pattern in their L2?

A first thought is that the concept of cleft constructions in English was unknown to the L2 learners and that they could not use of the focus information provided by this syntactic focus construction. If so, this should be indicated by a comparatively high number of missed responses in the phoneme detection task, specifically in the cleft sentences. The percentages of correct responses in the English nonnative condition were, however, clearly above chance level.[38] The difference in missed responses between clefts and non-clefts did not point to a disadvantage of cleft structures. Moreover, the difference in missed responses between conditions L1 and L2 was well within the range reported in other learner studies with word recognition tasks.[39] Given this evidence, the cleft construction seems feasable for the subject's L2 skills. The comparatively low degree of structural markedness also ensures a familiar, transparent word order. Thus, the lack of effect cannot be attributed to the speech materials not being accessible to the learners.

It seems that the L2 learners do not carry over the subject-prominence they assign to cleft sentences in their native language to the similar construction in the L2. This implies that the English cleft construction is not understood to highlight subject-NPs as much as it does in the native German language. A thorough understanding of the syntactic structures that govern the L2 is an important factor in an online processing task. Therefore, the relevance of L1 discourse structure for the process of L2 acquisition needs to be retraced. W. Klein & Perdue (1997) suggested that language learners, particularly in untutored situations, universally develop a well-structured, efficient and simple form of a language system which the authors refer to as the Basic Variety (BV). In this system, the sequencing of discourse elements is guided by universal principles of information structure which operate largely independently of the specifics of the L1s or L2s involved. The authors identified three types of constraints that determine the utterance structure: phrasal, pragmatic, and semantic constraints (1997:313). Phrasal constraints define patterns in which elements may occur, and pragmatic constraints organize the information in connected discourse. They refer to the acquisition of topic-focus-structure, and clefting is named as device to mark the status of a focus expression. Pragmatic constraints define patterns such as 'topic first' and 'focus last', meaning that topics are mapped onto the initial subject-NP and the focus onto the VP. Semantic constraints relate to the thematic

[38] In condition English L2 there were 9.9% of responses missed or outside the analyzed range in clefts vs. 14.5% in non-clefts, compared to 5.7% in clefts and 6.7% in non-clefts in the condition English L1 (condition German L1: 5.5% in cleft sentences, 7.4% missed responses in non-clefts).

[39] Akker & Cutler (2003, p. 89) reported an error rate of 6 % of their nonnative listeners, and in Weber & Cutler (2006, Tab. III) the difference in missed responses between native and nonnative listeners ranged across stimuli groups from 2.7% to 6.7%.

roles of referents and to the control they may have, with the controller principle being that the NP with the highest degree of control comes first (1997:313). The concept of the Basic Variety claims that there is no need for L2 learners to acquire basic pragmatic and semantic aspects of information structure, as these are expressed from the earliest stages of L2 proficiency on. In the case of cleft structures this suggests that although learners are able to process the syntactic construction of a cleft sentence, they still may confuse, or may not be confident as to where in the L2 utterance the element with focus assignment or the highest control is situated. Thus, the difference between L1 and L2 with regard to the effect of cleft could be mainly a learner problem of applying specific linguistic structures present in the L1 according to the principles of information structure in the target language.

This concludes the discussion of the findings in the listening task. The next part is concerned with the findings in the recall task.

In the multiple choice task of the recall part, listeners were asked to choose from a list of four choices a word they thought they had heard in the listening part. It appeared that focus marking by cleft did not help German learners to remember novel words better, neither in native nor in nonnative word recall. In the English control group, the benefit of cleft shown in immediate processing was reversed, i.e., words were better recalled when they had been heard in sentences with canonical word order, and items occurring in clefted sentences were less efficiently recalled. Thus, the advantage of cleft as observed in the listening tasks with native speakers of German and of English was not replicated in the word recall. Firstly, the German results are discussed and after this the results of the English controls will be examined.

Claims of the beneficial effect of syntactic focus on English L1 recall notwithstanding (see Langford & Holmes, 1979; McKoon et al., 1993; Birch & Garnsey, 1995), I had hypothesized that for L2 processing cleft constructions are more difficult to process because they deviate from canonical word order, and that therefore syntactic focus would not facilitate recall in the L2. Although the results confirmed the expectation, the underlying reasoning must be reconsidered.

A first point concerns the initial hypothesis of a lack of L2 proficiency of learners with regard to the complexity of cleft structures. The recall data show that more non-cleft items were correctly recalled than items occurring in cleft sentences. This difference was, however, not significant, which shows that clefted and non-clefted items were treated alike by the learners. Items occurring in clefted and non-clefted structures therefore seemed to exhibit a similar degree of complexity with regard to word recall for L2 learners. The claim of dispreference and infrequent use of clefts in the German language (see E. Klein, 1988;

Ahlemeyer & Kohlhof, 1999) does not provide a plausible explanation for the lack of focus effect of cleft. Moreover, the fact that German learners overall did even better with the English materials than with the materials German strengthens the impression that the lack of beneficial effect of cleft cannot be ascribed to insufficient language proficiency.

Secondly, it is striking that throughout the German data only the factor of accent seemed to matter for word recall (the interaction of accent and cleft in English L2 will be discussed in the following section). Of the three factors in the experimental design (cleft, accent, and context), all were found to matter in the listening part. Hence, effects of more than one factor were likely to be expected also in the recall part, and a critical review of the experimental set-up of the recall part seems to be appropriate. One methodological concern is the phonological similarity of the options given in the multiple choice menu of the recall task. The target and one of the alternatives differed in one phoneme only, for example *tulbul* vs. *tulkul* or *Kabu* vs. *Katu* (see Tab. 3.4, p. 88). Conrad & Hull (1964) found that lists of words that sound similar were more difficult to remember than words that sound different. The phonological difference between a correct or false word option in the recall task thus could have been too subtle to be captured in the listeners' memory. The combined score of correct and similar answers given in the recall part showed an a benefit of cleft in the German native language condition. This confirmed the trend towards a focus effect of cleft that showed in word recall scores for correct items, and it mirrors at least partly the benefit of cleft shown in the phoneme detection times of the listening part.

Aligning with the issue of phonological relatedness of the word options in the recall test is the finding that in native German recall the recall percentage of phonologically related words was higher than that of unrelated words, which confirms the results of Birch and Garnsey (1995). However, this pattern could not be transferred to nonnative recall as listeners opted more for phonologically unrelated items than for related ones in the L2.

Another methodological point concerns the time elapsed between listening and recall. The learners' memory for the words was accessed at average nine minutes after they had heard the item in the sentence. For a better comparison with other work, consider the time spans used in experiments investigating the effect of focus on words in written sentences: In the study of Birch & Garnsey (1995), the effect of focus on word memory was tested in immediate recall at 1s after subjects had read a sentence containing the target word. McKoon et al. (1993) asked subjects to recall words after a block of 3 lines of text had been presented on a screen (mean number of words per block: 24, Experiment 1), with varying number of filler blocks in between (Experiment 2), and a block of 2 lines (mean: 20 words, Experiment 3). In the present study, a

much longer period had elapsed before memory was accessed, and other models of memory than those of the short term working memory may apply. This makes the results of Birch & Garnsey (1995) and of McKoon et al. (1993) less comparable to the results of the current study. To sum up, an experimental artefact with regard to the two points described above, i.e., phonological similarity of the multiple choice options, and a long time span between entry in the memory and word recall, may have contributed to a lack of effect of syntactic structure.

For native English language processing Birch & Garnsey (1995) proposed that focus conveyed by syntactic structure makes information salient to readers. This facilitates comprehension and also representation (of a discourse) in the memory for the information enhanced by focus (see also Langford & Holmes, 1979, and McKoon et al., 1993). From Birch and Garnsey's proposition I derived the hypothesis that the focus effect would likely prove to facilitate word recall in the native English language condition. This expectation could not be confirmed, because memory for words retrieved from cleft structures seemed to be better than memory for words from non-cleft structures. This result aligns with the assumption of Birch & Garnsey (1995) that people's memory for the details of sentences is quite limited, and that surface information such as syntactic structure is often less well remembered. Since there are differences in the current testing procedure with regard to the time span, the focus function of cleft constructions as found by Birch & Garnsey (1995) could maybe not take effect in the present recall task due to memory limitations.

There was an interaction in the English L1 data of cleft with accent in the way that accented items were better recalled when occurring in non-cleft constructions. Given the main effect for both accent and syntactic structure it seems that these parameters compete and evoke an exclusive use. In recall, it is not a combination of parameters that yields best results, but the reverse: only in absence of one parameter (cleft) the other parameter (accent) can take effect. A comparable interaction of cleft with accent to the one in English L1 emerged also in the recall of the English L2 condition. This constitutes at the same time the only effect that showed in the nonnative recall task. In L2 recall, cleft and accent are thus linked that cleft constructions inhibit an effect of accent and that non-cleft constructions launch effects of accent information. This conditional effect of accent is similar to the pattern that emerged in English L1 recall.

It is of interest that an interaction of cleft and accent also showed in the results of the English L1 phoneme detection task (see Fig. 3.5, p. 97), but then in the opposite direction: in listening, cleft constructions seemed to advance the beneficiary effect of accent. The opposite direction of effects in the native English language tasks suggests that the two tasks of online

phoneme monitoring and recall make different demands on the language processing device and that therefore different coding systems, or different manners of encoding, may be employed.

It was assumed that pitch accent is a strong cue to efficient word processing and to accurate word recall, and an advantage of accented words over unaccented words was expected. In the listening part, both the native German group (combined data of German L1 and English L2) and the English controls processed accented words much faster than unaccented words. This confirmed for the present experiment that listeners make use of accent to efficiently process speech, a finding that was demonstrated in various studies (see Cutler & Fodor, 1979; Pitt & Samuel, 1990a).

Regarding the lack of accent effect in Experiment 1 it has to be noted that the measure was a different one, i.e., rate of accurate word recognition (Experiment 1) instead of phoneme detection time (Experiment 2), therefore no straightforward comparisons can be made. The lack of accent effect in Experiment 1 was explained by (1) effects of test order of languages, a factor that was controlled for in the current experiment, and by (2) an overshadowing effect of word position in the sentence, which is not applicable due to the relatively fixed location of the target words in the current materials.

In Experiment 2, accent remained a strong cue to efficient word processing in German L1 in separate analyses per L1/L2 condition. In English L2, however, the effect of accent was not significant. Indications of this difference already emerged in the interaction of accent with language in the combined German data, where a larger benefit of accent was observed in native listening than in nonnative listening. A close inspection of the testing materials did not reveal any differences, as in both language conditions the length of the sentences was controlled for, and position of the target in the sentence and type of accent (contrastive) were similar. It could be, however, that listeners were sensitive to whether the contrastive accent made inherent sense or not (see p. 86f for examples of the test sentences). It appeared from a study of Eefting (1991) that listeners expect accents to be distributed in an appropriate way, with new information accented and given information only receiving a pitch accent if it is in contrast. Only the context version did evoke such an appropriate contrastive accent placement in the present materials, because the accent in the non-context version was on the adjective and the adjective could be perceptually an unusual constituent to be accented without further contextual information. It could be that the present materials were possibly not coherent or plausible for listeners with regard to deaccented versus unaccented information. This is supported by the fact that German listeners processed accented items faster when presented with context than when they heard them in single sentences.

A second point is that accent possibly conveys more information for the listeners in the native language than it does in the L2. Lehiste (1972) investigated the use of prosody in disambiguating syntactic structures, and did not find it surprising that F0 was not as consistently used to mark syntactic contrasts, since tonal or pitch accent cues often serve to mark semantic or affective distinctions (Lehiste, 1972, in: P. Warren, 1996, p.3). A more fine-tuned and differentiated interpretation of accent may be at work in L1 processing. In nonnative listening, these networks might not be established at this stage of L2 proficiency, and listeners could expect, and also could rely more on an appropriate accent placement in the meaning of Eefting's claim (1991). Indeed, the learners' L2 proficiency was mentioned by Akker & Cutler (2003) as a possible explanation for L1–L2 differences emerging in the prediction of accent to the computation of focus.

To conclude, it has to be noted that in comparison with the other two factors of *cleft* and *context*, the main effects obtained for *accent* in listening and recall showed the most similar processing patterns in English L1 and English L2. I interpret this as an indication of accent being a consistent cue to perception of prominence (see Akker & Cutler, 2003; Eriksson *et al.*, 2002). The beneficial function of accent had no effect in Experiment 1 because conditions were maybe acoustically not distinctive enough (experimental artefact), or due to effects of the order of test languages order, or because of overshadowing effects of word position (see section 2.8).

It was hypothesized that preceding context questions provide additional information and draw attention to the focused items, leading to faster and more accurate word processing. Across the two language conditions, German listeners processed sentences with context significantly faster, and this advantage of context also held in the separate German L1 and English L2 listening condition. Words in (by questions) focused position were detected faster than words in unfocused position; this implies that listeners had understood the question, because the focusing question determined what was new information in the answer sentence, thus guiding to the sentence focus. This shows that for the purpose of locating the answer to a question, semantic cues to focus can be exploited effectively in both native and nonnative listening. The present result also confirms Selkirk's (1995) notion that questions can determine focus within a subsequent utterance. Evidence of question-induced focus leading to faster and more effective sentence processing can be found also in Cutler & Fodor (1979), and in Akker & Cutler (2003). The proposition of context as a means to speed up processing is particularly interesting with regard to L2 processing. Although context increases the amount of processing load, native German speakers seem to use the longer stream of input to get prepared for the

word in question: preceding questions prepare listeners for upcoming information, and lead to a more rapid word processing.

The English controls showed no advantage in processing time when listening to the materials with context questions. It could be that individual differences brought about this lack of effect. A closer inspection of the distribution of the data (see Fig. 3.6, p.99) did not indicate a context effect that might have been disregarded by inferential statistics. As German speakers clearly showed an advantage under similar conditions, the lack of context requires further research attention, particularly because this finding is also contrary to results of other studies in English L1 (Cutler & Fodor, 1979; Akker & Cutler, 2003).

In the word recall task, presentations without context helped the German listeners to remember words better in the L1. The questions in the current experiment were not designed to create additional semantic information, but were merely paraphrasing the contents of the sentences with the aim of putting an element in focus. Context implied a longer stream of information input to process and to store, and in German L1 this clearly inhibited accurate recall. Contrary to results in the phoneme detection task, context had no effect in English L2 recall. Lawson & Hogben (1996) reported a lack of association between use of context and recall in L2 vocabulary learning for the lower proficiency group of their L2 learners, suggesting that the level of language proficiency may also play a role in making efficient use of context. Since the learners seemed to have processed the sentences competently, a lack of L2 proficiency in the sense of a limited lexicon seems an unlikely explanation for the lack of context effect in L2 recall. A more plausible explanation concerns the amount of actual semantic content that the questions offered to the learners. According to Lawson & Hogben (1996), context is important for *generation* of meaning of a new word and for *acquisition* of the meaning. It could be that the questions with their rather low degree of extra contextual information did not offer enough substance for the generation of meaning, as the words to be recalled concerned proper names. Moreover, questions could have been insufficient for the acquisition of meaning as they were intended to focus the names but not to convey meaning. An insufficient L2 proficiency seems a feasible explanation for the lack of context effect only if the term of *low L2 proficiency* referred to the construction of such underlying networks of meaning and not to processing difficulties due to, e.g., limited vocabulary size.

There was no effect of context in English L1 recall. This is a similar finding as in English L2 recall, and it can only be speculated that the reasoning of Lawson & Hogben (1996) also applies to English L2 recall: a higher amount of semantic information in the questions

would establish the semantic network needed to support accurate word recall. This hypothesis needs to be investigated in further research.

The opposed trends that emerged for the role of context in the data of the German learners, i.e., on one hand reducing processing time, on the other no advantage in word recall, suggest different mechanisms at hand for the tasks of word detection and word recall. This links to similar assumptions, namely that processing and recall draw from different devices of encoding, which emerged in the propositions made for English L1 listening (see effects of cleft construction, p. 118f).

Overall, German participants detected target words faster in the L1 than targets in English L2. At first sight, this result seemed to indicate a language dominance effect as found by Akker & Cutler (2003, for native Dutch learners of English). However, it could also be that the effect of L1 dominance depended primarily on the order of the languages in which subjects were tested: the dominance effect originated from the order English-German, thus when the German condition was tested after the English condition. In the test order of German-English, listeners processed on average the items equally fast in both languages.

The advantage of the native language in terms of processing time did not hold in the recall part. There was evidence that German participants recalled English items in general better than they recalled items in their native language. This showed as a trend in both language orders. An explanation for the advantage of the nonnative language could be the motivation of the participants. They mentioned in informal interviews at the end of the experiment that they were particularly eager to do well in the English condition, as this presented a challenge for them and they wanted to deliver a good performance. This motivation might have led to a higher level of attention in the English language tasks.

The concept of motivation is a central component of L2 acquisition theories (for example Krashen, 1981; Dörnyei, 2003), and language proficiency and motivation are strongly related (Oxford & Shearin, 1994). In the current study, attention as a non-linguistic variable seems to take effect only in the memory task and not in the immediate processing task. It can only be hypothesised that motivation expressed by a heightened attention in an online processing task can push performance to a certain point before processing limitations with regard to language proficiency (e.g., limited vocabulary size, listening comprehension skills) prevent performance in the L2 to exceed performance level in the L1.

As suggested by the current results, a different encoding process is set to work in memory tasks, where a representation of the word form is stored and later retrieved. A high level of attention could therefore be a crucial factor for succesful L2 word retention. Even

though the importance of motivation and attention in language learning might be self-evident to language teachers and learners alike, attention as a non-linguistic variable still requires further investigation. This is also a plea of Oxford & Shearin (1994), who see a need for an "expanded vision of L2 learning motivation" for the benefit of both students and teachers (1994:25).

The order in which the language conditions were presented was balanced across subjects in order to counter any unwanted effects of a learning bias, especially for the L2 condition. A comparison of results obtained in each order showed that listeners were faster in processing the English words when they had first done the task in German. This suggests that the test order of German-English worked in advantage for the English test condition. When the L2 materials were presented first, subjects reacted slower in the L2, indicating a disadvantage of the English L2 condition.

The order of languages did not influence the accuracy rates in the recall part, although a trend could be observed that English L2 word recall was at a disadvantage when this condition was tested first. In the German language condition, subjects were faster when tested in the order German-English, and slower in the order English-German. There was no difference between the recall scores in German L1, as German listeners accurately recalled about the same percentage of words in both test orders. Due to the fact that the listening results of the nonnative language condition were influenced by test order, the method of balancing subjects per language order was kept for Experiment 3 (reported in the following chapter 4).

Finally, subjects accurately recalled words they had not detected in the listening task. This effect showed in the two native language conditions and to an even higher degree in the L2 condition. This finding is contrary to the intuition that only items can get recalled that had previously been noticed. The phenomenon that words may be recalled though they cannot be recognized was addressed by Watkins & Tulving (1975) in their review of evidence of context effects in recognition. They proposed that a target word presented in the context of a copy of itself sometimes fails to be recognized in a different context, although it can be reproduced when its copy is given as a retrieval cue in a recall test. The observation itself was termed 'phenomenon of recognition failure of recallable words' (Watkins & Tulving, 1975, p.5). They concluded that specific encoding of a target word must entail more than just selection from among semantic alternatives.

In line with this, the current results confirm that an unsuccessful detection does not necessarily lead to an omission in the mental lexicon, and that specifically in L2 recall, multiple features are stored that leave a representation in the memory. The discrepancy in performance

between phoneme detection times and word recall also suggests that online processing and word representation in the memory employ different manners of encoding.

3.11. Conclusions

Cleft constructions served in native German listening as efficient option to highlight information and seemed to facilitate processing. This focus effect is explained by the typological parameter of subject-prominence. In relation to a sentence in canonical word order, a cleft structure enforces subject-prominence by assigning focus to the highlighted constituent. The benefit of cleft was enhanced when the sentences were presented with context, which suggests a substantial benefit when focus effects of syntactic surface structure and coherence relation between sentences are integrated. Contrary to German L1, the marked cleft construction did not reduce detection times in English L2. The L1-L2 difference was interpreted as a learner problem of applying specific linguistic structures according to the principles of information structure in the target language. Focus marking by cleft did not help German learners in native or in nonnative word recall. This was probably due to the phonological similarity of the multiple choice options, and due to a long time span between listening and recall. In L2 word recall, cleft and accent seemed to depend on each other in order to take effect. The integrative use of several speech parameters at a time could be a specific strategy to advance nonnative recall.

The faster processing of cleft sentences by English L1 listeners, and their better use of accent in cleft sentences suggests an optimum of performance when information structural means of accent information and of syntactic focus structure coincide. A less accurate recall of words in clefted sentences was attributed to memory limitations: it is possible that the focus function of cleft constructions could not take effect due the time span elapsed between listening and word recall. The recall advantage of accented items in non-clefted structures suggests that the process of word processing and subsequent word recall is not a modular one, but that for successful speech processing a combination of various parameters is beneficial.

Accent was used for efficient word processing in German L1 and in English L1 listening, but not in English L2. It could be that accent placement in L2 listening was not clear enough regarding de-accented versus unaccented information; accent may also convey more information for listeners in the L1 than in the L2. Thus, a more fine-tuned and differentiated interpretation of accent may be at work in L1 processing. A similar effect in English L1 and English L2 recall was that accented items were better remembered when they occurred in non-clefted structures.

Opposing trends emerged in English L1 regarding the use of accent in cleft constructions: cleft constructions boosted the beneficiary effect of accent in phoneme detection, whereas cleft constructions inhibited the benefit of accent in the recall task. It is suggested that the two parameters of *cleft* and *accent* compete and evoke an exclusive use in English L1 and L2 recall. Of the three factors investigated, accent yielded the most similar results in English L1 and English L2. This underlines the cross-linguistic function of accent as a consistent cue to perception of word prominence.

In both L1 and L2 listening, German listeners were faster in processing sentences with context. Although context increases the amount of processing load, L2 learners seem make use of the longer stream of input to get prepared for upcoming information, and in turn process this information faster. Context had no benefit for native English listening, a finding that could not be attributed to individual variation, and that therefore has to be further investigated. Presentations without context helped subjects to remember words in German L1, possibly because the longer stream of input enlarges the amount of information that is to be stored.

The lack of context effect in English L2 recall could be due to the low degree of semantic content of the questions. Lawson & Hogben (1996) proposed that a higher degree of semantic content is beneficial to the acquisition of meaning in L2 learning, but target-bearing words of the current experiment concerned proper names, and the questions were intended to focus the names and not to create meaning. Hence, context could not fulfil the function of generating and acquiring meaning. There was no advantage of context in English L1, and it is speculated that the explanation of the low degree of content, as proposed by Lawson & Hogben (1996) for L2, may also apply to English L1 recall.

The two measurements of reaction time and word recall accuracy yielded different results, such as cleft and context on one hand speeding up processing time, yet on the other offering no advantage in recall. This suggests that word processing and word recall draw from different devices of encoding.

Finally, a high level of attention emerged as important factor in L2 memory tasks, confirming that language proficiency and motivation are strongly related (Oxford & Shearin, 1994), and that non-linguistic variables have to be taken into account in L2 studies.

CHAPTER 4

4. Focus particles in L1 and L2 word processing and word recall

This chapter concerns the role of focus marking by lexical means, considering specifically the focus particles *only*/*even* and their German translation equivalents *nur*/*sogar*. It is assumed that focus particles highlight certain parts of a sentence, making the element in the scope of the particle salient to the listener. At issue is the question whether focus conveyed by focus particles leads to an advantage in L1 and L2 word processing and word recall. An experiment was conducted that comprised a phoneme detection task and a subsequent word recall task. The aim was to investigate (1) whether a word is detected faster and more accurately recalled if it is in the scope of a focus particle or not, (2) how the interaction of sentence accent and particle affects word processing and word recall performance, and (3) if context facilitates the recognition and the recall of words in the scope of a focus particle. To investiate, adult German L2 learners of English were tested in two language conditions, i.e., in German L1 and in English L2. Half of them were tested in a condition with context and the other half was presented a condition without context. A group of native speakers of British English were tested as controls (language condition English L1) in conditions with/without context.

Key findings were that focus marking by particle did not lead to faster processing in German L1, English L2, or in English L1. Word recall scores in English L2 showed that listeners remembered items in the scope of a focus particle better than items that were not focused by a particle. In German L1 and English L1, particles had no effect on word recall performance. Accent gave a processing advantage only in English L1. In the word recall tasks in conditions German L1 and English L2, accented items were consistently better remembered. Context had no main effect on processing times in any of the language conditions tested, and context also had no effect on word recall accuracy.

4.1. Introduction

Understanding the way in which information is organized in the linguistic system of a language is assumed to help the L2 learner to understand and to speak the foreign language. A central concept in the information structure of a language is the concept of focus. Focus markers are linguistic means for a speaker to highlight elements in an utterance. The assumption of the current thesis is that, if listeners pick up on these means, they can use them for efficient and rapid comprehension. There are various linguistic devices that express focus, and in languages

like English and German, this includes focus marking by lexical means, in the current study realised by the particles *only* and *even* and their German equivalents *nur* and *sogar*. These so-called focus particles are two examples from the large group of particles (examples for both languages will be given on p. 128). The particles *only*/*even* were chosen because they are commonly used in both target languages of the current study, i.e., in English and German.

The following section 4.2 outlines meaning and function of the focus particles only/even in the context of other particles, followed by an overview about their use in English and German. This part includes references about the frequency of their occurrence in these languages (section 4.3.1), and experimental evidence of processing strategies of sentences with *only*/*even* (section 4.3.2). After this, two sections are dedicated to the other two factors explored in combination with the factor of particles, *accent* (section 4.4) and *context* (section 4.5). Based on the literature reviewed in chapters 4.2.-4.5, research hypotheses of the current study are proposed in section 4.6. The hypotheses are tested in Experiment 3, which is reported in section 4.7.

4.2. Lexical particles as exponents of focus structure

There exists a large number of lexically specifying expressions used to quantify over people, objects, events, locations, and time. They belong to the category of adverbs. Within this category, a subgroup of focus/scalar particles can be distinguished, also called focus(ing) adverbs/adverbials (König, 1993). This subgroup comprises words such as *only*, *even*, *too*, and *also*. Despite showing a considerable degree of variation as to inventories and syntactic constraints, a minimal set of one additive and one particle can probably be found in all languages, and König (1993) describes them therefore as 'universal phenomenon'.

Focus particles provide information about which entities and what number or proportions of them contribute to the meaning of a sentence. In many ways, focus particles behave like negation in that their particular meaning may affect the entire sentence or only a selected part of it. They are included in this study because they "interact with the focused part of the sentence they occur in" (König, 1991, p. 3), and because they are "one of the formal exponents of focus structure, in addition to prosodic prominence, morphological markers, word order and specific syntactic constructions which consistently identify focus " (König, 1991, p. 13). It could be argued, therefore, that focus particles are not devices of focus marking. However, their interaction with focus structure makes particles a linguistic feature worth to be explored, complementing the two means of focus marking explored in this study, prosodic prominence (chapter 2) and cleft constructions (chapter 3).

Paterson *et al.* (1999, p.718) describe the function of focus particles for a reading task as such that focus particles point the reader's attention at certain entities or sets of entities that may be implemented in the reader's mental representation of the text, which is why focus particles are used to emphasize a certain part of the sentence. This part can be emphasized positively or negatively with respect to other possibilities, and by this semantic distinction focus particles can be grouped into two major classes. The division into the two classes depends on whether the particles include or exclude alternative values of the content of the focused constituent: One class involves particles that indicate either restrictive/exclusive meaning (such as *only*, *alone*, *just*, *merely*; for German: *nur, ausschliesslich, eben, lediglich*), and the other class involves particles with additive/inclusive meaning (such as *even, also*, *too*, ...; for German: *sogar*, *auch*, *insbesondere*…; see König, 1991:33). Although this assignment into two groups does not apply to every particle in English, German or other languages, König (1991) still sees this distinction as important for most languages.

Let us now consider the particles only/even in more detail. The particle *only* is classified as exclusive focus particle bearing contrastive focus because it identifies one possible referent to the exclusion of other alternatives.[40] The contribution made by *only* to the meaning of a sentence can be expressed by a negated existential quantifier ('nobody'/ 'nothing other than', see example (13c)). The positive contribution made by *only* to the meaning of a sentence is a presupposition, corresponding in cases like (13a) to the relevant sentence without particle (13b):

(13a) Only FRED bought a new car.

(13b) Fred bought a new car.

(13c) Nobody other than Fred bought a new car.

(König, 1991:33)

Accordingly, Ni *et al.* (1996) partition the semantic representation of sentences containing the focus particle *only* into three parts: One part represents background information, a second represents the element in focus, and the third part represents a contrast set as alternative to the focused element. The contrast set is not mentioned explicitly in the sentence; instead, it is presupposed to exist. Liversedge *et al.* (2002) elaborated the extent of presuppositions the reader is formulating. They proposed that for the reading of ambiguous sentences the principle of *parsimony* applies. This means that the reader constructs a discourse representation containing fewest referential presuppositions. Following this principle of

[40] Particles like *only*, *also* or *even* may also be associated with a ranking (see König, 1991, p.99f). For the present study, *only* does not induce an ordering nor does it restrict the domain of quantification to scales but will be used in its exclusive meaning instead.

parsimony, the particle *only* should cause readers to instantiate a discourse model containing focus and contrast sets and to anticipate further modifying information that specifies the nature of the contrast between them. With regard to processing capacities this suggests a high demand on listners' resources: sentences containing the particle *only* require processing of complex representations because of the sets of alternatives that are evoked.

The particle *even* is termed an inclusive focus particle because it includes some alternative(s) for the element of their scope:

(14) Sogar DER PRÄSIDENT kam zur Versammlung.
'Even the President came to the meeting.'

(König, 1991:34)

The example sentence (14) illustrates that *even* is associated with specific conditions that have to be met if the containing sentence is to be uttered felicitously. In the present case, other elements than the one in focus are constituted: the contribution made by *even* (=*sogar)* to the meaning of sentence (14) is that it licenses the inference that other people than the president came to the meeting. *Even* also induces a scalar or ordering quality to the interpretation of the sentence: Not only did the regular members of the committee attend, even the president came (see König, 1991:69). Hence, similar to *only*, *even* evokes interpretations of the context.

Next to the division of focus particles into groups conveying inclusive/exclusive meaning, König (1991) distinguishes a third group of particles, referred to as *particularizers*. They comprise words like *exactly, especially, largely* and *precisely*. The basic function of these particles (in German words like *ausgerechnet*, *genau*, *gerade*) does not indicate is not exclusivity but rather emphatic assertion. Their function is comparable with the one of cleft sentences (see chapter 3.2). The discourse function of English it-clefts, i.e., to highlight the clefted constituent, may be translated appropriately into German by using language-specific features such as focus particles (Ahlemeyer & Kohlhof, 1999). A similar observation is made by König (1991), who states that cleft sentences in English are often used to translate sentences with *gerade* and *eben* in German (König, 1991:121, note 1). This complements the view outlined in chapter 3.2 that cleft constructions are a rather dispreferred option in German and alternatives such as particles are often used for the expression of focus.

Focus particles may occur in several positions in a sentence. König (1991) describes the positional variability of focus particles as one of their most striking and important properties. It also reflects another general characteristic of them, that is, their interaction with the focus structure of a sentence. Because of this, many studies investigated reader's discourse representation by manipulating prior referential context or the referential properties of discourse representation, using the focus operator *only* (for example, Crain, Ni, & Conway; 1994; Ni et

al., 1996; Paterson et al., 1999; Clifton *et al.*, 2000). There are some differences between English and German regarding the placement of the particles *only* (*nur*) and *even* (*sogar*), which are addressed by König (1991, chapter 2.3.1 and 2.3.2). In the present experiment, however, the position of the focus particle was fixed in order to keep the number of variables restricted. The variability of focus particles as to their position is of no consequence for the present study and will therefore not be discussed in further detail (on the variability of focus particles and their modification ability of constituents, see also Pullum & Huddleston, 2002).

4.3. The use of focus particles

4.3.1. Frequency

Tottie (1986) gives an indication of the frequency of the use of focus particles in her study of differences between spoken and written English. She examined adverbials of focusing and contingency in British English, based on a sample of 25000 words each from the London-Lund Corpus and the Lancaster-Oslo/Bergen Corpus. Although a comparison of spoken/written language is not relevant here, the distribution of focusing adverbials gives an estimate of their general use within English. Tottie divides focusing adverbials into the two major categories of *restrictives* and *additives*, which aligns with the division made by König (1991). The group of restrictives is further differentiated into exclusives (*alone*, *just*, *only*) and particularizers (*especially*, *exactly*, *largely*). Tab. 4.1 shows the distribution of these two categories, as found in the sample taken for British English (Tottie, 1986, in Callies, 2006:67).

Tab. 4.1: *Distribution of different types of focusing adverbials, across spoken and written English (Tottie, 1986:98, in Callies, 2006:67).*

Type of focusing adverbial		spoken English (N)	written English (N)
restrictives	exclusives	91	54
	particularizers	2	33
additives		24	59
total		117	146

Of particular interest are the frequencies of occurrence of exclusives and additives, as these two groups contain the focus particles *only/even*, which are used as exemplars to investigate the effect of focus particles in the present experiment. Within the category of exclusives, the particle *only* was more frequent in writing (37 vs. 22 instances); within the group of additives, *even* occurred also more often in writing than in speaking (11 vs. 3 instances). Thus, across the two modes (spoken/ written language), *only* and *even* were found more often in

written than in spoken English. Regardless of this preference, this corpus analysis shows that the focus particles *only* and *even* are commonly used in English.

As far as lexical focusing devices in German are concerned, focus particles seem to be used more often in German than English. König (1991:78) described German as a language with a particularly rich inventory of focus particles, where, for example, as many as eight lexical items can to be used as translations of English *even*. The previous Chapter 3 illustrated the differences in the use of syntactic focusing devices in English and German by examining corpora of translation studies (Ahlemeyer & Kohlhof, 1999; Doherty, 1999). Recall that according to Ahlemeyer & Kohlhof (1999), English it-clefts were rendered not with the German equivalent (*Spaltsatz*) but instead were often translated by using features such as focus particles, topicalization or a combination of both (see p. 74). At the present, I am not aware of an equivalent to the quantitative analysis of the distribution of categories of particles in English as conducted by Tottie (1986) for German. However, based on the findings of König (1991) and of Ahlemeyer & Kohlhof (1999), there seems to be more of a general preference in German to use lexical means to express focus than in English. Hence, a certain ease and habitualness in dealing with focus marking by particles can be expected for German.

4.3.2. L2 studies on the processing of focus particles

Based on the literature reviewed so far it appears that sentences with focus particles require processing of more complex representations than sentences without focus particles: Listeners have to analyze the scope of the particle and the focus structure of the sentence to establish which linguistic constituent indicates the focus set. In addition, listeners have to determine the nature of the contrast that is to be represented, and use contextual or pragmatic knowledge to infer a set of alternatives. Processing requirements have been investigated in a range of research studies (for example, on the influence of 'only' on parsing, see Clifton et al., 2000; Ni et al., 1996; Dimroth & Watorek, 2000; Dimroth, 2002; Paterson et al., 1999). Experimental evidence of processing requirements comes mainly from L1 studies, and only few looked into how L2 learners process lexical means to mark focus which is why they are reported here in brief, although they concerned the use of other particles than *only/even*.

W. Klein & Perdue (1997) proposed that L2 learners use particles in the L2 according to similar patterns to the L1. With respect to the position of scope particles they predicted that scope particles are to be located between topic and focus, which means that particles would immediately precede (left adjacency) the affected constituent. Dimroth & Watorek (2000) tested this hypothesis in a detailed acquisition study of French (*aussi*), German (*auch*) and Dutch (*ook*) as second languages. They collected data from retellings produced by adult learners of these

languages with various L1 backgrounds.[41] Their results only partly confirmed Klein & Perdue's (1997) hypothesis of similar processing patterns in L1 and L2, as the distribution of the equivalent translations of the target particle *also* was indeed adjacent, but overwhelmingly right adjacent. The acquisition of the particle was interpreted as a stepwise integration of the L1 pattern into L2 acquisition (Dimroth & Watorek, 2000). A similar observation was made in a subsequent cross-linguistic study. In this, Dimroth (2002) confirmed the finding for stressed and non-stressed forms of particles and adverbials: Stressed variants have scope over the topic information of the relevant utterances. Dimroth concluded that in the course of L2 acquisition the scope changes that particles are used with. These two studies illustrate the dynamics underlying the process of L2 acquisition of particles, in that, for example, learner biography and a different L1 linguistic system can influence the use of particles in the L2.

4.4. Accent effects

The presence of a pitch accent on a certain part of an utterance makes this part for listeners more salient than others. Moreover, patterns of accentuation reflect the information structure of a sentence, as different distributions of pitch accents imply different focus structures (Selkirk, 2005). Accent has been established as a major factor contributing to efficient speech processing in native language processing (Cutler & Fodor, 1979; Pitt & Samuel, 1990a). To some extent this was also demonstrated for nonnative processing (Akker & Cutler, 2003), where findings suggested that nonnative listeners showed a predicted-accent effect, although not equal to native efficiency in the mapping of accent to semantics. A question addressed in the present experiment is if effects of focus assignment by particles and the effect of (prosodic) accent influence each other. The positional variability of focus particles permit that different positions of the particle in a sentence correlate with different locations of the sentence accent, thus allowing different interpretations of the sentence. This property is exemplified in examples (15a) - (15e), in which the particle moves through all positions, changing the element in focus (focus is indicated by capitals):

(15a) Only FRED could have shown the exhibition to Mary.

(15b) FRED only could have shown the exhibition to Mary.

(15c) Fred could only have SHOWN the exhibition to Mary.

(15d) Fred could have shown only THE EXHIBTION to Mary.

[41] The database consisted of narrative discourses by native speakers of Spanish (3 subjects) and Arabic (3) acquiring French, native speakers of Arabic (4) and Turkish (3) acquiring Dutch, and native speakers of Turkish (1) and Italian (3) acquiring German.

(15e) Fred could have shown the exhibition only to MARY.

(König, 1991:10)

Depending on the position of the particle and that of the sentence accent, *only* relates to different parts of the example sentence (15a-15e). The grammatical representation of the sentence involves the representation of background information and that of the focused element. The focus structure is typically marked by intonation, and the focus of a sentence may comprise more elements than the single word carrying the intonation centre (*nuclear tone*), as can be seen in (15d). Prosodic prominence, therefore, does not clearly identify or delimit the focus of a sentence: pitch accent and the interpretation as focus are systematically related but are distinct notions. Focus particles interact with the focus structure of a sentence as shown in examples (15a) - (15e). The current experiment examines if focus marking by particle interacts with accent in L1/L2 word processing and asks, how listeners process accented or unaccented words that either are or are not in the scope of a particle.

Results from Experiment 1 on the effects of prosodic prominence suggest that word position in the sentence might have overshadowed the accent effect. In Experiment 2 on syntactic focus marking, both the German and English participants seemed to be sensitive to the presence of accent: Accent had a consistent effect both on phoneme detection times and word recall accuracy, albeit not in nonnative language processing. For the present experiment, the factor of accent is considered in the study with the aim to complement findings on the interaction of focus marking and accent from Experiment 1 and Experiment 2.

4.5. Context effects

Focus structure is typically marked by intonation, and the appropriateness of the focal accent placement discourse can depend on the context provided. Consider example (16), in which the focus assignment depends on the question posed:

(16) John washed the CAR.

(16a) What did John wash?

(16b) What did John do?

(16c) What happened?

(König, 1991:10)

In sentence (16), either the direct object could be in focus (as answer to 16a), the VP (16b), or the whole sentence in broad focus (16c). This illustrates that context is important in identifying the focus of a sentence. *Wh*-interrogatives like (16a) - (16c) can define the focus of a

sentence as the part of the sentence that corresponds to the wh-phrase in a wh-expression to which it provides an appropriate answer. As outlined in section 3.5 (see p. 76), a wh-expression focuses a specific constituent of the sentence, and the appropriate answer to the question focuses the same constituent (Selkirk, 1995; Selkirk, 2005).

In case there is ambiguity as to which element of the sentence is in the scope of a focus particle (see König, 1991:107ff.), context could help to reduce this ambiguity. In the current experiment, however, the position of the particle was fixed, leaving no doubt as to which element was in its scope: the focus particle occurred always in the middle field (German: *Mittelfeld*) of the sentence, and took scope over the following constituent. Therefore, context did not have the function of resolving ambiguity.

In Experiment 2 (effect of syntactic focus marking, see chapter 3), preceding context questions seemed to help German learners of English to process words faster in the native and the nonnative language condition, confirming the focus effect proposed by Selkirk (1995). To explain this finding, I argued that in L2 processing the listener gets prompted for the target word by the longer stream of input, and that context provides a semantic network that facilitates processing. The same assumption holds for the current experiment, namely that a question can assign focal accent to a word in the following answer sentence, which in turn facilitates processing of the respective word.

Results of Experiment 2 revealed no facilitative effect of context on word recall performance in nonnative language processing. Analyses of the German data across the factor *language* revealed that context enhanced the effect of cleft, suggesting a benefit with regard to processing times when the focus effect of surface structure and that of coherence relation are integrated. There was no interaction in the recall part of focus by cleft structure and context. The question of the current experiment is: what is the effect of the combination of focus particles and context on word processing and on the recall of words? Focus particles were found to be a well used option in German to mark focus (König, 1991), and a certain ease and habitualness in dealing with focus marking by particles can be expected from the German participants. Context is, therefore, not a 'last resort' listeners could turn to for comprehension. Lawson & Hogben (1996) proposed that by integrating of the word into a broader lexical network, context supplies a network of meaning which might be beneficial for long-term recall. The function of the context questions is, however, more laid out as that of a focusing device in the sense of Selkirk (1995) as they provide no further information on the word to be recalled. In the word recall task, questions probably only add to the processing load, and are therefore not expected to result in a more accurate representation of novel words in the learners' memory.

4.6. Research hypotheses

The present experiment examines if focus conveyed by the focus particles *even*/*only* (German: *sogar*/*nur*) facilitates word processing and word recall in native and nonnative language processing. Focus particles are elements of focus structure that can identify focus (König, 1991), and their function is to emphasize a certain part of the sentence (Paterson *et al.*, 1999). Findings indicated that L2 learners are aware of the appropriate use of particles as focusing device, although there seems to be more of a preference to express focus by particles in German than in there is in English (see König, 1991; Ahlemeyer & Kohlhof, 1999).

The first question is whether in native and nonnative listening, native German learners of English make use of the information structure conveyed by focus particles to process words faster in their native German and in English L2. Moreover, do they remember novel words which are lexically marked for focus by particles more accurately than novel words which are not lexically marked? The semantic representation of sentences with *only* evokes contrast and complementing sets as alternative to the element in focus (Ni *et al.*, 1996). This causes readers to instantiate a discourse model containing focus and contrast sets, thus making processing more complex. Similarly, the particle *even* includes alternative sets for the element in scope which also evokes interpretations of context. Hence, it can be expected with regard to the speed of processing that lexical focus marking does not lead to faster word processing, neither in the L1 nor in the L2. Interpretations of the results of Experiment 2 suggested that processing and recall seem to draw from different devices of encoding. This justifies a different reasoning regarding the predictions for the listening and the recall task: Due to focus particles being a preferred and well-used feature for native speakers of German, it can be expected that L2 learners transfer this habitualness to the L2, and benefit from this preference. It is, therefore, hypothesized that lexical focus marking facilitates word recall in that novel words are more accurately recalled when these are marked by focus particles than when unmarked. Thus, the full benefit of the focusing function of particles is expected to show in the word recall task, both in the L1 and L2.
In brief: focus particles slow down processing but recall gets more accurate.

The second question concerns *accent* and its facilitative effect on the processing of words which are in the scope of a lexical focus marker. Are words in the scope of a particle processed faster and recalled more accurately when they are accented than when they are not marked by accent? How do the effects of focus particles and the effect of (prosodic) accent influence each other? Accent was established as a major factor contributing to efficient speech processing in native language listening (Cutler & Fodor, 1979; Pitt & Samuel, 1990a; Akker &

Cutler, 2003). Findings of Experiment 1 suggested that accent can be overshadowed by, for example, positional factors. In Experiment 2, accent had a beneficial effect both on phoneme detection times and on word recall in the L1, but not in the L2. Moreover, in the recall task accent interacted with syntactic focus marking the way that cleft constructions seemed to inhibit an accent effect. The expectation of the current Experiment 3 is that focus particles don't reduce processing times of items in the scope of a particle. Instead, it seems more probable that listeners use accent as a cue for information marking. The hypothesis is that accent is a major source of information highlighting, and it is expected that accent facilitates processing and recall in both native and nonnative listening. The current work assumes that pitch accent and the interpretation as focus are distinct, yet systematically related notions. It is therefore probable that accent interacts with other factors that express focus, such as focus particles.

The third research question concerns the effect of context: Does additional context in form of a preceding focusing question facilitate word processing and subsequent word recall? Findings of Experiment 2 were that context helped listeners to process words faster in German L1 and English L2, but in the recall task context did not help listeners to remember words more accurately. The lack of beneficial effect of context was explained by insufficient semantic content that the questions were offering. In line with Selkirk (1995), the hypothesis regarding immediate word processing is that focusing questions point the learner to the element in focus, making it more salient. Context is therefore expected to reduce word processing times in both native and nonnative listening. This is different for the word recall task: additional context enlarges the amount of information the listener has to process, which poses an additional challenge to the retention in the memory. Based on the findings of Experiment 2 it is argued that context provides no semantic *network of meaning* in the sense that it offers further information on the word to be recalled. Hence, context is not expected to lead to a more accurate representation of novel words in the learners' memory.

To sum up the main predictions of Experiment 3:

1. German learners of English don't use lexical focus marking for a faster word processing, neither in the L1 nor in the L2. However, lexical focus marking facilitates word recall in both the L1 and the L2.

2. Accent facilitates both the processing and the recall of words which are in the scope of a lexical focus marker.

3. Context in the form of a preceding question leads to a faster processing in both language conditions. With regard to recall, words will be better remembered when presented without context.

To test the hypotheses, Experiment 3 was constructed. It comprised two parts: a phoneme detection task assessed the ease of processing of novel words, and a subsequent word recall task evaluated the effect of focus marking by particle on the recall performance. German L2 learners of English were presented with materials in German (German L1) and in English (English L2); a control group of native British listeners did the experiment in the English language condition (English L1). Experiment 3 is reported in the next section 4.7.

4.7. Experiment 3: Effect of lexical focus markers on L2 word processing and word recall

This section reports on Experiment 3, which explored the role of lexical particles as focus marking devices in native and nonnative word processing and word recall. Focus particles interact with the focused part of the sentence they occur in (König, 1991), and particles point the readers' attention at mental representations they have of a text, as shown in a reading task by Paterson *et al.* (1999). This function is assumed in the current Experiment 3 to translate from reading to listening. The experiment investigated if the focus particles *even*/*only* and their German translation equivalents *sogar*/*nur* facilitate word processing and word recall in German L1 and English L2. To this end, German L2 learners of English were tested in two language conditions (German L1/ English L2). Per language condition, one group was presented a condition with context and another group was presented a condition without context. A control group of native speakers of British English was tested in the two context conditions with the test materials in English (condition English L1). The methodology will we be outlined in sections 4.7.1 - 4.7.4. The results of the study will be presented in two parts, namely the phoneme detection task in section 4.8.1, and the recall task in section 4.8.2.

4.7.1. Speech materials

40 sentences were constructed in each German and English[42], 20 of which contained the target phoneme /b/ in a word in medial sentence position (= target sentences), and 20 that contained no /b/ (= fillers). An adjective always preceded the target-bearing word. The target sound /b/ occurred in the second syllable of the target word which was lexically unstressed, and the position of the target phoneme was always syllable-initial. Target-bearing words were two syllables long and were made-up names of birds. As in the previous experiments, this type of target word was chosen because it is conceptually simple, and because a large number of low frequency words was needed which the subjects were unlikely to know.

[42] I am grateful to Ruben van de Vijver for constructing the English materials, and to Anne Zimmer-Stahl for constructing the materials in German.

The target phoneme could occur in a sentence that either contained a focus particle (condition *with particle*), or not (condition *no particle*). In condition with particle, the target-bearing word appeared in a sentence with a preceding focus particle (*even/only,* German language condition: *nur/sogar*), and focus particles occurred in adnominal position. This left-to-right sequence indicated the scope of the particle, according to the principle that the leftmost element takes wide scope over the operator that follows (see König, 1991:47). In German, it is invariably the case that in the so-called 'middle field' (*Mittelfeld*) the leftmost operator takes the widest scope (König, 1991:47). In the condition *no particle*, the target-bearing word appeared in a similar position in a sentence, only without particle. Within the two particle conditions there were two accent conditions: in one, the target was accented (condition *accent*), in the other, the adjective preceding the target was accented, thus leaving the target-bearing word unaccented (condition *no accent*). This yielded four versions of target sentences, with combinations of two particle conditions (+/- particle) and two accent conditions (+/- accent on the target bearing word). Sentences were constructed in German and in English, and patterned as closely on each other as possible in length (14-18 syllables), plausibility and syntactic structure.

The sentences were presented to two different groups of subjects in two context conditions (with preceding question / without question). To put either the target or another element of the sentence in the scope of the focus, two alternative questions were constructed for each sentence: one that focused on the first potential target-bearing word, and one that focused on the adjective preceding the target word.. That is, the target-bearing word either constituted the answer to the question or it did not (in which case the adjective provided the answer). The questions did not contain a focus particle, because including particles in the questions would have meant that in conditions with context, listeners would have heard the particle twice. This could have be interpreted as a double exposure to the focus-inducing device, making a comparison between the two context conditions more difficult.

Appendix 10a contains the complete speech materials in English; Appendix 10b contains the complete speech materials in German. See the following Tab. 4.2 for all eight versions of the sentence *A grey hunter nursed a starving kilbit with some fresh meat*.

Tab. 4.2: *Example of an English sentence containing the target phoneme /b/, all 8 conditions.*

		with particle	no particle
no context	target accented	A grey hunter nursed even a starving KILBIT with some fresh meat.	A grey hunter nursed a starving KILBIT with some fresh meat.
	target not accented	A grey hunter nursed even a STARVING kilbit with some fresh meat.	A grey hunter nursed a STARVING kilbit with some fresh meat.

with context	target accented	What starving animal did a grey hunter nurse with some fresh meat? A grey hunter nursed even a starving KILBIT with some fresh meat.	What starving animal did a grey hunter nurse with some fresh meat? A grey hunter nursed a starving KILBIT with some fresh meat.
	target not accented	What kind of animal did a grey hunter nurse with some fresh meat? A grey hunter nursed even a STARVING kilbit with some fresh meat.	What kind of animal did a grey hunter nurse with some fresh meat? A grey hunter nursed a STARVING kilbit with some fresh meat.

Similar to this, sentences were constructed in German. Tab. 4.3 shows the sentence *Die Kinder machten den stillen Kabu für den Krach verantwortlich* as a stimulus example of the German language condition:

Tab. 4.3: *Example of a German sentence containing the target phoneme /b/, all 8 conditions.*

		with particle	no particle
no context	target accented	Die Kinder machten sogar den stillen KABU für den Krach verantwortlich.	Die Kinder machten den stillen KABU für den Krach verantwortlich.
	target not accented	Die Kinder machten sogar den STILLEN Kabu für den Krach verantwortlich.	Die Kinder machten den STILLEN Kabu für den Krach verantwortlich.
with context	target accented	Welches stille Tier machten die Kinder für den Krach verantwortlich? Die Kinder machten sogar den stillen KABU für den Krach verantwortlich.	Welches stille Tier machten die Kinder für den Krach verantwortlich? Die Kinder machten den stillen KABU für den Krach verantwortlich.
	target not accented	Welches Tier machten die Kinder für den Krach verantwortlich? Die Kinder machten sogar den STILLEN Kabu für den Krach verantwortlich.	Welches Tier machten die Kinder für den Krach verantwortlich? Die Kinder machten den STILLEN Kabu für den Krach verantwortlich.

In each of the two context conditions (+/- context) this yielded a distribution of targets as shown in Tab. 4.4 (a distribution per particle (only/even) is given in Appendix 11).

Tab. 4.4: *Distribution of 20 targets over accent and particle condition per language.*

			language	
			German	English
particle condition	with particle	accent	5	5
		no accent	5	5
	no particle	accent	5	5
		no accent	5	5

In addition to the 20 target sentences, 20 filler sentences were constructed which contained other consonant but the target phoneme. Filler sentences were constructed similar to target sentences, except that they didn't contain the phoneme /b/. Fillers were also recorded with a focusing question, in conditions with or without particle, and in accented or unaccented condition. Altogehter, two complete sets of materials were constructed per language: One set contained the question-answer pairs (condition *with context*), and one set comprised only the answer sentences (condition *no context*).

Similar to Experiment 2, a word recall part was set up as multiple-choice task. In this, each target-bearing word (in case of the fillers: the word in medial position) was presented with three alternatives, one of which was a word with the target consonant /b/ replaced by another consonant, and the other two alternatives were unrelated but in length and stress pattern identical with the target-bearing word. This resulted in three answer categories in the analyses: one item rated as correct, one as similar and two items rated as false. To avoid that subjects choose only words containing the phoneme /b/, some choices for the filler items contained also a /b/. An example of choices presented in the recall test for the target-bearing word *kilbit* is given in Tab. 4.5 (a complete list of recall items is given in Appendix 12a-12d).

Tab. 4.5: *Choices offered in the recall task, with corresponding classification*

classification		correct	similar	false	false
item	English:	kilbit	kilfit	nesmal	nesgral
	German:	Nisbe	Nisge	Harma	Harta

Because German is a language with inflexion, care was taken that the endings of the choices matched in their assumed gender.[43]

4.7.2. Speakers and recording procedure

A male speaker of South Eastern British English recorded the English stimuli, and a male native speaker of Standard German recorded the stimuli in German. This yielded a total of 40 question-answer pairs per language condition. In addition to that, five sentences were recorded in each language for a familiarization part. All materials were recorded to Digital Audio Tape in a sound-attenuated booth with 22.05 kHz 16-bit samples per second. Stimuli were edited in PRAAT, version 4.4.16 (Boersma & Weenink, 2006).

[43] For example, *Nisbe* would assumed to be feminine in German due to its ending on 'e'.

4.7.3. Participants

40 adult native German learners of English participated in Experiment 3, either for course credit or a small monetary compensation. They were mostly undergraduate students at the University of Potsdam, and on average 24.5 years old. They had on average 8,8 years (median: 9 years) of English instruction at school, beginning at the age of 11. None of the participants had spent longer than 12 months in an English-speaking country (mean: 2.5 months, median: 1 month). 24 native English listeners participated in the experiment as controls (mean age: 30.5 years). They were mostly students at University College London, and were paid a small sum for their participation.

4.7.4. Procedure and experimental task

German participants were tested at the University of Potsdam/ Germany, the English control group was tested at University College London/ UK. Before entering the test, subjects completed a questionnaire on their language background (Appendix 6). Subjects were tested individually in a quiet experiment room. They were informed that a word recall test would be administered after the listening part of the experiment. In the listening part (English language condition/ German language condition) they received written instructions on the computer screen in the tested language. In this, subjects were asked to listen within the sentences for the occurrence of a specified target phoneme, the sound /b/, and to press a button as soon as they heard that particular sound in the sentence. Listeners were instructed to react as quickly as possible. They were also asked to pay attention to the contents of the sentences because they would be tested on the sentences later.

The listening part started with a practice session of five sentences. During the practice part the experimenter was present to answer questions. Feedback on the correctness of the answers was given in the practice part but no feedback was given during the actual test.

The materials were presented binaurally over headphones, and the level of the sound files could be further adjusted individually. The subjects alternated with regard to language order, so that in the end one group had started with the English part followed by the German part, and other group began with the German part first and then did the English part.

After completing the listening part, subjects entered the second part of the experiment which tested the recall of words that had occurred in the listening part. This recall test consisted of a written online form that listed the 40 sentences of the listening part. In each of them, four alternatives for the target-bearing word (in case of the fillers: the word in medial position) were presented to choose from (see Fig. 4.1). As in the listening part, subjects received no feedback in the recall part on the choices they made.

Fig. 4.1: *Screenshot of the recall test, showing the drop-down menu with four options to choose from (English language condition).*

The experiment was programmed using DMDX software (version 3.0.2.4). The program and procedure of the current experiment was kept similar to that of Experiment 2 (see chapter 3.8.4, p. 89). An overview over the total number of cases per context condition with the distribution of the targets across syntactic structure and accent is given in Tab. 4.6, followed by a summary of the design:

Tab. 4.6: *Distribution of subjects across context conditions.*

Condition *with context*:
20 subjects * (5 targets + particle, + accent; 5 targets + particle, – accent;
5 targets – particle, + accent; 5 targets – particle, – accent)
split for order of languages: 10 subjects in the order German-English,
10 subjects in the order English-German
Condition *no context*:
20 subjects * (5 targets + particle, + accent; 5 targets + particle, – accent;
5 targets – particle, + accent; 5 targets – particle, – accent)
split for order of languages: 10 subjects in the order German-English,
10 subjects in the order English-German
English native controls:
24 subjects distributed across context condition (= 12 context / 12 no context):
5 targets + particle, + accent; 5 targets + particle, – accent;
5 targets – particle, + accent; 5 targets – particle, – accent;
in English language condition only

The distribution shown in Tab. 4.6 yielded for analyses of the German data
20 subjects*2 (+/-context)* 2 (L1/L2)* 2 (+/-particle)* 2 (+/-accent)* 5 = 1600 cases.
For the English control group, this yielded
12 subjects*2 (+/-context)* 2 (+/-particle)* 2 (+/-accent)* 5 = 480 cases.

The dependent variable in the listening part was reaction time (RT) to the onset of the target bearing word. The dependent variable in the recall part was rate of accuracy (% correct). Independent variables were (1) focus conveyed by particle (condition +/− particle), (2) accent on the target-bearing word (condition +/− accent), and (3) semantic focus on the target-bearing word, defined as whether the target-bearing word provided the answer to a preceding question (condition +/− context). The order in which the German subjects did the experiment (German L1 - English L2, or English L2 - German L1) varied systematically. As in Experiment 2, this was done to avoid task learning effects. A comparison of test order itself is, however, not relevant to the present study.

4.8. Results

Two measures were recorded in the experiment, i.e., reaction times to the onset of the target-bearing word (RT), and rate of accurate word recall (% correct). Results are reported in two parts: section 4.8.1 reports on the analyses of the phoneme detection task, followed by the results of the recall task in section 4.8.2.

4.8.1. Results of the phoneme detection task

Responses to targets of less than 150 ms or longer than 5000 ms were discarded. For each response the reaction time (RT, in ms) was calculated from the onset of the target-bearing word.[44] In the German L1 task, no subject was responsible for more than five (out of 20) missed or discarded responses, and in the English L2 task for more than 12 (out of 20) missed or discarded responses. In the English control group (English L1), no subject was responsible for more than 2 (out of 20) missed or discarded responses. In the German subject group in condition *no context*, this yielded for the German L1 task a total of 379 responses (94.5% of all responses) valid for analyses, and in the English L2 task a total of 335 responses (83.8%). In the German subject group in condition *with context*, this yielded for German L1 a total of 394 responses (98.5% of all responses) valid for analyses, and in English L2 a total of 357 responses (89.3%).

[44] As in Experiment 2, the reason for not measuring from the onset of the target but from the onset of the word was that the target word as a whole is assumed to be in the scope. Because of this focal accent assignment listeners are expected to be at a heightened state of attention already at the onset of the word.

In the English control group of condition *no-context*, there were 234 responses (97.5% of all responses) valid for analyses, and in the condition with context a total of 236 responses (98.3%). An overview over the mean RTs per language condition in the two context conditions for the variables *particle* and *accent* is given in Tab. 4.7:

Tab. 4.7: *Mean RT (ms) per context condition, for particle and accent condition.*

		German L1		English L2		English L1	
		- particle RT (ms)	+ particle RT (ms)	- particle RT (ms)	+ particle RT (ms)	- particle RT (ms)	+ particle RT (ms)
no context	no accent	920.7	963.5	953.4	891.5	786.1	726.2
	accent	855.4	879.4	943.0	890.8	718.1	709.1
with context	no accent	975.0	849.4	994.3	993.5	857.7	729.1
	accent	938.5	971.9	950.0	820.7	756.6	786.0

The data was examined with regard to the effect of *particle, accent*, and *context*. The analyses of these results are reported in separate sections: the first section presents the results of main effects; after that each variable will be examined per language task in more detail, applying separate analyses for each of the factors.

Main effects

Mean RTs were computed across conditions for subjects and items. An analysis of variance for repeated measures was then applied to the data with *language* (German L1/ English L2), *particle* (no particle/ with particle), and *accent* (accent/ no accent) as within-subject factors, and *context* (no context/ with context) as between-subject factor.

German data (German L1 and English L2):

The two context conditions did not differ significantly. The effect of language was not significant in the subject analysis [F1(1,38)=1.429; p =.239], but showed a significant effect in the item analysis [F2(1,8)=13.148; p <.05], with mean RTs of 920.4 ms (median 885.2) in German L1, and mean RTs of 937.1 ms (median 905.5) in English L2. In all further analyses, significant effects showed in the subject analyses but did not hold in the item analyses: Across language and context conditions, the effect of *particle* was significant [F1(1,38)=5,664; p<.05], with listeners detecting targets occurring in sentences with particle faster (mean RT 906.2 ms; s.d. 332.1) than targets in sentences without particle (mean RT 940.7 ms; s.d. 334.9). *Accent* also turned out to have a main effect [F1(1,38)=7.209; p<.05], indicating that accented targets

(mean RT 905.8 ms; s.d. 331.5) were faster detected than unaccented targets (mean RT 942,1 ms; s.d. 335.4). There was a significant three-way-interaction of *language* by *accent* by *context* [F1(1,38)=13.683; p=.001]. This interaction is interpreted by visual display of the data in Fig. 4.9 in the summary (see p. 150). Results also showed a significant four-way-interaction of language by particle by accent by context [F1(1,38)=4.174; p=.048].

Of major interest is the interaction of *language* by *particle* by *accent* [F1(1,38)=6.43; p=.015], because it tells about the relationship of *particle* with *accent* in the L1/L2 language context. The interaction is illustrated in Fig. 4.2:

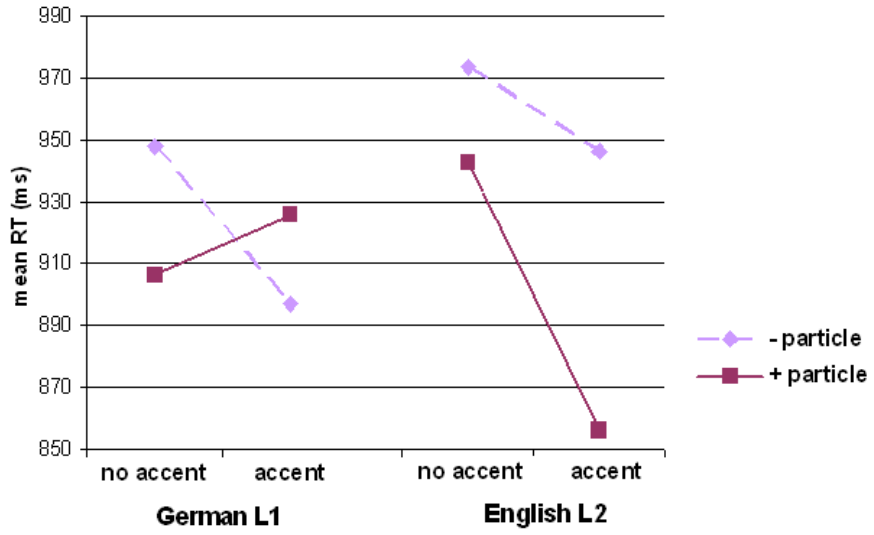

Fig. 4.2: *Mean reaction times (ms) obtained in the two language conditions, for accent and particle (German subject group).*

This interaction shows that in both German L1 and English L2, accented targets were detected faster than unaccented targets if the target was not focused by a particle (purple, dotted lines). If the item was in the scope of a particle, then *no accent* was more beneficial in German L1, whereas an accented target that was also in the scope of a focus particle was faster detected in English L2 (red, solid lines). The combination of accent with particle thus gave an advantage in English L2 processing, but not in German L1 processing.

English control data (English L1):

A repeated-measures ANOVA with *particle* and *accent* as within-subject factors and *context* as between-subject factor revealed no main effect of *particle* (mean RT: with particle 737.8 ms, s.d. 241.5; no particle: mean 779.5 ms, s.d. 338.9). There was a main effect of *accent* [F1(1,22)=9.431; p=.006] indicating that accented targets (mean RT: 742.4 ms, s.d. 284.8) were

faster detected than unaccented ones (mean RT: 776.1 ms, 305.7). There was a significant interaction of *particle* by *accent* [F(1,22)=5.227; p<.05], shown in Fig. 4.3:

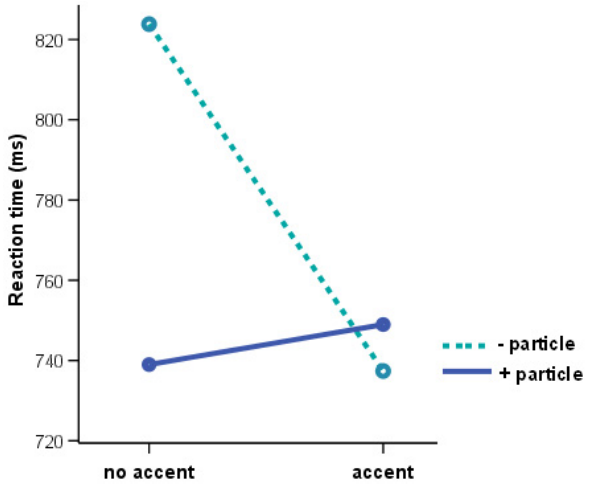

Fig. 4.3: *Interaction of accent by particle, condition English L1.*

The interaction in Fig. 4.3 shows that in condition English L1, *accent* made no difference to phoneme detection times when the target occurred in a sentence with focus particle: mean RTs for *no accent* and *accent* differed only marginally (solid blue line). In the absence of a focus particle (dotted blue line), a facilitating function of accent seemed to take effect, and accented items in sentences without focus particle were as fast detected as unaccented targets occurring in sentences with focus particle. Thus, given there is no further lexical cue as to where important information can be found, accent seems to have a similar effect as the presence of a focus particle. It took listeners longest to detect a target if it was unaccented and not in the scope of a focus particle.

There was no significant difference in phoneme detection times between the two context conditions in English L1. All significant effects showed only in the subject analyses. A t-test showed significant differences between latencies in English L1 (mean RT 761.3 ms; s.d. 295.5), and English L2 (mean RT 937.1 ms; s.d. 351.4) [t (62)=3.877; p<=.001], indicating that native English listeners detected the target phoneme significantly faster than the German subjects did in condition English L2.

Effect of focus particles

To examine the effect of focus particle in the German data per language condition, ANOVAs with univariate measures were carried out in conditions German L1 and English L2 across context conditions. This revealed no significant effect for particle condition in condition German L1. In condition English L2, the difference in phoneme detection times between items

occurring without particle (959.8 ms; s.d. 366.2), and items focused by particle (895.4 ms; s.d. 333.7) failed to reach significance level [F(1,159)=3.602; p=.06]. Oneway ANOVAs were carried out on the data for the separate context conditions with particle as fixed factor, and RT as dependent variable. This revealed no significant effect of particle condition. Thus, the main effect found in the combined data of the German group (see bottom of p. 144) did not hold in analyses carried out per language condition. *Particle* also showed no effect in further analyses per context condition. Mean RTs are displayed per context conditions in Fig. 4.4:

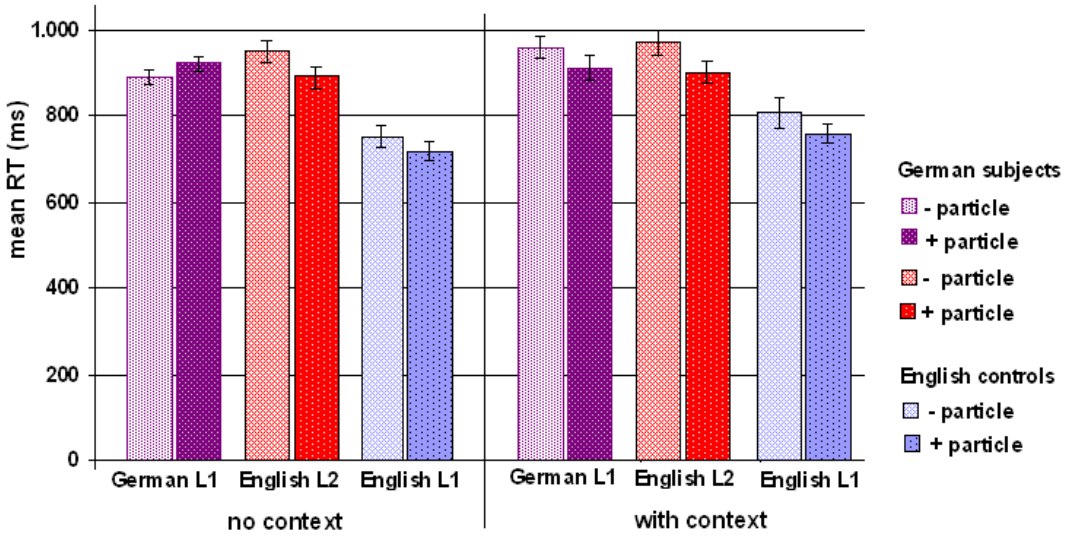

Fig. 4.4: *Mean RT (ms) per context condition for the effect of the factor particle.*

It can be seen in all conditions but German L1 (no context) that items focused by particle were detected faster than items not focused by particle. However, this difference was only significant in the combined data of the German group (German L1 and English L2); focus assignment by particle showed no difference with regard to detection times in the separate language conditions or in any of the context conditions. The general advantage of English L1 > English L2 is clearly visible in the lower bars of the English controls (outer two blue bars at the right in each context panel). Fig. 4.4 also shows that the difference between particle conditions, although not significant (see above), is more pronounced in the no-context condition.

Effect of accent

The analysis of the combined German data (German L1 and English L2) had revealed a main effect of *accent* (see p. 144f), indicating that accented targets were faster detected than unaccented targets. The German data was then examined per language condition. In condition German L1, mean RT for unaccented items was 927.3 ms (s.d. 304.8), and 912.3 ms (s.d. 327.4) for accented items. This difference wasn't significant in a univariate ANOVA with *particle*,

accent, and *context* as fixed factors. In English L2, mean RT for unaccented items was 959.8 ms (s.d. 368.2), and 899.0 ms (s.d. 334.0) for accented items. This difference failed to reach significance level [F(1,159)=3.136; p=.079].

One-way ANOVAs carried out on the data per context condition revealed no effect of accent in condition German L1 with context. There was an effect of accent in the no-context condition in German L1 [F(1,38)=4,268; p<.05], suggesting that accented items were faster detected (867.8 ms; s.d. 240.3) than unaccented items (942.3 ms; s.d.237.8). This is illustrated in Fig. 4.5, where the leftmost bar (=*no accent*) is higher than the bar to its right (=*accent*).

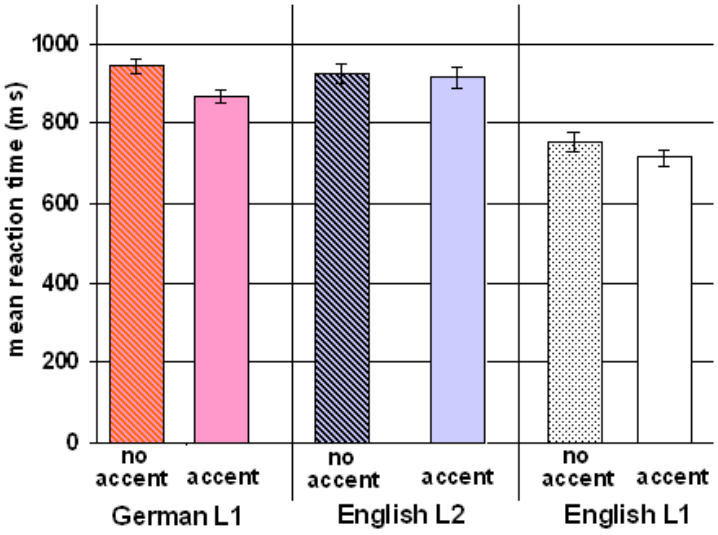

Fig. 4.5: *Mean RT (ms) for the factor accent in the no-context condition.*

ANOVAs carried out on the English L2 data in the two context conditions revealed no significant effect of accent. The effect of accent found in English L1 across context conditions is depicted in Fig. 4.6:

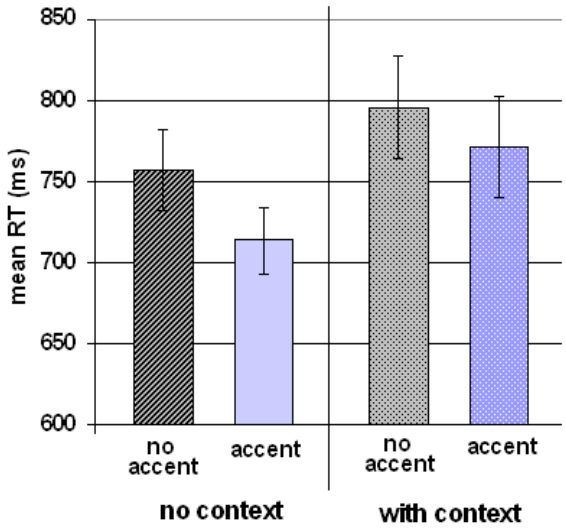

Fig. 4.6: *Mean RT (ms) per language task for accent (English L1).*

In Fig. 4.6, the lower bars to the right of each section show faster reaction times for accented items. The main effect of accent across context conditions (advantage of *accent* > *no accent*, see p. 144f) did not hold in separate analyses of the two context conditions where the difference of accent was not significant any more.

The effect of accent in English L1 depended on the presence of a focus particle in the sentence (see Fig. 4.3, p. 146). This interaction in English L1 now displayed in boxplots (Fig. 4.7) is compared with the effect of accent in English L2 (no interaction, Fig. 4.8). Fig. 4.7 shows for English L1 that in sentences with focus particle, *accent* made no difference to detection times, whereas in sentences without focus particle, accent on the target had the effect of reducing detection times. This is in contrast to English L2, where the proportion of the accent benefit (blue vs. grey bars) seemed to be similar in the two particle conditions (Fig. 4.8).

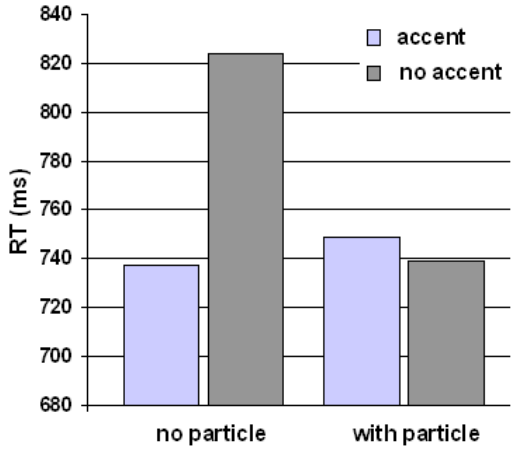

Fig. 4.7: *Mean reaction time (ms) for the effect of accent as a function of particle (English L1)*

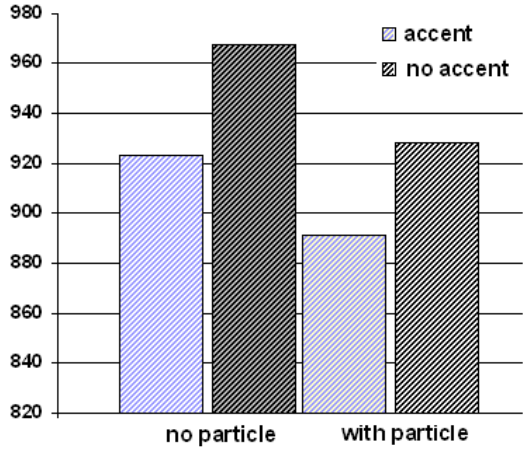

Fig. 4.8: *Mean reaction time (ms) for the effect of accent as a function of particle (EnglishL2)*

Effect of context

The mean reaction times of correct phoneme detection for items presented with and without context were calculated for each language condition (Tab. 4.8).

Tab. 4.8: *Mean reaction times (ms) with standard deviations (s.d.) per context condition.*

	German L1 mean RT (ms)	English L2 mean RT (ms)	English L1 mean RT (ms)
no context	904.8 *(241.7)*	919.6 *(331.8)*	734.9 *(243.8)*
with context	934.0 *(373.8)*	934.0 *(378.3)*	783.0 *(337.9)*

A univariate ANOVA with *particle*, *context*, and *accent* as fixed factors was carried out on the data. In German L1, the effect of *context* was not significant, suggesting that it did not matter to subjects whether the item had been presented with a preceding question or not. There was also no significant difference between the two context conditions in English L2. The analysis of English L1 had revealed no significant main effect of context (see p. 146).

Summary of effects: Phoneme detection task

The results of the phoneme detection task of Experiment 3 are summarized in Fig. 4.9. Squares indicate German L1, and triangles English L2. The data of English L1 is indicated by circles. Blank symbols indicate the no-particle condition and filled symbols indicate the conditions with particle.

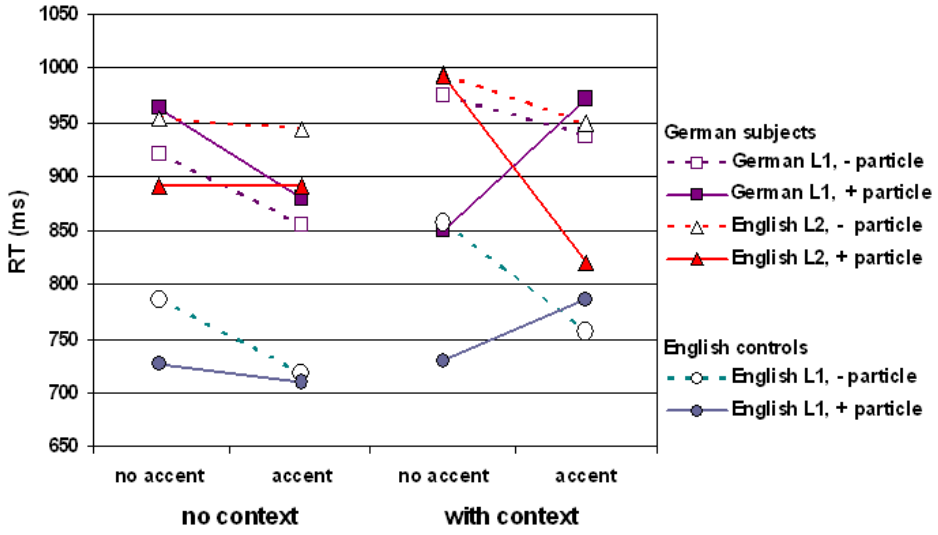

Fig. 4.9: *Mean RT (ms) for the two subject groups in the two context conditions (-/+ context), for accent and particle.*

In the overview of Fig. 4.9, similar patterns of German L1, English L2, and English L1 stand out with regard to particle condition (dotted lines, with downwards slope from left to right): there is a trend in all three groups that accent in sentences with no particle seems to lead to faster phoneme detection. A similar, even stronger trend can be found in English L2 for sentences with particle in condition with context (solid red line with filled triangles, panel to the right): when presented with context, the combination of accent and particle seems to make listeners detect targets faster than when there is no accent. This is in sharp contrast to German L1 (solid purple line with filled squares, panel to the right), where items are faster detected when lexically focused by a particle and not accented. In English L1, accent and particle seem to serve a common cause: if an item is not focused by a particle, then accent takes over and

seems to have the same effect as the presence of a focus particle. The overall lower values in English L1 data indicate a general advantage with regard to detection times of English L1 over English L2.

The main effects in the phoneme detection task of Experiment 3 are listed in Tab. 4.9 (note that this is for the combined data of the German group). In case of an effect, '>' indicates an advantage of the condition to the left over the condition the right.

Tab. 4.9: *Overview main effects of the listening part for the German subject group (combined data of German L1 and English L2), and English controls (English L1).*

	German data (German L1 and English L2)	English L1
particle	* with particle > no particle	-
accent	* accent > no accent	* accent > no accent
context	-	-
particle*accent	-	* advantage of accent in no-particle condition
language *accent*context	*	-
language*particle*accent	*	-
language*particle*accent*context	*	-

In the combined data of the German group (see German L1 and English L2, Tab. 4.9), items focused by particle were faster detected than items not focused by particle. The 3-way-interaction in the German data showed that the combination of accent with particle gave an advantage in English L2, but not in German L1. Both the German subject group (across language conditions) and the English controls processed accented items faster than not-accented items. With regard to the presence of focus particles in condition English L1, accented items were faster detected than unaccented ones in sentences with no focus particle, whereas there was no additional benefit of accent in sentences with focus particle.

An interaction of *language* with *particle* and with *accent* effect emerged in the combined data of German L1 and English L2 (see Tab. 4.9 above). The interaction suggests that not single factors, but a flexible concept of multiple factors seems to take effect in efficient language processing. Separate analyses per language condition revealed no effects of the three main factors under investigation (see Tab. 4.10).

Tab. 4.10: *Effects per language task for German L1 and English L2.*

	German L1	English L2
particle	-	-
accent	-	-
context	-	-

The summary of the effects per context condition (Tab. 4.11) shows that in the *no-context* condition of German L1, accented items were faster detected than unaccented items. In the conditions there were no other effects of *accent,* or for that matter effects of *particle*.

Tab. 4.11: *Overview effects (listening part) per language task and context condition.*

	German L1		English L2		English L1	
	no context	context	no context	context	no context	context
particle	-	-	-	-	-	-
accent	* accent > no accent	-	-	-	-	-

This overview concludes the analysis of the first part of Experiment 3. The next section 4.8.2. reports on results obtained in the word recall task of Experiment 3.

4.8.2. Results of the recall task

The second part of the experiment examined the effect of *particle*, *accent*, and *context* on word recall. Percentages of correct word recall were computed per language and context condition for *particle* and *accent*. Percentages of accurate word recall are given in Tab. 4.12:

Tab. 4.12: *Accurate recall (%) in each condition for each of the factors.*

		German L1		English L2		English L1	
		- particle	+ particle	- particle	+ particle	- particle	+ particle
no context	no accent	55.0 %	50.0 %	40.0 %	45.3 %	60.0 %	60.0 %
	accent	72.0 %	65.0 %	51.1 %	59.0 %	63.3 %	61.7 %
context	no accent	55.0 %	49.5 %	32.2 %	50.5 %	49.1 %	61.7 %
	accent	66.0 %	70.0 %	41.1 %	54.0 %	65.0 %	75.0 %

An ANOVA with univariate measures was applied to the data, with *correct recall* as independent variable, and *language* (German L1 and English L2), *context* (+/- context), *particle* (+/- particle), and *accent* (+/- accent) as fixed factors. A first observation was that the German subjects recalled German items better (mean 60.0%) than English items (mean 43.5%), which was a significant difference [F(1,78)=17,982, p<.001]. The following sections report on the results for *particle*, *accent*, and *context*, and concludes with a summary of effects found in the word recall task.

Effect of focus particle

The combined data of the German group (German L1 and English L2) was examined with regard to the effect of *particle*. An ANOVA with univariate measures showed a significant effect of particle on the rate of accurate word recall [F(1,158)=4.841, p<.05], indicating that items focused by a particle were better recalled (54.5% correct recall) than items without focus particle (49.0% correct recall).

In condition German L1, the mean correct recall of items without particle was 62.0%, and the mean recall of items with particle was 58.0%. In an ANOVA with univariate measures this was not a significant difference. In the recall of English L2, there was a significant effect of particle [F(1,147)=8.461, p<.005], indicating that items presented in sentences with focus particle were significantly better recalled (51.0%) than items occurring in sentences without particle (36.0%). In English L1, the mean recall for items occurring with particle was 64.6%, and for items without particle 58.3%. This was not a significant difference.

In a next step, the recall scores were examined per context condition. The percentages of correct recall for *particle* are given per language and context condition (Tab. 4.13):

Tab. 4.13: *Rate of accurate recall (%) for each language condition, split for particle.*

	German L1		English L2		English L1	
	- particle	+ particle	- particle	+ particle	- particle	+ particle
no context	63.5 %	57.5 %	39.0 %	51.0 %	61.7 %	60.8 %
context	60.5 %	58.5 %	33.0 %	51.0 %	55.0 %	68.3 %

Oneway ANOVAs with *correct recall* as dependent variable and *particle* as fixed factor revealed that *particle* had no effect in the two context conditions in German L1. The particle condition had, however, a significant effect in English L2 in both of the context conditions (no-context: [F(1,38)=4,734; p<.05], with context: [F(1,37)=5,057; p<.05]), showing in both cases that items focused by a particle were significantly better recalled than items in sentences without focus particle.

There was no effect of *particle* in the recall scores of English L1 in the no-context condition. There was, however, a significant effect of *particle* in the condition with context [F(1,22)=4,822; p<.05], indicating an advantage of accurate recall for items focused by particles (68.3%) over items occurring in sentences without focus particle (60.8%).

In the multiple choice task, items were divided into the three categories of correct, similar, and false answers (see Tab. 4.5, p. 140). The distribution of responses across these answer categories was examined in more detail for the German subject group. The percentages of responses are displayed for each category in Fig. 4.10.

Fig. 4.10 shows that percentages of similar answers in German L1 is rather small: subjects either gave a correct or a false answer. This was different in English L2, where percentages of similar answers were higher. The correct and similar answer choices differed in one phoneme, and it seems that German listeners were much more aware of this difference in their native language, because they either chose the correct answer or the false answer. The difference was probably not that perceptible in the L2, as listeners opted more often for 'similar' items, thus for items that differed with the correct target in one phoneme.

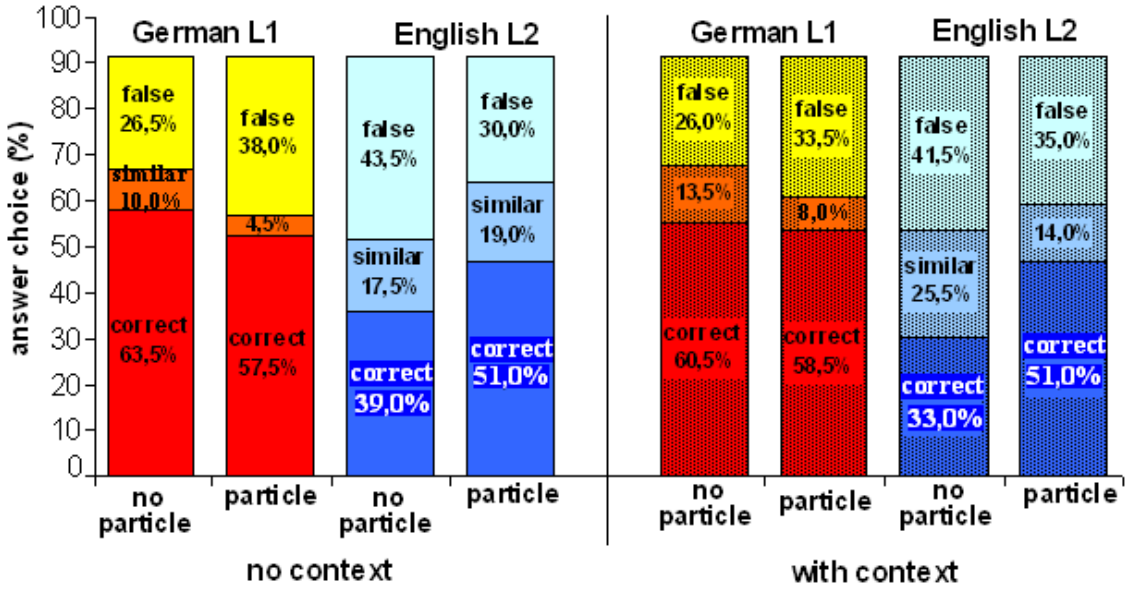

Fig. 4.10: *Categorization of answers (correct-similar-false) given in the recall part (German subject group).*

With regard to the effect of focus particles on the choice of answer category it can be observed that listeners in the German language conditions gave less often similar answers in sentences with focus particle (orange fields in the middle of each bar: no particle vs. particle). Altogether, the answer patterns seem largely alike for the context conditions.

Effect of accent

A univariate ANOVA revealed a main effect of *accent* in the word recall data of the German subject group (German L1 and English L2) [F(1,158)=22.227; p<.001], indicating that accented items were significantly better recalled (58.6%) than unaccented items (44.9%). In the recall scores of the English controls, *accent* failed to reach significance [F(1,87)=3,755; p=.056]. There was no interaction of *accent* with any of the other factors. The German data was then split for language task, and German L1 and English L2 were analysed separately. ANOVAs with univariate procedure revealed a significant effect of accent in condition German L1 [F(1,158)=19.881; p<.000], indicating that accented items were recalled more accurately (68.3%) than unaccented items (51.8%). In English L2 there was an effect of accent [F(1,147)=5.958; p<.005] similar to that in condition German L1: accented items were recalled more accurately (49.0%) than unaccented items (38.0%).

Percentages of accurate recall were then calculated for the two context conditions (Tab. 4.14). Separate oneway ANOVAs examined the effect of accent per context condition. *Accent* had a significant effect in German L1 in condition *no context* [F(1,38)=8,511; p<.01], and in condition *with context* [F(1,38)=9,229; p<.01], suggesting in both cases an advantage of word recall of accented items over unaccented items.

Tab. 4.14: *Rate of accurate word recall (%) for each language condition, split for accent.*

	German L1		English L2		English L1	
	no accent	accent	no accent	accent	no accent	accent
no context	52.5 %	68.5 %	42.9 %	55.3 %	60.0 %	62.5 %
with context	52.3 %	68.0 %	41.6 %	47.9 %	55.7 %	70.0 %

In condition English L2, the effect of *accent* was significant in condition *no context* [F(1,38)=7,668; p<.01], with an advantage of *accent* over *no accent*. There was no significant effect of accent in condition English L2 with context. In condition English L1, *accent* had no effect in the no-context condition, and a significant effect emerged in the condition with context [F(1,22)=7,237; p<.05] (*accent* > *no accent*).

Effect of context

Mean percentages of accurate recall were calculated for the two context conditions (Tab. 4.15, p. 157). ANOVAs with univariate procedure revealed no significant effect of context condition on word recall in either condition German L1, English L2, nor in English L1. There were also no significant interactions. This means that context had no effect on the word recall performance of the subjects.

Tab. 4.15: *Rate of accurate recall (%) for each language condition.*

	German L1	English L2	English L1
no context	60.5 %	45.0 %	61.3 %
with context	59.5 %	42.0 %	61.7 %

Summary of effects: Recall task

An overview of the mean rate of accurate word recall (%) per context and language condition is given in Fig. 4.11. This graph is based on the mean accuracy rates given in Tab. 4.12 (p. 152). A notable observation in Fig. 4.11 is the consistent effect of accent on word recall, showing in the upward direction of the data lines *no accent – accent* in each context condition (slope from left side upwards to the right). In all but two conditions, i.e., in condition English L1 *no context* (+particle, blue filled circle), and in condition English L2 *with context* (+particle, red filled triangle), accented items were significantly better recalled than unaccented items. This observation was confirmed in the analyses.

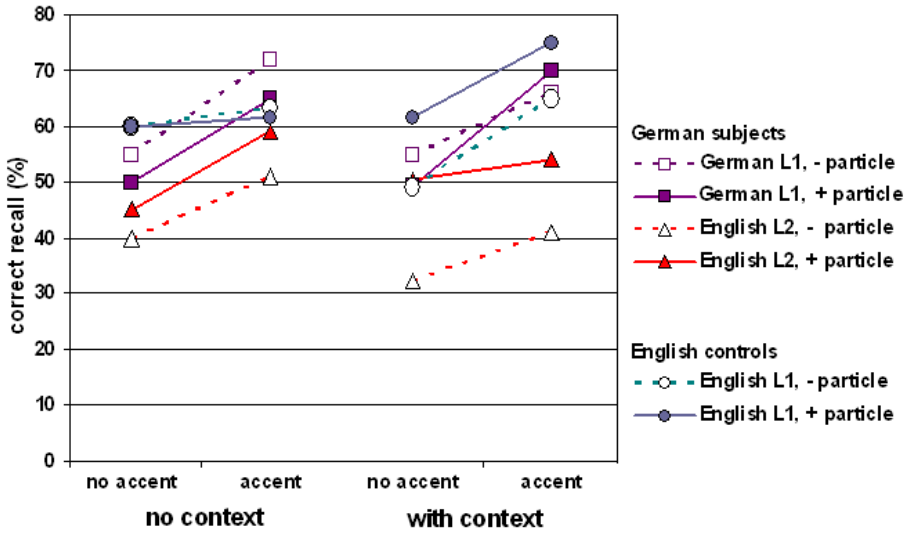

Fig. 4.11: *Percentages of correct word recall.*

Main effects found in the combined data of the German subject group (German L1 and English L2), and main effects found in the data of the control group (English L1) are summarized in Tab. 4.16 (p.157). In the combined German data, items focused by a particle were better recalled than items without particle. Furthermore, accented items were better recalled than unaccented items. Context had no effect on word recall performance. In the data of the English control group, none of the factors was significant.

Tab. 4.16: *Overview of main effects in the word recall task for the German subject group (German L1 and English L2) and English controls (English L1).*

	German data (German L1 and English L2)	English L1
particle	* with particle > no particle	-
accent	* accent > no accent	-
context	-	-

The following Tab. 4.17 gives an overview over the effects in the data of the German group per language task and across context conditions. Items focused by particle were better recalled only in condition English L2. Accented items were better recalled than unaccented items in both German L1 and English L2. Context had no effect on the word recall performance.

Tab. 4.17: *Effects per language task (recall part), for German L1 and English L2.*

	German L1	English L2
particle	-	* with particle > no particle
accent	* accent > no accent	* accent > no accent
context	-	-

The distribution of answers in the three categories of the multiple choice test revealed that German subjects seemed to be more aware of small phonemic differences in their native language, choosing either the correct answer or the false answer. Such phonemic differences did not seem to be that perceptible in the L2, as German subjects opted more often for items categorized 'similar' in condition English L2 than they did in condition German L1.

The final Tab. 4.18 (p.158) summarizes the effects per context condition. With regard to *particle*, this comparison between context conditions had an effect only in condition English L1: *context* gave rise to an effect of *particle*, that is, items focused by particle were better recalled in the presentation with context than items not focused by particle, and this effect did not hold for the presentation without context. With regard to *accent*, the presentation without context led to a word recall advantage of accented items in condition English L2, whereas *accent* made no difference in the presentation with context. In condition English L1, on the other, *accent* led to a better word recall in condition with context.

Tab. 4.18: *Effects per language task and context condition (recall part).*

	German L1		English L2		English L1	
	no context	context	no context	context	no context	context
particle	-	-	* + particle > no particle	* + particle > no particle	-	* +particle> no particle
accent	* accent > no accent	* accent > no accent	* accent > no accent	-	-	* accent > no accent

Results obtained in the phoneme detection task and in the word recall task are discussed in the following section 4.9. This section also concludes the experimental part of this study. The final chapter 5 brings together the findings of the three experiments conducted in the course of this work.

4.9. Discussion

The current experiment aimed to determine the influence of particles as focus markers on the speed of word processing and on accuracy of word recall in German L2 learners of English. Furthermore, the role of accent and additional context were examined.

The two subject groups differed significantly, as the English native listeners were faster in word processing than the German L2 learners. The performance of the German learners in the English L2 task was good in that only 10% fewer correct detections were recorded than in the native language task. Results of the phoneme detection task showed that German subjects responded as rapidly to sentences in German as to sentences in English. All this was taken as evidence of a good and sufficient English proficiency of the nonnative subjects, and confirmed that the task was well within the limits of their foreign language skills. The word recall task proved to be difficult as the German participants achieved overall significantly higher scores of accurate word recall in the native language task than they did in the English language task.

The main interest of the present experiment was to investigate whether focus particles lead to faster and more accurate processing of the element in scope of the particle. I argued that focus particles indicate a restrictive/exclusive meaning, or an additive/inclusive meaning, evoking a contrast set of alternatives resp. complementing sets to the element in focus. It was therefore hypothesized that lexical focus marking does not lead to faster word processing. The hypothesis was confirmed in that German participants in neither their L1 nor in the L2 condition detected targets faster when these were focused by a particle. Furthermore, no beneficial effect

of focus particle showed in more in-depth analyses as in none of the context conditions subjects reacted faster when the sentences contained a focus particle. The lack of effect in the separate language tasks supports the assumption that the presence of focus particles evokes a contrast set of alternatives in the listener (Ni *et al.*, 1996). This seems to call up a discourse model in the listener's mind that contains both focus and contrast sets which makes the listener anticipate further modifying information (Liversedge *et al.*, 2002), altogether a process that is evidently taking up resources of processing time.

However, in the combined data of the German subjects across the two language conditions, results revealed a facilitative effect of focus particles. The hypothesis needs to be refined: German participants show an overall sensitivity towards the presence of focus particles, but particles themselves are not a device to *mark* focus. The results can be interpreted as evidence for the notion of König (1991) that focus particles interact with focus structure while focus is marked by other means.

In the recall task in conditions German L1, the German subjects did not remember words focused by a particle more accurately. This could also be due to the notion that focus particles open sets of conditions and contexts in subjects, which enlarges the set of representations in the memory rather than narrowing it down to the element in the scope of the focus (see Ni *et al.*, 1996; Liversedge *et al.*, 2002). The use of focus particles led to a better recall in both context conditions of English L2. An explanation for this could be that L2 learners, when faced with the difficult task of recalling words in an L2, make use of a broad variety of exponents that identify focus. The general hypothesis of the current thesis is that focus supports a better representation of the word in the memory of the learner. Focus particles are seen as a preferred and often-used feature in German (König, 1991) and it could be that German subjects resort to this habitualness, and consequently use focus particles to exploit information structure in the L2, that is, in a situation when help from additional sources is required.

The English controls did not rely on focus particles to process words faster, nor to recall them more accurately. This suggests that particles were not recognized as a main source of highlighting information, which could be due to particles being a less preferred option to mark focus in English (König, 1991; Ahlemeyer & Kohlhof, 1999). Particles had a beneficial effect in the recall task in the condition with context. This could suggest that particles are only acknowledged if they make sense to the listener, that is, when they are integrated in a coherence relation between sentences. It seems that for the English native speakers, particles were

acknowledged as expression of focus when embedded in *real* information structure which seemed to be provided in the current setting only by the context questions.

Sentence accent was realized in the present experiment either on the word containing the target phoneme, or on the adjective that preceded this word. Results indicated a beneficial effect of *accent* on processing times in English L1 listening, but not in German L1 and not in English L2. Analyses of the combined German data (German L1 and English L2) showed a beneficial effect of accent, suggesting a general sensitivity of the German participants to accentual information. Accent showed its importance mainly in interactions with other factors. In condition German L1, for instance, accent and context seemed to influence each other: when listeners had additional context questions, they did not seem to rely on information provided by accent as they did when the input consisted of single sentences. This suggests that in the absence of other features, accent is a significant parameter to highlight information (see Cutler & Fodor, 1979; Pitt & Samuel, 1990a; Akker & Cutler, 2003). The German participants benefited from the combination of particle with accent in L2 processing, but not in L1 processing. The difference suggests an integrative use of the two speech parameters as a beneficial strategy in English L2 processing, and an exclusive use of the parameters as a beneficial strategy in German L1 processing.

In English L2 listening, the processing of accented words paralleled that of unaccented words. Accent had an influence on the speed of processing only in combination with other factors. This is indicated by the aforementioned interactions of accent with language and context, and interactions of accent with language and particle. Therefore, the current results give no evidence that accent can be isolated as single factor determining faster L2 word processing. This is in line with Akker & Cutler (2003) who found no main effect of accent in English L2 when testing Dutch L2 learners of English in a L1 - L2 comparison (see p. 24f).

A main effect of accent in English L1 showed that English native listeners used accent to process words faster. An interaction of accent by particle suggested a close relation of the two factors in English L1: When listeners were not given lexical cues as to where to find the important information (i.e., the target word), then accentual information was used. However, if there were lexical cues available, then accent made no difference. This relationship did not emerge in English L2.

Accent proved to be a powerful factor to an accurate representation of novel words in the memory for German participants. In German L1 and English L2, accented words were better recalled than unaccented words. This effect held up in the no-context condition in English L2, but when German participants had to recall words presented with context in the L2, they no

longer used accent information for accurate recall. Altogether, results of the present experiment suggest accent as a reliable cue to accurate word recall for the German participants. The English controls did not use accent information for a more accurate recall. Yet, they used accent for a better word recall when having to remember words presented in context. In this they showed a similar pattern to native German language recall.

It was hypothesized that listeners detect words presented with context faster, but that context would not facilitate word recall. To test this hypothesis, half of the participants worked with material that comprised single sentences, the other half of the subjects was presented the same single sentences together with a preceding question. Depending on the accent condition, the target-bearing word either constituted the answer to the question, or the preceding adjective did. It turned out that in German L1, English L2 and in English L1, context in form of a preceding question had no effect on the speed of word processing nor on word recall accuracy. Thus, context as a single factor did not facilitate word processing, therefore this part of the hypothesis has to be rejected; results confirmed the hypothesis proposed for word recall.

The finding that context did not facilitate recall confirmed earlier findings obtained in Experiment 2, in which no facilitative effect of context on word recall could be observed, although subjects detected words faster when they were presented with context. In contrast to Experiment 2, a complete lack of effect of context was observed in the current experiment. I interpret this finding that the cleft constructions in Experiment 2 presented complex structures for listeners to process and listeners took advantage of context as an additional help. In the current Experiment 3, on the other hand, sentences containing focus particles were in terms of their syntactic structure relatively easy to process because they require fewer changes in the word order than a cleft construction. Therefore, since circumstances did not present a challenge to the listener, the questions were a surplus of information providing no further semantic focus, and therefore had no effect on the speed of word processing.

With regard to a more accurate representation in the memory, additional context seems to enlarge the amount of information the listener has to process, which I interpret as an aggravating aspect. One might speculate about why there were no beneficial effects of context in the word recall task, given positive results obtained for context in the phoneme detection tasks in conditions German L1 and English L2 of Experiment 2, and because positive effects are also promoted by L2 research studies (see Krashen, 1989; Lawson & Hogben, 1996). A deciding factor could be the form of context presented in the experiment. The context questions did not allow the learner to build additional semantic, prosodic or lexical connections that could

have helped to anchor the novel word in the memory, such as it happens when novel words can be embedded in a different kind of discourse model. For instance, context with stronger lexical cues could motivate the learner to pay closer attention to the word in focus. A semantically stronger context could establish a network of meaning, which would make it easier for the learner to remember the word. Such forms of context could maybe compensate for the additional processing load that context provides, and they might in turn facilitate word recall.

4.10. Conclusions

Focus marking by lexical particle did not reduce word processing times in either German L1, English L2, or in English L1. It is suggested that the presence of focus particles evoke contrast sets of alternatives and complements to the element in focus (Ni *et al.*, 1996), which instantiates a complex discourse model containing the element in focus and its alternatives, letting the listener await further modifying information (Liversedge *et al.*, 2002). This semantic complexity slows down processing. Across language conditions, however, German listeners altogether acknowledged the presence of focus particles for faster processing, which is interpreted as evidence for the notion of König (1991) that focus particles interact with focus structure.

The impact of focus particles on processing speed showed in interactions with other linguistic factors: the combination of accent with particle gave no advantage in German L1 processing but it did so in English L2 processing. The effects of accent and of focus particle are suggested to be exclusive in L1 processing, and integrative in L2 processing.

In native language word recall of German L1 and English L1, no facilitating main effect of focus particle on recall performance could be established. This could be because focus particles open sets of conditions and contexts in subjects that enlarge the set of representations rather than narrowing it down to the element in the scope of the focus particle.

Focus by particles led to a better word recall in both context condition of the English L2 recall task. It is suggested that L2 learners, when faced with the difficult task of recalling words in an L2, use a broad variety of means that identify focus. Lexical focus marking leads to a more accurate recall in L2 in challenging situations when help from additional sources is required.

Accent did not emerge as a single factor determining efficient word processing in German L1 and in English L2 listening, although results across language conditions revealed a beneficial sensitivity of German participants to accentual information. Accent showed its importance mainly in interactions with other factors as German listeners used accent

information in German L1 when no context was provided; they also benefited from the aforementioned combination of accent with particle in L2 processing. Accent proved to be a reliable cue to accurate word recall in German L1 and in English L2.

English native listeners used accent as a cue to faster language processing regardless of the context condition. Again, a close relationship of accent and particle revealed that in the absence of lexical cues to important information, listeners turn to accentual information for faster language processing. However, in the presence of focus by particle, English listeners did not use additional accent information for faster speech processing.

Context had no effect on the speed of word processing in either language condition of the German group or in condition English L1. Discrepancies with findings of Experiment 2 are explained by the lesser degree of syntactic complexity of the sentence materials in the current experiment. Context did not turn out to be a factor determining accurate recall in any of the conditions, which supports earlier results of Experiment 2. L2 research promotes the advantageous effect of context for L2 word learning (see Krashen, 1989; Lawson & Hogben, 1996), and it is speculated that a context that offers more semantic, prosodic, or lexical connections could compensate for the additional processing load that context constitutes for the listener.

With regard to a perceptual sensitivity to phonetic detail it is suggested that German subjects seemed to be more aware of small phonemic differences in their native language. Small phonemic differences did not seem to be that perceptible in the L2.

CHAPTER 5

5. General discussion and conclusion

The present study investigated how use of focus markers affects processing speed and word recall recall in a native-nonnative language comparison. The three parameters chosen for investigation were (1) focus marking by prosodic means, specifically focal accent, word length and word position; (2) focus marking by syntactical means, exemplified by the use of the cleft construction; and (3) focus marking by lexical means, realized by the focus particles *even* and *only*. This chapter presents a summary of the main findings of three experiments conducted.

The experiments tested German learners of English both in their native German and in English as their L2. As a control, native English speakers were included for the English language condition. The tests investigated whether the type of focus marking leads to more efficient and accurate word processing in marked structures than in unmarked structures, and whether differences in processing patterns can be observed between the two language conditions.

The aim of examining the effects of prosodic, syntactical and lexical means of focus marking was to understand better how L2 learners make use of information structure in the L2. A deeper insight into the information structure of a language is believed to form a powerful resource to access form and meaning, thus contributing to the learners' L2 proficiency.

This chapter also discusses the effects of the different parameters and factors across experiments, with the following emphasis: In section 5.1.1, the results with regard to the three parameters in question are summarized and discussed in relation to one another. Section 5.1.2 addresses the contribution of context in the form of preceding questions. After this, findings are discussed with respect to differences between native and nonnative word processing, thus comparing patterns and processing strategies used in German L1 to those used in English L2 (section 5.1.3). I then move on to comparing results of the phoneme detection task with those obtained in the recall task. The goal here is to see if the different measures yield similar results with regard to the impact of focus markers (section 5.1.4). The experimental methodology applied in the experiments will be reviewed in section 5.2., and suggestions for future research will be made in section 5.3. This work ends with proposing the main conclusions that can be drawn from the study (section 5.4).

5.1. Summary of main results

5.1.1. Focus markers in L2 processing and recall

Do focus markers facilitate word processing and word recall in the L2? This question was addressed by investigating the effects of pitch accent, cleft construction, and focus particle in L1 and L2 processing and word recall. The main findings are reported in separate sections, marked by the respective parameter under investigation.

Focus marking by prosodic prominence

The first experiment on prosodic prominence aimed to establish whether listeners react to prosodic variation of different focus structures, manifested by pitch accent. Results of Experiment 1 did not support the hypothesis that prosodic prominence as conveyed by focal pitch accent leads to a better word recognition. This was found for German L1, English L2, and for English L1. An experimental artefact is suggested as a possible explanation for the lack of effect: the prosodic variation elicited by wh-questions may not have yielded accent conditions that were perceptually distinctive enough. Instead of utterances with a natural emphasis, an exaggerated accentuation in the realization of the speech materials might have revealed accent as one of the most powerful and universal cues to efficient language processing, as claimed by the literature (e.g., Cutler, 1976; Cutler & Fodor, 1979; Pitt & Samuel, 1990a).

An important aspect regarding the performance in the nonnative language condition lies in the order in which the L1 and L2 are tested. It could be that in testing languages in subsequent experiments, the performance in the second experiment is influenced by knowledge acquired in the first, thus making it difficult to collect comparable data in two languages from the same listener group. A similar concern was expressed by Akker & Cutler (2003) for a test series of Dutch L1 - English L2 processing. In addition, a strong effect of position suggested that word position might have overshadowed the accent effect. Another accent aspect investigated was the effect of the local prosodic realization of a word in contrast to the global prosodic contour of the surrounding sentence. Results indicated that the surrounding prosodic sentence contour rather than the prosodic realization of the word itself that made listeners recognize the word. Thus, prosody indeed directed listeners' attention to the semantic focus of the sentence (Cutler, 1976).

To investigate the function of accent in its interplay with focus marking devices, Experiment 2 also considered the effects of accent and cleft structures, and Experiment 3 considered the effects of accent and focus particles. The question was how the respective

focusing device (i.e., *cleft* or *particle*) and pitch accent work together. Results were expected to complement and extend findings on the use of accent information in Experiment 1.

In Experiment 2, accent was found to be a strong cue to efficient word processing in German L1 and in English L1, but not in English L2. This difference was attributed to patterns of expectation that are employed in the L1 but not (yet?) in the L2. There seems to exist a fine-tuned sensitivity to how accents are distributed in the native language, and listeners expect an appropriate distribution (Eefting, 1991). It could be that, without further contextual information, the accent placement was not plausible for the listener with regard to an interpretation of de-accented versus unaccented information. This explanation is supported by the benefit of accent in sentences presented with context. The similarity of accent effects in the two native language conditions German L1 and English L1 suggests that in native language processing a generally more fine-tuned and differentiated interpretation of accent may be at work (Lehiste, 1972 in: P. Warren, 1996). Indeed, the efficient use of accent may therefore also depend on the level of L2 proficiency, as suggested by Akker & Cutler (2003). Experiment 2 revealed similar processing patterns of accent in English L1 and English L2, in both listening and recall. This underlines the role of accent as a consistent cue to perception of prominence (see Akker & Cutler, 2003; Eriksson *et al.*, 2002). An effect of accent was not shown in Experiment 1, probably because the focus conditions were acoustically not distinctive enough (a possible experimental artefact). In addition, the order in which test languages were presented and overshadowing effects of word position may have inhibited accent effects. The issue of testing order will be addressed in the last paragraph of this section.

Let us now turn to the effect of accent on focus particles in Experiment 3. In contrast to the benefit that accent offered for native German and native English processing in relation to cleft (see paragraph above), accent in relation to focus particles was not found to result in faster word processing by the German participants in German L1 and English L2, but did benefit the native English participants. However, in the absence of other factors like context, accent became a significant parameter to highlight information in German L1. The importance of accent for the speed of recognition emerged also in several interactions of accent with other factors. Accent proved to be a powerful cue to an accurate representation of novel words in the memory in German L1 and English L2, and a similar trend was observed in English L1.[45]

In Experiments 2 and 3, evidence suggests that accent is an important factor for efficient word processing and accurate recall in German L1 and English L1, but less so in

[45] The processing advantage of accented items failed to reach significance in German L1 (p=.079); the recall advantage of accented items marginally failed to reach significance level in English L1 (p=.056).

English L2. This underlines the function of accent as core speech parameter in native language use (see Cutler & Fodor, 1979; Pitt & Samuel, 1990a; Akker & Cutler, 2003); furthermore, it indicates that an accurate distribution of accent placement constitutes an important area of L2 acquisition (Eefting, 1991). The current results suggest that accent and its relationship with other speech parameters has to be newly established in the L2 to fully reveal its benefits for efficient processing of speech.

Experiment 1 also investigated word length and word position as means to mark prosodic prominence. It appeared that word position was indeed more important for accurate recognition than accent information. Words in German L1 and also partly in English L2 were better recognized when in final position, confirming the notion of listeners' preference for the outer ends of an utterance, as proposed by Slobin (1985) for English, and by Klein (1984) for German. However, this finding does not align with the sentence location principle as proposed by VanPatten (2004), which states a ranking of initial > final > medial position. The current finding is interpreted as recency effect (Murdock, 1962), in that recent stimuli, i.e., those in final sentence position, are disproportionately better represented in the memory than medial or initial stimuli. This effect is thus due to the shorter elapsed time between occurrence and recognition. The salience of the final position also agrees with a convention for the integration of new information in a discourse, namely that relevant background information is referred to first, followed by novel information (Haviland & Clark, 1974). This structure is assumed to cue the listener to what the speaker considers to be important information, and the advantage of the final position might benefit from this convention. The similar use of the final position for accurate word recognition in German L1 and English L2 in the condition when target words were unaccented is interpreted with Oller (1973) as a learned aspect of language: lengthening in final position cues listeners to the end of a sentence, and this linguistic feature seems to get mapped from the L1 onto the L2.

The length of a word had little impact on word recognition accuracy in all language conditions, which confirms results of Lovatt *et al.* (2000). For the L1-L2 comparison this also complements earlier results obtained in a production task for French learners of Polish (Rast, 2003, and Rast & Dommergues, 2003) with similar evidence from a word recognition task. The current results also extend the findings of these authors to the new language pair of German L1 - English L2. Word length gained importance for efficient recognition of words only in the absence of other factors, e.g., that of accent. In this case, German participants recognized German words better when they were long and English words better when these were short. This reverse direction of the effect indicates differences in processing patterns between L1 and L2 processing with regard to word length.

Focus marking by cleft structures

The cleft construction facilitated word processing in German L1. This is explained by the advantage of subject-prominence of clefts that is gained by assigning focus to the highlighted constituent. The clefted constituent is located at the beginning of a sentence and an advantage of this position challenges the above explanations of the advantage of the final position by the recency effect (Murdock, 1962) and the advantage by the listeners' expectations of a discourse organization of background and novel information (Haviland & Clark, 1974). The type of it-clefts in Experiment 2 allowed the highlighted element in initial position only, and it would be of interest to examine possible effects of position in contrasting the it-cleft with a WH-cleft (see chapter 3.2, sentence (8b), p. 72), where the highlighted element occurs in final position. The beneficial effect of cleft was enhanced by context which suggests a substantial benefit when the effects of surface structure and coherence relation between sentences are integrated.

The cleft construction did not facilitate word processing in English L2. Although the subjects seemed to understand the syntactic construction of a cleft in the L2, this result indicates that making use of a focus effect for efficient word processing is a step further than the general ability to comprehend a syntactically marked structure. Applying linguistic structures that are present in the L1 according to principles of information structure in the L2 remains a challenge for L2 acquisition. Indeed, English native listeners made use of the cleft construction for faster word processing, confirming cleft as an important focusing option in English (Doherty, 1999). The combination of accent information with syntactic focus marking seemd a specific benefit in English L1 processing: optimal performance can be achieved with regard to immediate word processing when information structural means coincide.

The benefit of cleft in German L1 listening was not replicated in the word recall task, and cleft had no effect in English L2 word recall either. This result could be attributed to a long time span between entry in the memory and recall, and also to the close phonological similarity of the multiple choice options (see Conrad & Hull, 1964). Interestingly, cleft and accent seem to be linked in English L1 and L2 recall such that the presence of cleft inhibits the accent effect. Thus, in contrast to the phoneme detection results it is not a combination of parameters that yields best results, but the exclusivity of one parameter: the prosodic marking of an element can take effect only in a syntactically unmarked structure.

Birch & Garnsey (1995) observed a beneficial focus function of cleft constructions in English L1 recall. This might not have been exploited in the current study because of the rather long time that elapsed between listening and recall and could be thus due to memory limitations. Despite the different results, this explanation aligns to the finding of Birch & Garnsey (1995)

that the memory for the details of sentences is limited and that surface information such as syntactic structure is often less well remembered.

Focus marking by the particles 'even' and 'only'

The marking of words by focus particles did not influence the speed of word processing in German L1 and English L2. This is explained by the notion of Ni *et al.* (1996) that the focus particles under investigation evoke the semantic representation of a contrast set of alternatives. This causes listeners to instantiate a complex discourse model containing the element in focus and the set of alternatives, and listeners anticipate further modifying information to delimit the choices evoked (Liversedge *et al.*, 2002). It could be due to this semantic complexity that focus particles did not reduce the time needed to process words in the scope of the particle. Despite the lack of effect in the separate language conditions, German participants in the combined data (German L1 and English L2) detected words focused by a particle faster than they detected unmarked words. This is evidence for a general awareness of the function of particles to highlight the element in their scope. The result also links to the notion of König (1991) that focus particles themselves are not a device to actually *mark* focus, but that they interact with focus structure while focus is marked by other devices.

Focus particles had no effect on word recall in German L1 and in English L1, which is also explained by the notion that focus particles open sets of alternatives and contexts, a process which enlarges the set of representations rather than narrowing it down to the single element in the scope of the focus. The beneficial effect of particles on recall in the L2 is attributed to a strategy of 'resorting to well-known resources': when facing a more difficult task like recall, language learners make use of the broad variety of linguistic features to identify focus. Focus particles are seen as a preferred and often-used feature in German (König, 1991) and German subjects could resort to well-known features to exploit information structure in the face of a challenging task in the L2.

The English controls did not use focus particles for faster processing and for more accurate recall, which confirms that this type of focus marking is a less preferred option in English (see König, 1991; Ahlemeyer & Kohlhof, 1999). The facilitative effect of focus particles in English L1 on the recall in the condition with context suggests that particles are only acknowledged if they make sense to the listener, i.e., if particles as meaningful elements and are integrated in coherent relation to sentences. English native speakers benefited from particles as expression of focus when these occurred in *real* information structure, which was provided only in the condition with context questions.

5.1.2. The role of context

Context helped listeners in the cleft experiment process words faster in German L1 and in English L2. This confirmed the focusing function of questions (Selkirk, 1995) and the beneficial effect of accent shown in earlier studies (Cutler & Fodor, 1979; Akker & Cutler, 2003). The better recall of words presented without context in German L1 is explained by the view that a longer stream of input increases the amount of information that has to be processed. The lack of context effect in English L2 recall is possibly due to the low degree of semantic content in the questions. Semantic content supports L2 word learning (Lawson & Hogben, 1996), but due to the design of context in the current experiments, context might not fulfil this beneficial function of generating and acquiring meaning (a function advocated by Lawson & Hogben, 1996). There was no advantage of context in English L1, which led to speculation that also in English L1 the effect that context did not stimulate a better representation of novel words in the memory, was due to its low degree of semantic content (Lawson & Hogben, 1996).

Overall, only German participants made use of context for faster word processing in the L1 and the L2, and then only when confronted with more complex syntactic structures. In the experiment with focus particles, context had no effect on the speed of word processing and no effect on word recall accuracy in any of the language conditions. This could be due to the relative ease that syntactic structures of sentences with focus particles are processed with, because they require fewer changes in the word order than, for instance, a cleft construction does. Thus, if circumstances do not present a challenge to the listener, then a surplus of information has no effect on the speed of word processing. With regard to representation in the memory, additional context enlarges the amount of information the listener has to process. It is speculated that if genuinely novel semantic information was offered in the context, then this might also result in a more accurate representation of novel words in the listener's memory.

5.1.3. Comparison between language conditions

The participants of Experiment 1 on prosodic focus marking showed no difference between the three focus conditions with regard to word recognition in German L1, English L2, and English L1. This suggests similar perception patterns of prosodic information in all three language conditions. Word length, on the other hand, yielded different results: in native German, long words were better recognized than short words, whereas in both English L1 and English L2 there was an advantage of short words. This reverse direction of effects suggests that processing patterns in the German language and in the English language are different with regard to word length. The final and the initial position of a word in the sentence were used for accurate word recognition in a similar way in German L1 and English L2 when there was no

accent information available. The benefit of the final position in English L2 is explained by the acoustic lengthening that occurs. In addition to providing a stable input, it also cues listeners to the end of the utterance and is interpreted as a learned aspect of language (Oller (1973). The medial word position yielded similar results in all three language conditions. Thus, German L2 learners employed similar strategies in their L1 and their L2 with regard to their use of accent, and in the way they appraised the medial position for accurate word recognition. They modified their L2 strategies closer to those employed by native English speakers when it concerned the use of word length, and in the use of the initial and final word position. This suggests that regarding the use of accent, the L2 strategy followed the native language, whereas in matters of length and position (surface structure) the L2 conformed more to the nonnative target language.

The cleft constructions in Experiment 2 did not make word processing faster in English L2 as they did in English L1. This difference is attributed to a learner problem of applying specific linguistic structures according to the principles of information structure in the target language. Experiment 2 also revealed similar patterns for the use of accent information in English L1 and English L2 processing and recall. This underlines the function of accent across subject populations as a consistent cue to the perception of prominence (see Akker & Cutler, 2003; Eriksson et al., 2002).

German participants benefited from the combination of particle with accent in English L2 language processing, but not in German L1 processing. A similar, integrated approach of focus parameters was also observed in English L1 (cleft experiment). The discrepancy between patterns in German L1 and English L2 indicates an integrated use of the speech parameters *accent* and *particle* as a strategy in L2 processing, and an exclusive use of these parameters in German L1.

5.1.4. Comparison between findings of the phoneme detection task and the recall task

Experiment 2 and Experiment 3 comprised a phoneme detection task and a subsequent word recall task. Because of the similar experimental method, it is of interest to examine in how far these two tasks yielded similar results or whether they lead to different findings. For example, cleft in relation to accent showed different results in the two tasks for the language conditions English L1 and English L2: cleft constructions advanced an effect of accent in the detection task, whereas the cleft constructions inhibited the accent effect in the recall task. Thus, in immediate processing it is the combination of parameters that results in the most efficient performance, in contrast to word recall where the exclusivity of a parameter gives best results. This reverse effect of cleft in the two English language tasks suggests that the two

processing tasks of phoneme monitoring and recall make different demands on the language processing device, and that online word processing and representation in the memory are processes that employ different systems of encoding. Similarly, the opposing trends that emerged for the role of context in German L1 (Experiment 2), i.e., on one hand reducing processing time, on the other no advantage for word recall, also suggest different mechanisms at work for the tasks of detection and recall. In Experiment 3, sentences with focus particles required more processing time in both German L1 and English L2, which implied a transfer of processing strategies from L1 to L2. However, particles did not facilitate recall in the L1 as they did in the L2. It seems that depending on the task to be accomplished, different strategies are called upon. The recall task is interpreted as a more difficult one, as participants resorted to using additional sources of information, such as particle or accent, to overcome memory limitations.

Finally, a certain percentage of words were recalled in Experiment 2 that had not been accurately detected in the listening task. This observation is contrary to the intuition that only items that had previously been noticed would be recalled. Watkins & Tulving (1975) proposed that although a word can be reproduced when it is given as a retrieval cue in a recall test, it may fail to be recognized in a different context. Hence, the encoding of a target word must entail more than just selection from among semantic alternatives. Results from the current experiment confirm that an unsuccessful detection does not necessarily lead to omision in the mental lexicon, which suggests at the same time that the two tasks of phoneme detection and word recall employ different manners of encoding.

5.2. Methodological considerations

This thesis developed out of work within project C4/SFB 632: *Prosody and information structure as forms of "input" in second language acquisition*. The complex outline of project C4 determined the experimental setup of the experiments in the current thesis. The sheer size of Experiment 1 illustrates the challenge to accommodate the issues and views that were introduced by project requirements, also illustrated by the number of factors to be considered in Experiments 2 and 3. This left in some cases the statistical procedures with a limited data set that made findings (statistically) less significant, for instance in the case of the effect of medial position per accent condition per language condition (Experiment 1). An effort was made to meet the demands by testing a large number of subjects in Experiment 1. In Experiment 2 and Experiment 3, the factors of *context* and of *accent* were added to the main factor under investigation, *cleft* or *particle*, respectively. This might have made findings for the main factors less straightforward and overall more complex to interpret, as can be seen for

instance in four-way interactions that emerged in the course of analysing the effects of focus particles (see Tab. 4.9, p. 151). For future research, an experimental approach could be favoured that includes fewer factors. Having said this, the current approach seems particularly appropriate as it reflects the complexity of focus structure. 'Laboratory speech' that isolated the different parameters and factors under investigation may have omitted important interactions between the factors. The many factors also offer the opportunity to collect comparable data in two languages from the same listener group to investigate several linguistic aspects. A further motivation is that this kind of rich pool of data not only contributes to scientific insights but also stimulates further research into questions that arise due to the broad spectrum under investigation. With regard to the methodology used it must be pointed out that all experimental techniques developed and used for the present study are documented and experimentally valid methods that can be considered appropriate instruments for the collection and the evaluation of experimental data.

Finally, one issue raised in chapter 2 was that results obtained in L2 studies can be rather heterogeneous. Rüschemeyer *et al.* (2005) attributed this to the fact that subject groups differ in relevant biographical information such as age of L2 acquisition, learner history, or in level of foreign language proficiency. Altogether, it is difficult to control all variables relevant for the processes under investigation, although the degree of individual variability and the variability within a group of subjects is usually considered in in statistical methods for data analyses. It was thus of interest to create a large and truly representative group of participants that was also homogeneous with regard to L2 proficiency. To this end, a language test was carried out in Experiment 1 (Allan, 2001), and for Experiments 2 and 3 subjects were recruited that met certain conditions (e.g., less than one year in an English speaking country, see questionnaire, Appendix 5). These measures notwithstanding, it cannot be excluded that certain effects, or the lack thereof, may be attributed to individual and group variability that emerged in the course of analyses.

5.3. Suggestions for future research

In the discussion, some preliminary interpretations were offered that could not be verified due to lack of experimental evidence. The first paragraph of this section addresses some of these points. After this, suggestions for research are discussed that refer to broader issues concerning the use of focus markers in L2 processing.

The general lack of accent effect in Experiment 1 gave rise to speculations about alternative methods of recording instructions: if speakers were instructed to exaggerate the

realization of sentence accentuation, then more clear-cut results of subjects' responses with regard to the different focus conditions could perhaps be obtained. In addition to the current recordings with natural emphasis, this type of recordings could be used as control material to either support or challenge the explanation that the lack of accent effect could be due to an experimental artefact.

In English L2, better recognition of short words was observed, in contrast to better recognition of long words observed in German L1 (Experiment 1). Result patterns obtained in English L2 conformed to the patterns in English L1 which could suggest a general advantage of short over long words in English, meaning that in this case the L2 adapts processing strategies of the target L1. The effect emerged in two of the three focal accent conditions, thus not consistently. To substantiate a claim of general language preferences with regard to word length, and also to support the claim that in matters of surface structure the L2 conforms to the L1, more investigation into this aspect is required. Linked with the aspect of surface structure, but then for German native language processing, is the positional effect that showed: word position at the outer end of the sentence facilitated the recall of shorter words, but longer words were clearly at an advantage when occurring in medial sentence position. The advantage of short words at the outer ends of a sentence is explained by primacy/ recency effects, which are complemented by an advantage of longer words in the medial position because these provide a larger amount of information as reference points for later recall. The resulting hypothesis still needs to be experimentally verified, namely that the switch of preference constitutes a general processing pattern in German that serves the interests of efficient representation in the listener's memory.

The next suggestion concerns the salience of the final position explained by the recency effect. The processing advantage of cleft in German L1 and in English L1 could be seen as a contradiction, because the type of it-cleft used in Experiment 2 highlights precisely an element in initial sentence position. Further investigation into this positional aspect could be performed by comparing listeners' sentence processing with canonical word order, it-clefts, and WH-clefts (see example (8b), p. 72), a type of cleft that assigns focus to the element in final position. Based on the current findings it is hypothesised that recency effect and focus effect combine to favour efficient processing of items occurring in WH-clefts.

Experiment 3 investigated the effect of focus particles by using the two focus particles *only* and *even* (German: *nur/sogar)*. In the analyses, the data obtained for the two particles were always considered together. Although these particles share certain aspects such as evoking interpretations of context, it could be that effects differ per particle as they belong to different categories (*only*: restrictive, and *even*: additive). Results obtained in the current

Experiment 3 may thus reflect or depend on the characteristics of mainly one of the two particles. The current design did not take this into account and it might therefore be interesting to investigate the effect of particles per category.

Another suggestion for further research concerns the form of *context*. The lack of context effects in the experiment with focus particles was unexpected, given the benefit of context for the processing of words and the benefit of no context in the recall task of the cleft experiment. The reasoning of Lawson & Hogben (1996) applies to word recall results in English L1 as well as to English L2: Context questions have to contain sufficient semantic content in order to establish a semantic network that stimulates accurate word recall. I argue in the current study that additional context enlarges the amount of information the listener has to process, hence the disadvantage of context. However, beneficial effects of context can be imagined, especially in the L2 environment: If the form of the context allows learners to build additional semantic, prosodic or lexical connections, this would help to anchor the novel word in memory. Different forms of context information need to be investigated to find a feasible balance of quality and quantity of information that supports the memory vs. information flow that rather impedes the representation of novel words in the learner's memory.

The next point concerns a more general interest in the perception of L2 prosody. Recordings of prosodic patterns may indeed differ when uttered by a native compared with a nonnative speaker and subjects may be biased in their responses. The question is to what extent the perception of prosodic parameters depends on the subjects' impression that the experimental speech materials are recorded by a native or a nonnative speaker. A possible scenario could be that German native speakers listen to a set of English stimuli recorded by English native speakers, and to a set of English stimuli recorded by German L2 speakers of English. To eliminate unwanted effects of foreign accent such as vowel quality, materials would have to be synthesized so that only prosody is judged. This could give insight into L1/L2-dependent perceptual patterns of prosody. For the current thesis, this would be interesting with regard to the perception of focal accent conditions (Experiment 2).

Finally, a fascinating topic is the role of *attention* with regard to L2 proficiency. Attention seems to have an impact on the memory task but not in the immediate processing task (see cleft experiment). It is suggested that heightened attention in an online processing task can push performance only to a certain level before processing limitations due to, for instance vocabulary size, or listening comprehension skills prevent the performance in the L2 exceeding the performance level of the L1. A different encoding process is employed in memory tasks, where a high level of attention is a prerequisite, and may also be a trained behaviour. The possibilities and limitations of attention in L2 processing and recall need further investigation.

5.4. Conclusion

This thesis was undertaken to investigate the use of focus markers in L2 processing. Results indicate that it is the global prosodic sentence contour that conveys focus rather than the local prosodic realization of the word. Altogether, listeners were not found to use prosodic variation of different focus structures for better word recognition, a result whch could be due to experimental artefacts and due to testing methodology. The length of a word is not a decisive factor, yet there is a recognition advantage of longer words in German and of shorter words in English L1 and L2. The final position in a sentence is important for accurate L1 and L2 word recognition. The particular salience of words in the final position is attributed to a recency effect (Murdock, 1962), and it also may benefit from the discourse convention to present background information first before novel information (Haviland & Clark, 1974), which encourages listeners attend to information in the final position. Across experiments, results indicate that accent is a factor in determining faster word processing and in better word recall in German L1 and English L1, but less so in English L2. On one hand, this confirms the role of accent as core speech parameter in native language use (e.g., Cutler & Fodor, 1979; Pitt & Samuel, 1990a); on the other the finding also indicates that even a commonly used parameter such as accent has to be newly established in the L2 in relations to other speech parameters to fully reveal the benefits for efficient processing of speech. This illustrates the need for re-orientation of information-structural organization in the course of L2 acquisition.

Syntactic focus marking facilitates word processing in native German, a finding which is ascribed to the subject-prominence of clefts and the thereby associated focus effect. This focus effect was not found in English L2, although the cleft construction can be confirmed as an important focusing option in English (Doherty, 1999). For L2 processing, this suggests a difference between the comprehension of a complex syntactic structure and the active use of the underlying information-structural aspects of a marked structure. Focus marking by syntactic means was not found to anchor words in memory, in either of the language conditions. The consistency of effect in all language conditions suggests that this could be caused by the phonological similarity of word choices (see Conrad & Hull, 1964) and by memory limitations due to a long time span between listening and recall (see Birch & Garnsey, 1995; McCoon et.al., 1993). Results of the phoneme detection task suggest a combination of information-structural parameters for efficient word processing in English L1 and English L2. This is in contrast to the recall task, in which the exclusivity of parameters leads to an accurate representation of novel words in memory.

The focus particles *only/even* do not reduce the time needed to process words in the scope of the particle. This confirms a preference in the English language to mark focus by other means than particles (König, 1991; Ahlemeyer & Kohlhof, 1999). For the German native speakers, the lack of focus effect is attributed to the inherent ability of these particles to evoke contrast sets of alternatives and complements. Semantic complexity thus presents a constraint on word processing. Probably for the same reason, focus particles do not facilitate a more accurate word recall: they enlarge the set of representations rather than narrowing it down to the element in the scope of the focus. However, in challenging situations such as an L2 memory task, L2 learners seem to use the focusing function of particles as a means for effective representation of novel words in the memory. Overall, the parameter of focus particle emerges in the current Experiment as a rather weak means to mark focus.

There is evidence that additional context facilitates processing of complex syntactic structures but that a surplus of information has no effect if the sentence construction is less challenging for the listener. The increased amount of information to be processed seems to impede better recall particularly in the L2. Altogether, it seems that focus marking devices and context can combine to form an advantageous alliance: a substantial benefit in processing efficiency is found when parameters of focus marking and coherence of sentences are integrated. L2 research advocates the beneficial aspects of providing context for efficient L2 word learning (Lawson & Hogben, 1996). The current thesis promotes the view that a context which offers more semantic, prosodic, or lexical connections might compensate for the additional processing load that context constitutes for the listeners.

To conclude this work: The results of the present study suggest that information structure is more accessible in the native language than it is in the nonnative language. There is, however, some evidence that L2 learners have an understanding of the significance of some information-structural parameters of focus marking. This has a beneficial effect on processing efficiency and recall accuracy; on the cognitive side it illustrates the benefits and also the need of a dynamic exchange of information-structural organization between L1 and L2. The findings of the current thesis encourage the view that an understanding of information structure can help the learner to discover and categorise the forms and meanings of the L2. Information structure thus emerges as a valuable resource to advance proficiency in a second language.

Zusammenfassung (summary in German)

Das Sprechen und Verstehen einer Fremdsprache (L2) stellt eine komplexe Leistung für einen Nicht-Muttersprachler dar. Kenntnisse und Fertigkeiten auf verschiedenen sprachlichen und außersprachlichen Ebenen wirken dabei zusammen, wie z.B. eine andere Grammatik, neue Lautbildungen in der Aussprache, der Aufbau von Wortschatz, und auch die Sensibilisierung für mögliche kulturell unterschiedliche Kommunikationsformen oder das Training kommunikativer Kompetenz. Eine wichtige Hilfe bei der muttersprachlichen wie der fremdsprachlichen Sprachverarbeitung bieten Mittel, mit denen sprachliche Information gegliedert wird, um sie verständlich zu machen. Die Informationsstruktur ermöglicht es, zum Beispiel den Fokus einer Äußerung zu markieren und damit Intentionen sprachlich zu vermitteln.

In gesprochener Sprache sind es vor allem prosodische Mittel wie Satzakzent, die es dem Hörer ermöglichen, die wichtigen Informationen in der Äußerung herauszufinden. Aber auch durch die Verwendung unterschiedlicher grammatischer Strukturen oder durch besondere Wortwahl können Sprecher Satzteile markieren, die sie für besonders wichtig halten, und sie damit hervorheben. Wird die Informationsstruktur eines Satzes verletzt, indem zum Beispiel der Satzakzent auf ein eher unwichtiges Wort gelegt wird, kann der Gesprächspartner/die Gesprächspartnerin einen anderen Teil des Satzes als im Fokus stehend interpretieren als den vom Sprecher eigentlich intendierten Teil. Dies kann - in Kombination mit anderen Faktoren wie ungeschickter Wortwahl - zu Missverständnissen führen.

Nun kann eine Sprache prosodische, syntaktische oder lexikalische Möglichkeiten der Markierung besitzen, die entweder in einer anderen Sprache nicht vorkommen, oder die andere Funktionen in Bezug auf die Interpretation von Äußerungen erfüllen, die in dieser Form in der jeweils anderen Sprache nicht existieren. Dies betrifft zum Beispiel Unterschiede zwischen Intonations- und Tonsprachen oder zwischen silbenzählenden und akzentzählenden Sprachen. Ruft der Fremdsprachenlerner die Strukturen sprachlicher Information in der Muttersprache (L1) ab und überträgt sie auf die Fremdsprache, kann dies bei gleicher informationsstruktureller Organisation der Sprache zu einer erfolgreichen Strategie des fremdsprachlichen Verstehens führen. Wird aber Informationsstruktur in der Fremdsprache mit anderen Mitteln als in der Muttersprache ausgedrückt, entsteht ein Spannungsfeld zwischen Verarbeitungsstrategien der Muttersprache und denen der Fremdsprache.

Die vorliegende Arbeit befasst sich mit der Rolle informationsstruktureller Parameter in der muttersprachlichen und fremdsprachlichen Sprachverarbeitung. Es wird untersucht, wie

Fremdsprachenlerner Fokusmarkierung in der Muttersprache (hier: Deutsch) und in der Fremdsprache (hier: Englisch) zu effizienter Sprachverarbeitung nutzen. Das Ziel ist eine tiefere Einsicht, wie sich Informationsstruktur in der Fremdsprache erschließt; die grundlegende Annahme ist dabei, dass ein Verständnis und eine Sensibilisierung für Informationsstruktur dem Fremdsprachenlerner hilft, Form und Bedeutung von Sprache zu erkennen. Eine solche Einsicht in Informationsstruktur unterstützt die Erweiterung und Festigung fremdsprachlicher Kompetenz.

Die Frage nach dem Gebrauch von Informationsstruktur in einer Fremdsprache wird in drei experimentellen Studien untersucht, die sich auf jeweils eines der folgenden sprachlichen Mittel zur Fokusmarkierung konzentrieren:

1. Prosodische Mittel der Fokusmarkierung: Unterstützen Satzakzent und Wortposition im Satz eine bessere Worterkennung?

2. Syntaktische Mittel der Fokusmarkierung: Ermöglicht die Konstruktion eines Spaltsatzes (Englisch: *cleft*) eine schnellere Verarbeitung des fokussierten Elements im Satz als eine kanonische Wortstellung, und kann sich der Hörer auch zu einem späteren Zeitpunkt noch besser an ein syntaktisch markiertes als an ein unmarkiertes Element erinnern?

3. Lexikalische Mittel der Fokusmarkierung: Bewirken Fokuspartikel (hier: *nur*/*sogar*) eine schnellere Verarbeitung des fokussierten Elements, und kann sich der Hörer auch zu einem späteren Zeitpunkt noch besser an das fokussierte als an das nicht-fokussierte Element erinnern?

Zusätzlich wird in Experiment 2 und in Experiment 3 untersucht, welchen Einfluss einleitende Fragen haben, die zur Fokusmarkierung eines Elements im Folgesatz dienen. Außerdem wird nachgegangen, welche Rolle es spielt, wenn ein syntaktisch oder lexikalisch fokussiertes Element einen Tonhöheakzent bekommt oder wenn dieser auf dem vorangegangenen Adjektiv realisiert wird.

Die Probanden sind deutsche Muttersprachler, die Englisch als Fremdsprache gelernt haben. In den Experimenten werden den Testpersonen jeweils Sprachaufnahmen von deutschen Sätzen und Aufnahmen von parallel dazu konstruierten englischen Sätzen dargeboten. Als Kontrollgruppe für den englischen Teil der Experimente werden englische Muttersprachler getestet, um Referenzdaten für die Ergebnisse der Fremdsprachenlerner zu erhalten.

Die Experimente sind als Perzeptionsexperimente konzipiert. Experiment 1 (prosodische Fokusmarkierung) untersucht Worterkennung in drei Bedingungen mit unterschiedlichem Fokus (weiter und enger Fokus, enger Fokus auf anderem Satzelement als

dem Zielwort), und zwei Bedingungen mit künstlich durch *splicing* verändertem Sprachmaterial. In Experiment 2 (syntaktische Fokusmarkierung) und Experiment 3 (lexikalische Fokusmarkierung) wird im Hörexperiment als Methode *phoneme monitoring* angewandt, wobei die Reaktionszeiten zum Erkennen des fokussierten Worts (welches ein vorher spezifiziertes Phonem enthält) gemessen werden. Im Anschluss an den Hörteil wird in diesen zwei Experimenten außerdem ein Erinnerungstest durchgeführt, bei dem die fokussierten Elemente mit einem Multiple-Choice-Verfahren (4AFC) noch einmal abgefragt werden und die Anzahl der richtigen Antworten gewertet wird.

Zu 1.: Prosodische Mittel der Fokusmarkierung

Akzentuierung ist ein Mittel, um im Satz wichtige Information hervorzuheben (Bolinger, 1972), was zu einer besseren Wahrnehmung solch akzentuierter Information führt (siehe z.B. van Santen & Olive, 1990; Eefting, 1991). Akzentstruktur scheint jedoch schneller in der L1 als in der L2 verarbeitet zu werden (Akker & Cutler, 2003). Es wird daher angenommen, dass in der L1 eine Fokusmarkierung durch Tonhöheakzent zu besserer Worterkennung eines solchermaßen markierten Wortes führt. Akzentstruktur sollte sich auch in der L2 erschließen, wenn auch in geringerem Maß (L1 > L2). Insgesamt wird ein unterschiedlich starker Fokuseffekt je nach Fokusbedingung erwartet (enger Fokus > weiter Fokus). Die Ergebnisse von Experiment 1 bestätigen, dass Worte in der Muttersprache besser erkannt werden als in der Fremdsprache. Ein unterschiedlicher, als Satzakzent realisierter Fokus hilft allerdings den Probanden weder in der Muttersprache noch in der Fremdssprache, fokussierte Worte schneller zu erkennen. Dies könnte auf ungenügende akustische Unterschiede in der Realisierung der unterschiedlichen Fokuskonditionen in den Sprachaufnahmen zurückzuführen sein. Die Experimente mit synthetisch, durch *splicing* manipuliertem Sprachmaterial ergeben, dass die umgebende Satzprosodie eher zur Worterkennung beiträgt als die einzelne Akzentmarkierung des Wortes (Cutler, 1976).

Für die Salienz der Wortposition im Satz postulierte VanPatten (2004) für fremdsprachliche Wahrnehmung die Reihenfolge von initialer > finaler > medialer Position. Akker und Cutler (2003) erwähnen für L1 und L2 einen Verarbeitungsvorteil von später im Satz auftretenden Worten gegenüber früher Auftretenden. Des weiteren fand Rast (2003) in einer L2-Produktionsstudie einen Vorteil der äußeren Satzpositionen gegenüber der medialen Position. Im vorliegenden Experiment werden die Sätze vor allem wegen der fremdsprachlichen Testbedingung in akzeptabler Länge gehalten, was Aussagen über die Position an den äußeren Satzenden ermöglicht, aber weniger deutliche Effekte für die medial Position erwarten lässt. Wortlänge wurde als Nebenfaktor mit in das Experiment aufgenommen ohne eigenständige

Hypothesen dafür zu formulieren. In einer früheren L2 Studie zeigte Wortlänge nur in Abhängigkeit zur Position des Wortes im Satz einen Effekt (Rast, 2003; Rast & Dommergues, 2003). Die Ergebnisse von Experiment 1 zeigen, dass die Länge der Zielworte keine entscheidende Rolle für deren korrekte Erkennung spielt. Die Wortposition im Satz, und hier besonders die finale Position, trägt jedoch entscheidend zur korrekten Worterkennung im Deutschen bei. Ein ähnlicher Trend zeigt sich für die Worterkennung in der Fremdsprache Englisch (siehe Klein, 1984; Slobin, 1985). Das Lokalitätsprinzip von VanPatten (2004) mit dem Verarbeitungsvorteil von initial > final > medial kann nicht bestätigt werden, und die besondere Salienz der finalen Position wird mit Murdock (1962) als *recency effect* erklärt. Außerdem könnte die finale Position von der Konvention für die Integration neuer Information profitieren: bekannte Information wird vor neuer Information genannt (Haviland & Clark, 1974). Hörer handeln nach dieser üblichen Diskursstruktur und richten ihre Aufmerksamkeit auf Information, die in finaler Position genannt wird.

Zu 2.: Syntaktische Mittel der Fokusmarkierung

Die Abweichung von kanonischer Satzstruktur lenkt die Aufmerksamkeit auf bestimmte Elemente im Satz, und der Spaltsatz ist in vielen Sprachen eine bekannte Art der Fokussierung (Lambrecht, 2001). Die Oberflächenstruktur eines Satzes beeinflusst seine Verarbeitung (Foss & Lynch, 1969; Langford & Holmes, 1979) und in Experiment 2 stehen zwei Hypothesen gegenüber: Der fokussierende Effekt von Spaltsätzen könnte einen Verarbeitungsvorteil bewirken. Andererseits sind Spaltsätze im Deutschen seltener und weniger gebräuchlich als im Englischen (Ahlemeyer & Kohlhof, 1999; Doherty, 1999; E. Klein, 1988); die syntaktische Komplexität von Spaltsätzen und die Erfahrung der Muttersprache könnten einem Verarbeitungsvorteil in Deutsch L1 und Englisch L2 entgegenwirken.

Die Ergebnisse von Experiment 2 zeigen, dass der Spaltsatz ein effektives Mittel der Fokusmarkierung im Deutschen ist. Dies wird auf die geringe strukturelle Markiertheit des Ersatz-Subjekts ‚es' zurückgeführt, da es an kanonischer, initialer Stelle steht. Die Prominenz dieses Subjekts setzt das nachfolgende Subjekt-Element in Fokus und verleiht ihm Subjekt-Prominenz. Der verarbeitungsfördernde Effekt von Spaltsätzen wird noch erhöht, wenn Oberflächenstruktur (Spaltsatz) und Satzzusammenhang (Kontext) integriert werden. Der Spaltsatz wird jedoch nicht in der Fremdsprache als ein effektives Mittel der Fokusmarkierung genutzt. Englische Muttersprachler nutzen den Fokuseffekt des Spaltsatzes zur schnellen Worterkennung, aber dieses informationsstrukturelle Mittel der L2 wird nicht von Fremdsprachenlernern erkannt und verwertet. Dies wird als Lernerproblem interpretiert: linguistische Strukturen der Muttersprache werden nicht adäquat nach informationsstrukturellen

Prinzipien in der Fremdsprache angewandt. Der Spaltsatz trägt weder im Deutschen noch im Englischen zu einer besseren Erinnerungsleistung bei. Das kann zum einen an der starken phonologischen Ähnlichkeit der im Test angebotenen Antwortoptionen liegen (Conrad & Hull, 1964); zum anderen kann es mit der Zeitspanne zusammenhängen, die zwischen Hörexperiment und Erinnerungstest liegen und die die Erinnerung an ein bestimmtes Wort zu sehr erschwert (Birch & Garnsey, 1995; McCoon et.al., 1993).

Zu 3.: Lexikalische Mittel der Fokusmarkierung

Fokuspartikel sind Exponenten von Fokusstruktur und sie markieren Satzelemente (König, 1991; Paterson et al., 1999). Die untersuchten Fokuspartikel evozieren Kontrast und Alternativmengen zu dem fokussierten Element, was Interpretationen von Kontext bewirkt (Ni et al., 1996; Liversedge *et al.*, 2002). Von daher wird keine schnellere Verarbeitung von fokussierten Worten erwartet. Ihre förderliche Eigenschaft zeigt sich jedoch in der Erinnerungsleistung, da sich dieser Prozess auf andere Erschließungsmechanismen zu stützen scheint: es wird erwartet, dass der bevorzugte Gebrauch von lexikalischen Mitteln zur Fokusmarkierung im Deutschen (König, 1991; Ahlemeyer & Kohlhof, 1999) sich positiv auf die Erinnerung von fokussierten Worten auswirkt.

Die Fokuspartikel *nur* und *sogar* in Experiment 3 erweisen sich in der Experimentreihe als schwächste Exponenten von Fokusmarkierung: Weder im Deutschen noch in Englischen als Fremdsprache noch in der englischen Kontrollgruppe bewirken diese Fokuspartikel eine schnellere Verarbeitung des fokussierten Elements. Dies erklärt sich durch die Eigenschaft von Fokuspartikeln, eine Menge an Alternativen zu evozieren und dadurch beim Hörer komplexe Diskursmodelle anzuregen, die sowohl das Element in Fokus als auch Alternativen dazu beinhalten (siehe Ni *et al.*, 1996; Liversedge *et al.*, 2002). Verarbeitung und Interpretation der Fokusstruktur benötigen dann einen erhöhten Zeitaufwand. Im Erinnerungstest kommt der Fokuseffekt nur in der fremdsprachlichen Testbedingung zum Tragen: Werden Lerner hinsichtlich mit hinsichtlich ihrer L2-Fertigkeit anspruchsvollen Situationen konfrontiert, wird Fokusstruktur zu einer besseren Repräsentation in der Erinnerung genutzt.

Übergreifend zeigt sich aus Experiment 2 und Experiment 3, dass ein zusätzlicher Satzakzent in Sätzen mit syntaktischer oder lexikalischer Fokusmarkierung in muttersprachlichem Deutsch und Englisch genutzt wird, aber in der Fremdsprache nicht gleichermaßen effektiv verarbeitet wird. Ein bedeutender Parameter wie Tonhöheakzent wird in der Fremdsprache scheinbar weniger genutzt, wenn gleichzeitig andere Mittel der Markierung

auftreten. Vor allem deutet dieser Effekt jedoch auf eine weitaus differenziertere Wahrnehmung und Interpretation von Tonhöheakzent in der Muttersprache hin.

Des weiteren scheint die Reihenfolge, in der die Testsprachen den Probanden angeboten werden (L1-L2 oder L2-L1) von Bedeutung zu sein, da ein Lerneffekt aus der ersten Testsprache die Leistung in der zweiten Testsprache beeinflussen kann. Dies erschwert die Erhebung vergleichbarer Daten für zwei Sprachen von derselben Probandengruppe (siehe Akker & Cutler, 2003).

Im Hinblick auf die Auswirkungen von Kontext auf die Wortverarbeitung weisen die Ergebnisse darauf hin, dass vorangestellte Fragen dem Fremdsprachenlerner nur bedingt Hilfe bei der zügigen Verarbeitung von z.B. schwierigeren Satzkonstruktionen bieten. Zusätzlicher Kontext scheint außerdem die Erinnerungsleistung zu erschweren, vor allem in der Fremdsprache. Sowohl in der Fremdsprachenforschung als auch in der Fremdsprachendidaktik hat die Einbettung in einen Kontext bei dem Erlernen von Worten eine große Bedeutung (Lawson & Hogben, 1996). Es wird dahingehend argumentiert, dass eine Form von Kontext, die mehr semantische, prosodische oder lexikalische Verbindungen schafft, den zusätzlichen Verarbeitungsaufwand kompensieren müsste.

Die Ergebnisse der vorliegenden Arbeit weisen darauf hin, dass sich Informationsstruktur eher in der Muttersprache als in der Fremdsprache erschließt. Einzelne informationsstrukturelle Parameter werden jedoch sehr wohl von den Fremdsprachenlernern erfolgreich ausgewertet, was sich in einer schnelleren und nachhaltigeren sprachlichen Verarbeitung äußert. Auf der kognitiven Ebene zeigt die vorliegende Arbeit die vorteilhafte Wirkung auf, wenn Informationsstruktur von Mutter- und Fremdsprache in dynamischem Austausch stehen.

Die Ergebnisse bestärken die Annahme, dass ein Verständnis von Informationsstruktur dem Fremdsprachenlerner helfen kann, Form und Bedeutung der Fremdsprache zu erkennen. Informationsstruktur erweist sich als potentiell wertvolle Ressource in der Entwicklung und Stärkung fremdsprachlicher Kompetenz.

.

References

Ahlemeyer, B., & Kohlhof, I. (1999). Bridging the Cleft. An Analysis of the Translation of English It-Clefts into German. Languages in Contrast, 2(1), 1-25.

Akker, E., & Cutler, A. (2003). Prosodic cues to semantic structure in native and nonnative listening. Bilingualism: Language and Cognition, 6(2), 81-96.

Allan, D. (2001). Oxford Placement Test 2: Oxford University Press.

Andreeva, B., Barry, W., & Steiner, I. (2007). Producing phrasal prominence in German. Paper presented at the ICPhS, Saarbrücken.

Baddeley, A. D., Thomson, N., & Buchanan, M. (1975). Word length and the structure of short-term memory. Journal of Verbal Learning and Verbal Behaviour, 14, 575-589.

Bannert, R. (1991). Automatic Recognition of Focus Accents in German. Journal of Semantics, 8, 191-218.

Barcroft, J., & VanPatten, B. (1997). Acoustic salience of grammatical forms: The effect of location, stress and boundedness on Spanish L2 input processing. In A. Perez-Leroux & W. R. Glass (Eds.), Contemporary perspectives on the acquisition of Spanish: Production, processing, and comprehension (pp. 109-121). Somerville, MA: Cascadilla Press.

Bassili, J. N., Smith, M. C., & MacLeod, C. M. (1989). Auditory and visual word stem completion: Separating data driven and conceptually driven processes. Quarterly Journal of Experimental Psychology, 41A, 439–453.

Beckman, M. E. (1986). Stress and Non-stress Accent. Dordrecht: Foris.

Bernstein, L. E., & Benoît, C. (1996). For speech perception by humans or machines, three senses are better than one. Paper presented at the Proceedings of the International Conference on Spoken Language Processing.

Berry, D. C., Banbury, S., & Henry, L. (1997). Transfer across form and modality in implicit and explicit memory. Quarterly Journal of Experimental Psychology, 50A, 1-24.

Bhatt, R., & Hancin-Bhatt, B. (2002). Structural Minimality, CP and the initial state in second language acquisition. Second Language Research, 18, 348-392.

Birch, S. L., & Garnsey, S. M. (1995). The effect of focus on memory for words in sentences. Journal of Memory and Language, 34, 232-267.

Boersma, P., & Weenink, D. (2006). Praat: doing phonetics by computer (Version 4.4.16).

Bolinger, D. L. (1972). Accent is predictable (if you're a mind-reader). Language, 48(3), 633-644.

Bolinger, D. L. (1978). Intonation across languages. In J. H. Greenberg (Ed.), Universals of human language (Vol. 2, pp. 471-524). Stanford: Stanford University Press.

Bradlow, A. R., & Pisoni, D. B. (1999). Recognition of spoken words by native and non-native listeners: Talker-, listener-, and item-related factors. Journal of the Acoustical Society of America, 106(4), 2074-2085.

Callies, M. (2006). Information Highlighting and the Use of Focusing Devices in Advanced German Learner English. Philipps-Universität, Marburg, Germany.

Caplan, D., Rochon, E., & Waters, G. S. (1992). Articulatory and phonological determinants of word length effects in span tasks. The Quarterly Journal of Experimental Psychology. Section A, human experimental psychology, 45(2), 177-192.

Carroll, M., Murcia-Serra, J., Watorek, M., & Bendiscioli, A. (2000). The Relevance of Information Organization to Second Language Acquisition Studies. The Descriptive Discourse of Advanced Adult Learners of German. Studies in Second Language Acquisition, 22(3), 441-466.

Carroll, S. E. (2006). Salience, Awareness and SLA. In M. Grantham O'Brien, C. Shea & J. Archibald (Eds.), Proceedings of the 8th Generative Approaches to Second Language Acquisition Conference (GASLA 2006) (pp. 17-24). Somerville, MA: Cascadilla Proceedings Project.

Carver, R. P. (1990). Reading Rate: A Review of Research and Theory. San Diego, CA: Academic Press, Inc.

Chapman, C. (1995). Perceptual Salience and Analogical Change: Evidence from Vowel Lengthening in Modern Swiss German Dialects. Journal of Linguistics, 32, 1-13.

Clifton, C., Bock, J., & Rado, J. (2000). Effects of the focus particle only and intrinsic contrast on comprehension of reduced relative clauses. In A. Kennedy, R. Radach, D. Heller & J. Pynte (Eds.), Reading as a Perceptual Process. Amsterdam: Elsevier.

Collins, P. C. (1991). Cleft and Pseudo-Cleft Constructions in English. London: Routledge.

Connine, C. M., & Titone, D. (1996). Phoneme Monitoring. Language and Cognitive Processes, 11(6), 635–645.

Conrad, R., & Hull, A. J. (1964). Information, acoustic confusion and memory span. British Journal of Psychology, 55, 429-432.

Cooper, N., Cutler, A., & Wales, R. (2002). Constraints of lexical stress on lexical access in English: evidence from native and non-native listeners. Lang Speech, 45 (Pt 3), 207-228.

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. Journal of Verbal Learning and Verbal Behaviour, 11, 671-684.

Craik, F. I. M., & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. Journal of Experimental Psychology: General, 104, 268-294.

Cutler, A. (1976). Phoneme-monitoring reaction time as a function of preceding intonation contour. Perception & Psychophysics, 20, 55-60.

Cutler, A. (1984). Stress and accent in language production and understanding. In D. Gibbon & H. Richter (Eds.), Intonation, Accent and Rhythm. Studies in Discourse Phonology (pp. 77-90). Berlin, New York: de Gruyter.

Cutler, A., Dahan, D., & van Donselaar, W. (1997). Prosody in the comprehension of spoken language: A literature review. Language and Speech, 40, 141-201.

Cutler, A., & Fodor, J. A. (1979). Semantic focus and sentence comprehension. Cognition, 7(1), 49-59.

Cutler, A., & Isard, S. D. (1980). The Production of Prosody. In B. Butterworth (Ed.), Language Production. London: Academic Press.

Cutler, A., Mehler, J., Norris, D., & Segui, J. (1986). The syllable's differing role in the segmentation of French and English. Journal of Memory and Language, 25, 385 – 400.

Cutler, A., Mehler, J., Norris, D., & Segui, J. (1987). Phoneme Identification and the Lexicon. Cognitive Psychology, 19, 141-177.

Cutler, A., & Norris, D. (1979). Monitoring sentence comprehension. In E. C. T. Walker (Ed.), Sentence processing: Psycholinguistic studies presented to Merrill Garret. Hillsdale, NJ: Erlbaum.

Cutler, A., & Norris, D. (1988). The Role of Strong Syllables in Segmentation for Lexical Access. Journal of Experimental Psychology: Human Perception & Performance, 14(1), 113-121.

Cutler, A., & Swinney, D. A. (1987). Prosody and the development of comprehension. Journal of Child Language, 14, 145-167.

Cutler, A., Treiman, R., & Van Ooijen, B. (1998). Orthografik inkoncistensy ephekts in foneme detektion? Paper presented at the 5th International Conference on Spoken Language Processing, Sydney, AUS.

Cutler, A., & van Donselaar, W. A. (2001). Voornaam is not (really) a homophone: Lexical prosody and lexical access in Dutch. Language and Speech, 44, 171–195.

Cutler, A., Weber, A., & Otake, T. (2006). Asymmetric mapping from phonetic to lexical representations in second-language listening. Journal of Phonetics, 34(2), 269-284.

Dijkstra, T., Roelofs, A., & Fieuws, S. (1995). Orthographic effects on phoneme monitoring. Canadian Journal of Experimental Psychology, 49, 264-271.

Dimroth, C. (2002). Topics, Assertions, and Additive Words: How L2 Learners Get From Information Structure to Target-Language Syntax. Linguistics, 40(4), 891-923.

Dimroth, C., & Starren, M. (2003). Information Structure and the Dynamics of Language Acquisition (Vol. 26): John Benjamins Publishing Company.

Dimroth, C., & Watorek, M. (2000). The Scope of Additive Particles in Basic Learner Languages. Studies in Second Language Acquisition, 22(3), 307-336.

Doherty, M. (1999). Clefts in Translations between English and German. Target, 11(2), 289-315.

Dörnyei, Z. (2003). Attitudes, Orientations, and Motivations in Language Learning: Advances in Theory, Research, and Applications. Language Learning, 53(1s), 3-32.

Dupoux, E., Peperkamp, S., & Sebastian-Galles, N. (2001). A robust method to study stress 'deafness'. Journal of the Acoustical Society of America, 110, 1606–1618.

Eefting, W. (1991). The effect of "information value" and "accentuation" on the duration of Dutch words, syllables, and segments. Journal of the Acoustic Society of America, 89(1), 412-424.

Ellis, R. (2004). The Definition and Measurement of L2 Explicit Knowledge. Language Learning, 54(2), 227–275.

Erdmann, P. (1990). Fokuskonstruktionen im Deutschen und im Englischen. In C. Gnutzmann (Ed.), Kontrastive Linguistik (Vol. 69-83). Frankfurt/Main: Peter Lang.

Eriksson, A., Grabe, E., & Traunmüller, H. (2002). Perception of Syllable Prominence by Listeners with and without Competence in the Tested Language. Paper presented at the Speech Prosody 2002, Aix-en-Provence.

Ferguson, G. A., & Takane, Y. (1989). Statistical analysis in Psychology and Education: McGraw-Hill Book Company.

Féry, C. (1993). German Intonational Patterns (Vol. 285). Tübingen: Niemeyer.

Fiedler, I., & Schwarz, A. (2006). Papers on Information Structure in African Languages. In ZAS Papers in Linguistics (Vol. 46). Berlin: ZAS.

Flege, J. E. (1988). Factors affecting degree of perceived foreign accent in English sentences. Journal of the Acoustical Society of America, 84(1), 70-79.

Flege, J. E. (1995). Second language speech learning: Theory, findings, and problems. In W. Strange (Ed.), Speech perception and language experience: Issues in cross-language research (pp. 233-277). Baltimore: York Press.

Flege, J. E., & Fletcher, K. L. (1992). Talker and listener effects on degree of perceived foreign accent. Journal of the Acoustical Society of America, 91(1), 370-389.

Flege, J. E., & Hillenbrand, J. (1986). Differential use of temporal cues to the /s/–/z/ contrast by native and non-native speakers of English. Journal of the Acoustical Society of America, 79, 508-517.

Flege, J. E., & Liu, S. (2001). The effect of experience on adults acquisition of a second language. Studies in Second Language Acquisition, 23, 527-552.

Flege, J. E., MacKay, I. R. A., & Meador, D. (1999). Native Italian speakers' perception and production of English vowels. Journal of the Acoustical Society of America, 106(5), 2973-2987.

Flege, J. E., Munro, M. J., & MacKay, I. R. A. (1995). Factors affecting strength of perceived foreign accent in a second language. Journal of the Acoustical Society of America, 97(5), 3125-3134.

Flege, J. E., Schirru, C., & MacKay, I. R. A. (2003). Interaction between the native and second language phonetic subsystems. Speech Communication, 40, 467–491.

Foley, W. A. (1994). Information Structure. In R. E. Asher & J. M. Y. Simpson (Eds.), The Enzyclopedia of Language and Linguistics (Vol. 4, pp. 1678-1685). Oxford: Pergamon Press.

Foss, D. J. (1969). Decision processes during sentence comprehension: Effects of lexical difficulty and position upon decision times. Journal of Verbal Learning and Verbal Behaviour, 8, 457-462.

Foss, D. J., & Jenkins, C. M. (1973). Some effects of context on the comprehension of ambiguous sentences. Journal of Verbal Learning and Verbal Behavior, 12, 577–589.

Foss, D. J., & Lynch, R. H. (1969). Decision processes during sentence comprehension: Effects of surface structure on decision times. Perception and Psychophysics, 5, 145–148.

Fry, D. B. (1955). Duration and intensity as physical correlates of linguistic stress. Journal of the Acoustic Society of America, 35, 765-768.

Goetry, V., Wade-Wolley, L., Kolinsky, R., & Mousty, P. (2006). The role of stress processing abilities in the development of bilingual reading. Journal of Research in Reading, 29(3), 349-362.

Grüter, T., & Conradie, S. (2006). Investigating the L2 initial state. In R. Slabakova, S. A. Montrul & P. Prévost (Eds.), Inquiries in Linguistic Development – In honor of Lydia White (pp. 89–114). Amsterdam: John Benjamins.

Gussenhoven, C. (2002). Intonation and interpretation: Phonetics and Phonology. Paper presented at the Speech Prosody 2002, Aix-en-Provence.

Gussenhoven, C. (2007). Types of focus in English. In D. Büring, M. Gordon & C. Lee (Eds.), Topic and Focus: Cross-Linguistic Perspectives on Meaning and Intonation (pp. 83-100): Springer Netherlands.

Gussenhoven, C., Repp, B. H., Rietveld, A. C. M., Rump, H. H., & Terken, J. (1997). The perceptual prominence of fundamental frequency peaks. Journal of the Acoustic Society of America, 102, 3009–3022.

Gut, U. (2003). Non-native speech rhythm in German. Paper presented at the 15th ICPhS, Barcelona.

Hartmann, K. (2006). Focus and Tone. In C. Féry, G. Fanselow & M. Krifka (Eds.), Interdisciplinary Studies on Information Structure. Working Papers of the SFB 632 (Vol. 6). Potsdam: Universitätsverlag Potsdam.

Hartmann, K. (to appear). Focus and Emphasis in Tone and Intonation Languages. In A. Steube (Ed.), The discourse potential of underspecified structures. Berlin: de Gruyter.

Hartmann, K., & Zimmermann, M. (2007). Focus Strategies in Chadic: The Case of Tangale Revisited. Studia Linguistica, 61(2), 95-129.

Hatch, E. M. (1983). Psycholinguistics: A Second Language Perspective. Rowley, MA: Newbury House Publishers.

Haviland, S., & Clark, H. H. (1974). What's New? Acquiring New Information as a Process in Comprehension. Journal of Verbal Learning and Verbal Behaviour, 13, 512-521.

Hawkins, R., & Chan, C. Y.-h. (1997). The partial availability of Universal Grammar in second language acquisition: the 'failed functional features hypothesis'. Second Language Research, 13(3), 187-226.

Hayward, K. (2000). Experimental Phonetics. Harlow, England: Pearson Education.

Hirschberg, J. (1993). Pitch Accents in Context: Predicting Intonational Prominence from Text. Artificial Intelligence, 63(1-2), 305-340.

Hirschberg, J., & Pierrehumbert, J. (1986). The intonational structuring of discourse. Paper presented at the Proceedings of the 24th annual meeting on Association for Computational Linguistics, New York.

House, D., Hermes, D., & Beaugendre, F. (1998). Perception of tonal rises and falls for accentuation and phrasing in Swedish. Paper presented at the ICSLP, Sydney.

Huckin, T., & Coady, J. (1999). Incidental vocabulary acquisition in a second language. Studies in Second Language Acquisition, 21, 181-193.

Hulstijn, J. (2002). Towards a unified account of the representation, processing and acquisition of second language knowledge. Second Language Research, 18(3), 193–223.

Hulstijn, J. (2003). Incidental and Intentional Learning. In C. Doughty & M. H. Long (Eds.), Handbook of Second Language Research (pp. 349-381). London: Blackwell.

Huss, V. (1978). English word stress in the post-nuclear position. Phonetica, 35, 86–105.

Ishihara, S. (2004). Prosody by Phase: Evidence from Focus Intonation Wh-scope Correspondence in Japanese. In S. Ishihara, M. Schmitz & A. Schwarz (Eds.), Working Papers of the SFB632, Interdisciplinary Studies on Information Structure (ISIS) (Vol. 1, pp. 77-120). Potsdam: Universitätsverlag Potsdam.

Issatchenko, A. V., & Schädlich, H. J. (1966). Untersuchungen über die deutsche Satzintonation. Stud. Grammatica, 7, 7-64.

Jackendoff, R. S. (1983). Semantics and Cognition. Cambridge/Mass.: MIT Press.

Jared, D. (1997). Spelling-sound consistency affects the naming of high-frequency words. Journal of Memory and Language, 36(4), 505-529.

Kiss, K. É. (2006). Topic and focus: two structural positions associated with logical functions in the left periphery of the Hungarian sentence. In C. Féry, G. Fanselow & M. Krifka (Eds.), Interdisciplinary Studies on Information Structure. The notions of information structure (Vol. 6). Potsdam: Universitätsverlag.

Klatt, D. H. (1976). Linguistic uses of segmental duration in English: Acoustic and perceptual evidence. Journal of the Acoustic Society of America, 59(5), 1208-1226.

Klein, E. (1988). A contrastive analysis of focus phenomena in English and German on a functional basis and some implications for a didactic grammar. Die Neueren Sprachen, 87(4), 371-386.

Klein, W. (1984). Zweitspracherwerb.

Klein, W., & Perdue, C. (1997). The Basic Variety (Or: Couldn't Natural Languages Be Much Simpler?). Second Language Research, 13(4), 301-347.

König, E. (1991). The Meaning of Focus Particles. A comparative Perspective. London: Routledge.

König, E. (1993). Focus Particles. In J. Jacobs (Ed.), Ein internationales Handbuch zeitgenössischer Forschung (pp. 978-987). Berlin: de Gruyter.

Koopmans-van Beinum, F. J., & van Bergem, D. R. (1989). The role of "given" and "new" in the production and perception of vowel contrasts in read text and in spontaneous speech. Paper presented at the European Conference on Speech Communication and Technology, Edinburgh.

Krashen, S. D. (1981). Second language acquisition and second language learning. New York: Pergamon.

Krashen, S. D. (1989). We acquire vocabulary and spelling by reading: Additional evidence for the input hypothesis. Modern Language Journal, 73, 440-464.

Krifka, M. (1997). Focus. In R. A. Wilson & F. C. Keil (Eds.), The MIT Encyclopedia of the Cognitive Sciences (MITECS) (pp. 315-317). Cambridge/MA: MIT Press.

Krifka, M. (2006). Basic Notions of Information Structure. In C. Féry, G. Fanselow & M. Krifka (Eds.), Interdisciplinary Studies on Information Structure (Vol. 6). Potsdam: Universitätsverlag Potsdam.

Ladd, D. R. (1996). Intonational phonology (Vol. 79).

Lambrecht, K. (1994). Information Structure and Sentence Form. Cambridge: University Press Cambridge.

Lambrecht, K. (2001). A framework for the analysis of cleft constructions. Linguistics, 39(3), 463–516.

Langford, J., & Holmes, V. M. (1979). Syntactic presupposition in sentence comprehension. Cognition, 7, 363-383.

Lawson, M. J., & Hogben, D. (1996). The Vocabulary-Learning Strategies of Foreign-Language Students. Language Learning, 46(1), 101-135.

Liversedge, S. P., Paterson, K. B., & Clayes, E. L. (2002). The influence of only on syntactic processing of "long" relative clause sentences. The Quarterly Journal of Experimental Psychology, 55A(1), 225–240.

Lovatt, P., Avons, S. E., & Masterson, J. (2000). The word-length effect and disyllabic words. The Quarterly journal of experimental psychology. A, human experimental psychology, 53(1), 1-22.

Loveman, E., van Hooff, J. C., & Gale, A. (2002). A systematic investigation of same and cross modality priming using written and spoken responses. Memory, 10(4), 267 - 276.

Makarova, V. (2003). The effect of F0 peak alignment, height and segmental base on sentence type perception across languages. Paper presented at the 15th ICPhS, Barcelona.

Marslen-Wilson, W. D. (1973). Linguistic structure and speech shadowing at very short latencies. Nature, 244, 522–523.

McAllister, R., Flege, J. E., & Piske, T. (2002). The influence of L1 on the acquisition of Swedish quantity by native speakers of Spanish, English and Estonian. Journal of Phonetics, 30, 229–258.

McClelland, J. L., & Elman, J. L. (1986). The TRACE model of speech perception. Cognitive Psychology, 18, 1-86.

McKoon, G., Ratcliff, R., Ward, G., & Sproat, R. (1993). Syntactic Prominence Effects On Discourse Processes. Journal of Memory and Language, 32(5), 593-607.

Mehler, J., Dommergues, J.-Y., Frauenfelder, U., & Segui, J. (1981). The syllable's role in speech segmentation. Journal of Verbal Learning and Verbal Behavior, 20, 298-305.

Mixdorff, H., & Fujisaki, H. (1999). The influence of focal condition, sentence mode and phrase boundary location on syllable duration and the F0 contour in German. Paper presented at the International Conference of Phonetic Sciences (ICPhS), San Francisco, USA.

Ni, W., Crain, S., & Shankweiler, D. (1996). Sidestepping Garden Paths: Assessing the Contributions of Syntax, Semantics and Plausibility in Resolving Ambiguities. Language and Cognitive Processes, 11(3), 283-334.

Norris, D. G. (1994). SHORTLIST: A connectionist model of continuous speech recognition. Cognition, 52, 189–234.

Norris, D. G., McQueen, J. M., & Cutler, A. (2000). Merging information in speech recognition: Feedback is never necessary. Behavioural and Brain Sciences, 23(3), 299-370.

Oller, K. D. (1973). The effect of position in utterance on speech segment duration in English. Journal of the Acoustic Society of America, 54(5), 1235-1247.

Otake, T., Hatano, G., Cutler, A., & Mehler, J. (1993). Mora or syllable? Speech segmentation in Japanese. Journal of Memory and Language, 32, 258–278.

Oxford, R., & Shearin, J. (1994). Language Learning Motivation: Expanding the Theoretical Framework. The Modern Language Journal, 78(1), 12-28.

Paterson, K. B., Liversedge, S. P., & Underwood, G. (1999). The Influence of Focus Operators on Syntactic Processing of Short Relative Clause Sentences. The Quarterly Journal of Experimental Psychology, 52A(3), 717-737.

Pennington, M. C., & Ellis, N. C. (2000). Cantonese speakers' memory for English sentences with prosodic cues. The Modern Language Journal, 84, 372-389.

Peperkamp, S., Dupoux, E., & Sebastián-Gallés, N. (1999). Perception of stress by French, Spanish, and bilingual subjects. Paper presented at the EUROSPEECH, Budapest.

Peters, A. (1985). Language Segmentation: Operating Principles for the Perception and Analysis of Language. In D. Slobin (Ed.), The Crosslinguistic Study of Language Acquisition (Vol. 2, pp. 1029-1067). Hillsdale, NJ: Erlbaum.

Pierrehumbert, J., & Hirschberg, J. (1990). The meaning of intonational contours in the interpretation of discourse. In P. Cohen, J. Morgan & M. Pollack (Eds.), Intentions in Communication (pp. 342-365). Cambridge, MA: MIT Press.

Pisoni, D. B., Logan, J. S., & Lively, S. E. (1994). Perceptual learning of nonnative speech contrasts: Implications for theories of speech perception. In H. C. Nusbaum & J. Goodman (Eds.), Development of Speech Perception: The transition From Recognizing Speech Sounds to Spoken Words. Cambridge: MIT.

Pitt, M. A., & Samuel, A. G. (1990a). Attentional allocation during speech perception: How fine is the focus? Journal of Memory and Language, 29, 611–632.

Pitt, M. A., & Samuel, A. G. (1990b). The use of rhythm in attending to speech. Journal of Experimental Psychology: Human Perception and Performance, 16, 564–573.

Polka, L. (1991). Cross-language speech perception in adults: Phonemic, phonetic, and acoustic contributions. Journal of the Acoustical Society of America, 89(6), 2961-2977.

Polka, L. (1995). Linguistic influences in adult perception of non-native vowel contrasts. Journal of the Acoustical Society of America, 97(2), 1286-1296.

Postman, L. (1975). Tests of the generality of the principle of encoding specificity. Memory & Cognition, 3, 663-672.

Pullum, G. K., & Huddleston, R. (2002). Adjectives and Adverbs. In G. K. Pullum & R. Huddleston (Eds.), The Cambridge Grammar of the English Language (pp. 525-595). Cambridge: Cambridge University Press.

Rast, R. (2003). Le tout début de l'acquisition: le traitement initial d'une langue non maternelle par l'apprenant adulte. Université de Paris VIII.

Rast, R., & Dommergues, J.-Y. (2003). Towards a characterisation of saliency on first exposure to a second language (Vol. 3). Amsterdam: Benjamins.

Rietveld, A. C. M., & Gussenhoven, C. (1985). On the relation between pitch excursion size and prominence. Journal of Phonetics, 13, 299–308.

Roelofs, A. (2006). The influence of spelling on phonological encoding in word reading, object naming, and word generation. Psychonomic Bulletin & Review, 13(1), 33-37.

Rooth, M. (1985). Association with Focus. University of Massachusetts, Amherst.

Rooth, M. (1992). A Theory of Focus Interpretation. Natural Language Semantics, 1(1), 75-116.

Rosa, E., & O'Neill, M. (1998). Effects of Stress and Location on Acoustic Salience at the Initial Stages of Spanish L2 Input Processing. Spanish Applied Linguistics, 2(1), 24-52.

Rosen, S., & Howell, P. (1991). Signals and systems for speech and hearing. London: Academic Press.

Rüschemeyer, S.-A., Zysset, S., & Friederici, A. D. (2005). Native and non-native reading of sentences: An fMRI experiment. NeuroImage, 31(1), 354-365.

Schacter, D. L. (1987). Implicit memory: History and current status. Journal of Experimental Psychology: Learning, Memory, and Cognition, 13, 501–518.

Schafer, A., Carter, J., Clifton, C., & Frazier, L. (1996). Focus in Relative Clause Construal. Language and Cognitive Processes, 11(1&2), 135-164.

Schwartz, B. D., & Sprouse, R. (1994). Word order and nominative case in nonnative acquisition: a longitudinal study of (L1 Turkish) German interlanguage. In T. Hoekstra & B. D. Schwartz (Eds.), Language acquisition studies in generative grammar (pp. 317-368). Amsterdam: John Benjamins.

Schwarz, A. (to appear). Verb and Predication Focus Marking in Gur. In I. Fiedler & A. Schwarz (Eds.), Information Structure in African Languages: Typological Studies in Language (TSL). Amsterdam, Philadelphia: John Benjamins.

Selkirk, E. (1984). Phonology and syntax: The relation between sound and structure. Cambridge, MA: MIT Press.

Selkirk, E. (1995). Sentence prosody: Intonation, stress, and phrasing. In J. A. Goldsmith (Ed.), The Handbook of Phonological Theory (pp. S. 550 - 569). Oxford: Blackwell.

Selkirk, E. (2005). Sentence Prosody: Intonation, Stress, and Phrasing.Unpublished manuscript.

Sityaev, D., & House, J. (2003). Phonetic and Phonological Correlates of Broad, Narrow and Contrastive Focus in English. Paper presented at the 15th International Conference of Phonetic Sciences, Barcelona, Spain.

Slobin, D. (1985). Crosslinguistic evidence for the Language-Making Capacity. In D. Slobin (Ed.), The Crosslinguistic Study of Language Acquisition (Vol. 2, pp. 1157-1256). Hillsdale, NJ: Lawrence Erlbaum.

Sluijter, A. M. C., & van Heuven, V. J. (1996). Spectral balance as an acoustic correlate of linguistic stress. Journal of the Acoustic Society of America, 100(4), 2471-2485.

Smits, R. J. C. (1989). The relative and cleft constructions of the Germanic and Romance languages. KUB, Tilburg.

Sonderforschungsbereich 632. (2003-). Informationsstruktur: Die sprachlichen Mittel der Gliederung von Äußerung, Satz und Text. from http://www.sfb632.uni-potsdam.de/

Steedman, M. (1991). Structure and Intonation. Language, 67(2), 260-296.

Streefkerk, B. (2002). Prominence. Acoustical and lexical/syntactic correlates. University of Amsterdam.

Suomi, K., Toivanen, J., & Ylitalo, R. (2003). Durational and tonal correlates of accent in Finnish. Journal of Phonetics, 31, 113–138.

Swerts, M., Avesani, C., & Krahmer, E. (1999). Reaccentuation or deaccentuation: a comparative study of Italian and Dutch. Paper presented at the 14th International Conference of Phonetic Sciences, San Francisco, USA.

t'Hart, J., Collier, R., & Cohen, A. (1990). A perceptual study of intonation: an experimental phonetic approach.

Thompson, S. (1978). Modern English from a Typological Point of View: Some Implications of the Function of Word Order. Linguistische Berichte, 54, 19-35.

Tottie, G. (1986). The Importance of Being Adverbial. Adverbials of Focusing and Contingency in Spoken and Written English. Paper presented at the English in Speech and Writing: A Symposium, Stockholm.

Treiman, R., Mulleunix, J., Bijeljac-Babic, R., & Richmond-Welty, E. D. (1995). The special role of rimes in the description, use, and acquisition of English orthography. Journal of Experimental Psychology: General, 124, 107-136.

Tulving, E., & Thomson, D. M. (1973). Encoding specificity and retrieval processes in episodic memory. Psychological Review, 80, 352-373.

Vainikka, A., & Young-Scholten, M. (1994). Direct access to the X'-theory: evidence from Korean and Turkish adults learning German. In T. Hoekstra & B. D. Schwartz (Eds.), Language acquisition studies in generative grammar (pp. 265-316). Amsterdam: John Benjamins.

Vallduví, E. (1991). The role of plasticity in the association of focus and prominence. Paper presented at the ESCOL 7.

van de Vijver, R., Sennema, A., & Zimmer-Stahl, A. (2006). An analysis of pitch and duration in material used to test L2 processing of words. In S. Ishihara, M. Schmitz & A. Schwarz (Eds.), Working Papers of the SFB632, Interdisciplinary Studies on Information Structure (ISIS) (Vol. 5, pp. 209-221). Potsdam, Germany: Universitätsverlag Potsdam.

van Santen, J. P. H., & Olive, J. P. (1990). The analysis of contextual effects on segmental duration. Computer Speech and Language, 4, 359-390.

VanPatten, B. (2002). Processing Instruction: An Update. Language Learning, 52(4), 755-803.

VanPatten, B. (2004). Processing Instruction. Theory, Research, and Commentary. Mahwah, NJ: Lawrence Erlbaum Associates.

von Stutterheim, C. (2003). Linguistic structure and information organisation: The case of very advanced learners. In S. H. Foster-Cohen & S. Pekarek-Doehler (Eds.), EUROSLA Yearbook (Vol. 3, pp. 183-206). Amsterdam: Benjamins.

Vroomen, J., Tuomainen, J., & de Gelder, B. (1998). The Roles of Word Stress and Vowel Harmony in Speech Segmentation. Journal of Memory and Language, 38.

Warren, P. (1996). Prosody and Parsing: An Introduction. Language and Cognitive Processes, 11(1-2), 1-16.

Warren, R. M., Bashford, J. A. J., & Gardner, D. A. (1990). Tweaking the lexicon: organization of vowel sequences into words. 47(5), 423-432.

Watkins, M. J., & Tulving, E. (1975). Episodic Memory: When Recognition Fails. Journal of Experimental Psychology: General, 104(1), 5-29.

Weber, A., & Cutler, A. (2006). First-language phonotactics in second-language listening. Journal of the Acoustic Society of America, 119(1), 597–607.

Wells, W. H. G. (1986). An experimental approach to the interpretation of focus in spoken English. In C. Johns-Lewis (Ed.), Intonation in discourse (pp. 53–75). London: Croom Helm.

Werker, J. F., & Tees, R. C. (1984). Cross-language speech perception: Evidence for perceptual reorganization during the first year of life. Infant Behaviour and Development, 7, 49-63.

White, L. (2003). Second Language Acquisition and Universal Grammar. Cambridge: University Press.

Zimmermann, M. (to appear). Focus Realization in West Chadic. In M. Zimmermann & C. Féry (Eds.), Information Structure from Different Perspectives. Oxford: Oxford University Press.

Table index

Figure index

Appendix

1. Experiment 1: Sentence materials

1a. Sentence materials Experiment 1: English stimuli

Familiarization phase:

Block1:
1. Even the familiar robin is threatened by domestic cats which are on the loose. <21 syllables>
2. Formidable hunters, household cats on the prowl can kill even very large birds. <20 syllables>
3. Birds like the sparrow that tend to flock can get some protection from the presence of other birds. <23 syllables>
4. Yet a big or especially agile cat can quickly kill a lone, young, sick or lamed bird. <22 syllables>
(word prompt:) **Robin**

Block2:
5. Small birds like the wrens are especially vulnerable because they tend to feed alone. <22 syllables>
6. Yet even larger birds like the seagull can be hunted down by groups of roving feral cats. <23 syllables>
7. Blue jays and other very noisy birds will chatter, caw, twitter, and squawk when threatened. <21 syllables>
8. Squawking and other defensive actions will deter some of the more timid feline hunters. <23 syllables>
(word prompt:) **Cardinal**

Block3:
9. Household and pet cats will also kill domesticated birds like the canary. <20 syllables>
10. Tropical and other exotic birds like parrots can also be attacked and mauled. <21 syllables>
11. And peacocks have been known to lose a few of their beautiful feathers to hunting cats. <21 syllables>
12. Only geese, chickens and other large farmbirds seem to get the upper beak on the cat. <21 syllables>
(word prompt:)**Parrots**

Experimental sentences (items balanced over word position in the sentence, word prompt in bold letters)
1-syllable words in sentence initial position

1a. What's happening?
Auks are being affected by the warming of the northern seas because they prefer cold waters. <24 syllables>
Auks
1b. Who is being affected by the warming of the northern seas?
Auks are being affected by the warming of the northern seas because they prefer cold waters. <24 syllables>
1c. Why are auks being affected by the warming of the northern seas?

Auks are being affected by the warming of the northern seas because they prefer cold waters. <24 syllables>

2a. What's happening?
Terns are travelling further north from the Mediterranean because winters are shorter. <23 syllables>
Terns
2b. Who are travelling further north from the Mediterranean?
Terns are travelling further north from the Mediterranean because winters are shorter. <23 syllables>
2c. Why are terns travelling further north from the Mediterranean?
Terns are travelling further north from the Mediterranean because winters are shorter. <23 syllables>

1-syllable words in sentence medial position

3a. What's happening?
Birds like brants are a nuisance outside their natural habitat because they push others out. <23 syllables>
Brants
3b. Who are a nuisance outside their natural habitat?
Birds like brants are a nuisance outside their natural habitat because they push others out. <23 syllables>
3c. Why are birds like brants a nuisance?
Birds like brants are a nuisance outside their natural habitat because they push others out. <23 syllables>

4a. What's happening?
Coastal birds like shags are breeding locally in good numbers although absolute numbers are down. <24 syllables>
Shags
4b. Who are breeding locally in good numbers?
Coastal birds like shags are breeding locally in good numbers although absolute numbers are down. <24 syllables>
4c. What's happening to coastal birds like shags?
Coastal birds like shags are breeding locally in good numbers although absolute numbers are down. <24 syllables>

1-syllable words in sentence-final position

5a. What's happening?
Because of their excellent camouflage it has become difficult for birders to locate rails. <24 syllables>
Rails
5b. Who is it difficult for birders to locate?
Because of their excellent camouflage it has become difficult for birders to locate rails. <24 syllables>
5c. Why has it become difficult for birders to locate rails?
Because of their excellent camouflage it has become difficult for birders to locate rails. <24 syllables>

6a. What's happening?
Saltpans, coastal marshes, salt estuaries and lagoons are still hosting wading birds like stilts. <23 syllables>
Stilts
6b. Who lives in saltpans, coastal marshes, salt estuaries and lagoons?
Saltpans, coastal marshes, salt estuaries and lagoons are still hosting wading birds like stilts. <23 syllables>
6c. Where do wading birds like stilts live?
Saltpans, coastal marshes, salt estuaries and lagoons are still hosting wading birds like stilts. <23 syllables>

2- or 3-syllable words in sentence-initial position

7a. What's happening?
Bitterns are spreading wherever new reed beds are being planted by conservation agencies. <24 syllables>
Bitterns
7b. Who are spreading wherever new reed beds are being planted?
Bitterns are spreading wherever new reed beds are being planted by conservation agencies. <24 syllables>
7c. Where are bitterns spreading?
Bitterns are spreading wherever new reed beds are being planted by conservation agencies. <24 syllables>

8a. What's happening?
Gannets are competing everywhere with fishermen for fewer and fewer fish. <20 syllables>
Gannets
8b. Who are competing everywhere with fishermen for fish?
Gannets are competing everywhere with fishermen for fewer and fewer fish. <20 syllables>
8c. What are gannets competing everywhere with fishermen for?
Gannets are competing everywhere with fishermen for fewer and fewer fish. <20 syllables>

2- and 3-syllable words in sentence-medial position

9a. What's happening?
Because it lives in many sorts of habitats the dunlin is now becoming rather common. <24 syllables>
Dunlin
9b. Who is becoming now rather common?
Because it lives in many sorts of habitats the dunlin is now becoming rather common. <24 syllables>
9c. Why is the dunlin now becoming rather common?
Because it lives in many sorts of habitats the dunlin is now becoming rather common. <24 syllables>

10a. What's happening?
Birds like flickers can get blown off course by gales while migrating south in America. <21 syllables>
Flickers
10b. Who can get blown off course by gales?
Birds like flickers can get blown off course by gales while migrating south in America. <21 syllables>
10c. When do flickers get blown off course by gales?
Birds like flickers can get blown off course by gales while migrating south in America. <21 syllables>

2- and 3-syllable words in sentence-final position

11a. What's happening?
In the northern parts of Scandinavian countries it is still possible to find dotterels. <24 syllables>
Dotterels
11b. Who do we still find in the northern parts of Scandinavian countries?
In the northern parts of Scandinavian countries it is still possible to find dotterels. <24 syllables>
11c. Where do we still find dotterels?
In the northern parts of Scandinavian countries it is still possible to find dotterels. <24 syllables>

12a. What's happening?
Another bird of prey which is quite large has recently attacked and captured the kestrel. <22 syllables>
Kestrel
12b. What has another bird of prey recently attacked and captured?
Another bird of prey which is quite large has recently attacked and captured the kestrel. <22 syllables>
12c. Who has recently attacked and captured the kestrel?
Another bird of prey which is quite large has recently attacked and captured the kestrel. <22 syllables>

Filler sentences (recorded in broad focus reading only)
What's happening?
1a. Dunnocks live in woods, parks, gardens, and sheltered areas, and therefore are thriving. <20 syllables>

What's happening?
2a. Accentors are shy birds threatened by ski resorts and other forms of tourist development. <23 syllables>

What's happening?
3a. Trossers are regularly blown from their breeding grounds by more frequent raging storms. <21 syllables>

What's happening?
4a. Tubenoses and other coastal birds are increasingly affected by offshore pollution. <23 syllables>

What's happening?
5a. Night herons are finding fewer marshes to colonise in order to reproduce. <21 syllables>

What's happening?
6a. Pelicans are being disturbed by recent military conflict in central Europe. <22 syllables>

What's happening?
7a. Petrels nest in places away from tourists and thus can safely lay eggs and care for their young. <23 syllables>

What's happening?
8a. Gulls are doing well because they feed inland on refuse in waste dumps and on worms in freshly ploughed soil. <25 syllables>

What's happening?
9a. Spoonbills are finding fewer wild shrimp to eat in their feeding areas because of overfishing. <25 syllables>

What's happening?
10a. Shelduck have long necks and can be confused with other species by birders when counting birds. <22 syllables>

What's happening?
11a. Once pets on large estates in the 18th century darins have escaped into the wild. <23 syllables>

What's happening?
12a. Like many species of ocean duck goldeneyes are black and white and hard to count. <20 syllables>

What's happening?
13a. Known for its landward flight path woodcock are difficult to see when sitting on their nests. <21 syllables>

What's happening?
14a. Birders may look for the spotted crake on lakes but they are increasingly hard to locate <22 syllables>

What's happening?
15a. Because their usual diet of snakes and lizards are now scarce the peepers are in trouble. <23 syllables>

What's happening?
16a. We find little egrets in coastal areas in Mediterranean saline lagoons . <23 syllables>

What's happening?
17a. Originating in the far east the pheasant is now thoroughly European. <21 syllables>

What's happening?
18a. The nesting grounds of the purple heron were flooded last year and completely destroyed. <21 syllables>

What's happening?
19a. Some birds like the tufted duck are actually benefiting from climate change. <20 syllables>

What's happening?
20a. Coloured pure white like the snow in winter calfons can hunt and not be seen by their prey. <21 syllables>

What's happening?
21a. Still to be found in hilly woodland and mountains are game birds like the hazelhen. <20 syllables>

What's happening?
22a. Except in arctic breeding colonies shown on television we seldom see skuas. <22 syllables>

What's happening?
23a. Manmade fires in dry heaths and meadows have become a serious threat to the curlew. <21 syllables>

What's happening?
24a. Well-established due to conservation on traditional breeding grounds is the crommon. <23 syllables>

What's happening?
25a. Only on a cruise ship in the southern hemisphere is one likely to see the kittiwake. <23 syllables>

What's happening?
26a. Despite possessing electric blue feathers fields are good hiding places for rollers . <21 syllables>

What's happening?
27a. Possibly no European bird is more exotic looking than the hoopoe. <20 syllables>

What's happening?
28a. Careful land conservation in rural areas has helped preserve from further loss the shrike. <23 syllables>

What's happening?
29a. Habitat loss has not been a serious problem for predatory birds like the rook. <22 syllables>

What's happening?
30a. Replanting hedgerows and introducing organic farming have helped to save linnets. <21 syllables>

What's happening?
31a. Grebes are a familiar sight to canoists, boaters, and other amateur sailors. <21 syllables>

What's happening?
32a. Viders are a large family variously affected by human pollution and waste. <23 syllables>

What's happening?
33a. Wollops have declined seriously because of urban development of their woodland habitat. <25 syllables>

What's happening?
34a. Lesser sinda have been known to fly for days while migrating without stopping for food. <21 syllables>

What's happening?
35a. Ansers form a v-shape when they fly in formation from the south to their summer home. <21 syllables>

What's happening?
36a. Coots have lobed toes which can become misshapen due to water pollution from chemicals. <22 syllables>

What's happening?
37a. Branta are less likely to migrate with global warming since they live in coastal regions. <22 syllables>

What's happening?
38a. Bay ducks are more likely to be seen in open estuaries now that rivers have less water. <24 syllables>

What's happening?
39a. Sawbills are expert underwater swimmers with powerful legs which propel them forward. <22 syllables>

What's happening?
40a. The draining of the wetland home to snipes has meant they have problems finding places to nest. <22 syllables>

What's happening?
41a. We often miscount buntings because they are very drab in colour and blend into the background. <24 syllables>

What's happening?
42a. Because they winter on open ground, twites are likely to be counted more accurately. <23 syllables>

What's happening?
43a. Dependent as they are on birch trees, polls are threatened by monoculture forestry. <21 syllables>

What's happening?
44a. Also favouring birch and alder forests, siskins often thrive in older city parks. <22 syllables>

What's happening?
45a. With beautiful blue wings when seen in flight, bramblings hide in woodland, forests and parks. <20 syllables>

What's happening?
46a. Like other warblers known for their birdsong, serins sing a very variable song. <21 syllables>

What's happening?
47a. A bird native to western Europe, the woodchat is spreading into the Middle East. <21 syllables>

What's happening?
48a. True to its name, a bird like the treecreeper runs about on the ground rather than fly. <21 syllables>

What's happening?
49a. One of the smallest birds in Europe, the firecrest has become locally common. <20 syllables>

What's happening?
50a. Insecticides are an important pollutant because they kill the food of the flycatcher. <23 syllables>

What's happening?
51a. Summer heat waves are driving further northward birds which want cool weather like orpheans. <21 syllables>

What's happening?
52a. Birders have not yet been able to give the public an exact count of yellow-brows. <21 syllables>

What's happening?
53a. Tall trees in parks and woodlots have become the preferred home to blackcaps. <17 syllables>

What's happening?
54a. France is still largely rural and has remained the home to many birds including dartfords. <22 syllables>

What's happening?
55a. No money in eastern Europe for industrial growth has meant good news for icterines. <22 syllables>

What's happening?
56a. The continued expansion of the EU will mean loss of habitat for sedges. <21 syllables>

What's happening?
57a. The extension of EU laws eastwards will offer greater protection for small birds like fieldfares. <24 syllables>

What's happening?
58a. Avalanches caused now every year by skiers will destroy the homes of ouzels. <20 syllables>

What's happening?
59a. Deforestation encourages the spread of birds which nest in fields like the wheatear. <21 syllables>

What's happening?
60a. Abandoned factory sites have become a safe place to build a new home for redstarts. <21 syllables>

What's happening?
61a. Gadwalls are widespread across Europe but are declining nonetheless in number everywhere. <23 syllables>

What's happening?
62a. Liking tall trees and dense woodland chiffchaff migrate to their breeding grounds via city parks. <22 syllables>

What's happening?
63a. Hunters now have to go to Greece, Turkey and points further east to hunt the chukar. <20 syllables>

What's happening?
64a. Garganeys are being forced to extend their breeding sites because their habitual food is gone. <24 syllables>

What's happening?
65a. Guillemots are travelling further and further into the Arctic in search of fish. <21 syllables>

What's happening?
66a. Philaropes are seeking new habitats wherever rivers are permitted to flood naturally. <24 syllables>

What's happening?
67a. Shovelers are replacing other breeds in reeds, ponds, lakes and other freshwater bodies. <22 syllables>

What's happening?
68a. Like many ducks the goosander thrives in cold northern rivers and half-frozen lakes. <20 syllables>

What's happening?
69a. Medium-sized ducks like the merganser are spreading northwards and displacing small birds. <21 syllables>

What's happening?
70a. Greedy and uncontrolled land development has reduced habitats of the avocet. <22 syllables>

What's happening?
71a. Flooded locales and mudflats, which used to provide its habitat, have ceased to house the pratincole. <24 syllables>

What's happening?
72a. One quickly notices the sanderling since it seems to chase the waves of incoming ocean tides. <24 syllables>

What's happening?
73a. Russels have profited a lot from their dependence on humans and their wasteful ways. <21 syllables>

What's happening?
74a. Many species are endangered and humankind could wipe out largely unknown birds like sipperds. <23 syllables>

What's happening?
75a. Photography has helped enormously to encode species like the fillmore which are shy. <22 syllables>

Filler sentences (recorded in 3 focus conditions)

1a. What's happening?
Because they cannot be farmed and need scrubland Greenpeace fears the dying-off of partridges. <21 syllables>
Partridges
1b. Whose dying off does Greenpeace fear?
Because they cannot be farmed and need scrubland Greenpeace fears the dying-off of partridges. <21 syllables>
1c. Why does Greenpeace fear the dying-off of partridges?
Because they cannot be farmed and need scrubland Greenpeace fears the dying-off of partridges. <21 syllables>

2a. What's happening?
Goshawks are not yet becoming endangered but are not numerous either in the forest. <23 syllables>
Goshawks
2b. Who are not becoming endangered?
Goshawks are not yet becoming endangered but are not numerous either in the forest. <23 syllables>
2c. Where are the goshawks not numerous?
Goshawks are not yet becoming endangered but are not numerous either in the forest. <23 syllables>

3a. What's happening?
Eagles are becoming hard to identify when adult because of the way that they moult. <23 syllables>
Eagles
3b. Who are becoming hard to identify?
Eagles are becoming hard to identify when adult because of the way that they moult. <23 syllables)
3c. Why are eagles becoming hard to identify?
Eagles are becoming hard to identify when adult because of the way that they moult. <23 syllables)

4a. What's happening?
Guinea fowl are increasing because captive-reared birds have been released in the wild. <20 syllables>
Guinea fowl
4b. What are increasing?
Guinea fowl are increasing because captive-reared birds have been released in the wild. <20 syllables>
4c. Why are guinea fowl increasing?
Guinea fowl are increasing because captive-reared birds have been released in the wild. <20 syllables>

5a. What's happening?
Plovers are becoming increasingly common in the U.K. but rare on the continent. <23 syllables>
Plovers
5b. What are becoming increasingly common in the U.K.?
Plovers are becoming increasingly common in the U.K. but rare on the continent. <23 syllables>
5c. Where are plovers becoming increasingly common?
Plovers are becoming increasingly common in the U.K. but rare on the continent. <23 syllables>

6a. What's happening?
Since they are much loved as a delicacy new EU protection laws are focusing on grouse. <24 syllables>
Grouse
6b. Who are new EU protection laws focusing on?
Since they are much loved as a delicacy new EU protection laws are focusing on grouse. <24 syllables>
6c. Why are new EU protection laws now focusing on grouse?
Since they are much loved as a delicacy new EU protection laws are focusing on grouse. <24 syllables>

7a. What's happening?
Owls are temporarily blinded by bright lights from cars at night and may fly into objects. <23 syllables>
Owls
7b. What are temporarily blinded at night?

Owls are temporarily blinded by bright lights from cars at night and may fly into objects. <23 syllables>
7c. What are owls temporarily blinded by at night?
Owls are temporarily blinded by bright lights from cars at night and may fly into objects. <23 syllables>

8a. What's happening?
Because of proper and widely distributed prepared sites we are now seeing more storks. <22 syllables>
Storks
8b. What are we now seeing more because of proper prepared sites?
Because of proper and widely distributed prepared sites we are now seeing more storks. <22 syllables>
8c. Why are we seeing more storks now?
Because of proper and widely distributed prepared sites we are now seeing more storks. <22 syllables>

9a. What's happening?
Many people in the future will see quail sitting on their dinner plates but not in the wild. <23 syllables>
Quail
9b. What will many people in the future see on their dinner plates but not in the wild?
Many people in the future will see quail sitting on their dinner plates but not in the wild. <23 syllables>
9c. Where will many people in the future see quail?
Many people in the future will see quail sitting on their dinner plates but not in the wild. <23 syllables>

10a. What's happening?
The orange beak of the puffin has made it a famous character in children's books. <21 syllables>
Puffin
10b. Whose orange beak has made it a famous character in children's books?
The orange beak of the puffin has made it a famous character in children's books. <21 syllables>
10c. Where has the orange beak of the puffin made it a famous character?
The orange beak of the puffin has made it a famous character in children's books. <21 syllables>

11a. What's happening?
The familiar cooing of the turtle dove in parks tells you it's comfortably at home there. <23 syllables>
Turtle dove
11b. Whose cooing in parks tells you it's comfortably at home there?
The familiar cooing of the turtle dove in parks tells you it's comfortably at home there. <23 syllables>
11c. What tells you that the turtle dove is comfortably at home in parks?
The familiar cooing of the turtle dove in parks tells you it's comfortably at home there. <23 syllables>

12a. What's happening?
Flamingos have to turn their heads upside down to feed on shrimp and other aquatic life. <22 syllables>
Flamingos
12b. Who have to turn their heads upside down?
Flamingos have to turn their heads upside down to feed on shrimp and other aquatic life. <22 syllables>
12c. Why do flamingos have to turn their heads upside down?
Flamingos have to turn their heads upside down to feed on shrimp and other aquatic life. <22 syllables>

13a. What's happening?
Because the flight of the eider is slow they cannot escape hunters and suffered in the past. <23 syllables>
Eider
13b. Who cannot escape hunters because their flight is slow?
Because the flight of the eider is slow they cannot escape hunters and suffered in the past. <23 syllables>
13c. Why can't the eider escape hunters?
Because the flight of the eider is slow they cannot escape hunters and suffered in the past. <23 syllables>

14a. What's happening?
Because they live in many places pipits have become more numerous than other birds. <22 syllables>
Pipits
14b. What have become more numerous than other birds?
Because they live in many places pipits have become more numerous than other birds. <22 syllables>
14c. Why have pipits become more numerous than other birds?
Because they live in many places pipits have become more numerous than other birds. <22 syllables>

15a. What's happening?
Poets and novelists are making the raven famous because people read about it. <22 syllables>
Raven
15b. What are poets and novelists making famous?

Poets and novelists are making the raven famous because people read about it. <22 syllables>
15c. Who are making the raven famous?
Poets and novelists are making the raven famous because people read about it. <22 syllables>

16a. What's happening?
Because it swarms in large flocks conservationists find it difficult to count the starling. <22 syllables>
Starling
16b. What do conservationists find difficult to count?
Because it swarms in large flocks conservationists find it difficult to count the starling. <22 syllables>
16c. Why do conservationists find it difficult to count the starling?
Because it swarms in large flocks conservationists find it difficult to count the starling. <22 syllables>

17a. What's happening?
The fires in Portugal, Spain and southern France have destroyed the homes of many vultures. <21 syllables>
Vultures
17b. Whose homes have the fires in southern Europe destroyed?
The fires in Portugal, Spain and southern France have destroyed the homes of many vultures. <21 syllables>
17c. What has destroyed the homes of many vultures?
The fires in Portugal, Spain and southern France have destroyed the homes of many vultures. <21 syllables>

18a. What's happening?
The damming of fast-flowing rivers and their banking has been disastrous for dippers. <21 syllables>
Dippers
18b. For whom has the damming of fast-flowing rivers been disastrous?
The damming of fast-flowing rivers and their banking has been disastrous for dippers. <21 syllables>
18c. What has been disastrous for dippers?
The damming of fast-flowing rivers and their banking has been disastrous for dippers. <21 syllables>

19a. What's happening?
City parks with large trees, lakes, ponds and fountains have now become home to songbirds like nightingales. <21 syllables>
Nightingales
19b. What is now living in city parks?
City parks with large trees, lakes, ponds and fountains have now become home to songbirds like nightingales. <21 syllables>
19c. What has now become home to songbirds like nightingales?
City parks with large trees, lakes, ponds and fountains have now become home to songbirds like nightingales. <21 syllables>

20a. What's happening?
Geneticists and ethologists are interested in bird song and study warblers. <22 syllables>
Warblers
20b. Who do geneticists and ethologists study?
Geneticists and ethologists are interested in bird song and study warblers. <22 syllables>
20c. Why do geneticists and ethologists study warblers?
Geneticists and ethologists are interested in bird song and study warblers. <22 syllables>

21a. What's happening?
Gardeners and bird lovers who give them seeds to eat have changed the habits of finches. <20 syllables>
Finches
21b. Whose habits have been changed?
Gardeners and bird lovers who give them seeds to eat have changed the habits of finches. <20 syllables>
21c.Who have changed the habits of finches?
Gardeners and bird lovers who give them seeds to eat have changed the habits of finches. <20 syllables>

22a. What's happening?
It's true that farmers destroy many bird habitats but then they grow the seeds we give to thrushes. <24 syllables>
Thrushes
22b. Who do we give the seeds farmers grow?
It's true that farmers destroy many bird habitats but then they grow the seeds we give to thrushes. <24 syllables>
22c. Who grows the seeds we give to thrushes?
It's true that farmers destroy many bird habitats but then they grow the seeds we give to thrushes. <24 syllables>

23a. What's happening?

Improper naming by zoologists has made it difficult to count the redbird. <21 syllables>
Redbird
23b. Who is it difficult to count?
Improper naming by zoologists has made it difficult to count the redbird. <21 syllables>
23c. What has made it difficult to count the redbird?
Improper naming by zoologists has made it difficult to count the redbird. <21 syllables>

24a. What's happening?
Surprisingly birds which escape and live successfully in parks and gardens are like parakeets. <24 syllables>
Parakeets
24b. What are birds like which escape and live successfully in parks and gardens?
Surprisingly, birds which escape and live successfully in parks and gardens are like parakeets. <24 syllables>
24c. Which birds are like parakeets?
Surprisingly, birds which escape and live successfully in parks and gardens are like parakeets. <24 syllables>

25a. What's happening?
Some small and passive birds become displaced from their nests by aggressive birds like martins. <20 syllables>
Martins
25b. Who is displacing small and passive birds from their nests?
Some small and passive birds become displaced from their nests by aggressive birds like martins. <20 syllables>
25c. Who become displaced from their nests by aggressive birds like martins?
Some small and passive birds become displaced from their nests by aggressive birds like martins. <20 syllables>

26a. What's happening?
Mockingbirds are indigenous to America but are becoming known in western Europe. <24 syllables>
Mockingbirds
26b. Who are indigenous to America?
Mockingbirds are indigenous to America but are becoming known in western Europe. <24 syllables>
26c. Where are mockingbirds becoming known?
Mockingbirds are indigenous to America but are becoming known in western Europe. <24 syllables>

27a. What's happening?
The bluejay is so famous and so colourful that it has lent its name to a baseball team. <23 syllables>
Bluejay
27b. Who has lent its name to a baseball team?
The bluejay is so famous and so colourful that it has lent its name to a baseball team. <23 syllables>
27c. What has the bluejay lent its name too?
The bluejay is so famous and so colourful that it has lent its name to a baseball team. <23 syllables>

28a. What's happening?
Hummingbirds live in the Amazon and depend on its survival for their food and breeding grounds. <24 syllables>
Hummingbirds
28b. Who lives in the Amazon?
Hummingbirds live in the Amazon and depend on its survival for their food and breeding grounds. <24 syllables>
28c. Why do hummingbirds depend on the survival of the Amazon?
Hummingbirds live in the Amazon and depend on its survival for their food and breeding grounds. <24 syllables>

29a. What's happening?
Woodpeckers feed on the insects which burrow in dead and rotting trees and help to break them down. <23 syllables>
Woodpeckers
29b. Who feeds on the insects in trees?
Woodpeckers feed on the insects which burrow in dead and rotting trees and help to break them down. <23 syllables>
29c. What do woodpeckers feed on?
Woodpeckers feed on the insects which burrow in dead and rotting trees and help to break them down. <23 syllables>

30a. What's happening?
Blackbirds in Europe sing sweetly and are quite unlike the American bird of the same name. <23 syllables>
Blackbirds
30b. Who is unlike the American bird of the same name?
Blackbirds in Europe sing sweetly and are quite unlike the American bird of the same name. <23 syllables>
30c. Who are European blackbirds unlike?
Blackbirds in Europe sing sweetly and are quite unlike the American bird of the same name. <23 syllables>

31a. What's happening?

Pigeons have evolved to depend on humans and are thriving wherever humans live. <21 syllables>
Pigeons
31b. Who have evolved to depend on humans?
Pigeons have evolved to depend on humans and are thriving wherever humans live. <21 syllables>
31c. Where are pigeons thriving?
Pigeons have evolved to depend on humans and are thriving wherever humans live. <21 syllables>

32a. What's happening?
Sandpipers are deserting beaches and going to live on northern coasts and wetlands. <21 syllables>
Sandpipers
32b. Who are deserting beaches?
Sandpipers are deserting beaches and going to live on northern coasts and wetlands. <21 syllables>
32c. Where are sandpipers going to live?
Sandpipers are deserting beaches and going to live on northern coasts and wetlands. <21 syllables>

33a. What's happening?
Crows are becoming increasingly threatened by human activities, pollution, and noise. <23 syllables>
Crows
33b. Who are becoming increasingly threatened by human activities?
Crows are becoming increasingly threatened by human activities, pollution, and noise. <23 syllables>
33c. What are crows becoming increasingly threatened by?
Crows are becoming increasingly threatened by human activities, pollution, and noise. <23 syllables>

34a. What's happening?
A bird from South America like the toucan will sell for many hundreds of dollars. <22 syllables>
Toucan
34b. Which bird from South America will sell for many hundreds of dollars?
A bird from South America like the toucan will sell for many hundreds of dollars. <22 syllables>
34c. What will a bird like the toucan sell for?
A bird from South America like the toucan will sell for many hundreds of dollars. <22 syllables>

35a. What's happening?
Originally a shy and wily game bird, the turkey can no longer feed itself. <22 syllables>
Turkey
35b. Who can no longer feed itself?
Originally a shy and wily game bird, the turkey can no longer feed itself. <22 syllables>
35c. What can the turkey no longer do?
Originally a shy and wily game bird, the turkey can no longer feed itself. <22 syllables>

36a. What's happening?
Australia's many unique birds thrive in its distinct environment, but the emu is doing best. <25 syllables>
Emu
36b. Which bird is doing best?
Australia's many unique birds thrive in its distinct environment, but the emu is doing best. <25 syllables>
36c. What is the emu doing?
Australia's many unique birds thrive in its distinct environment, but the emu is doing best. <25 syllables>

37a. What's happening?
Some birds like the catbird are such cultural symbols that they become the stuff of great literature. <25 syllables>
Catbird
37b. Which bird becomes the stuff of great literature?
Some birds like the catbird are such cultural symbols that they become the stuff of great literature. <25 syllables>
37c. Why do birds like the catbird become the stuff of great literature?
Some birds like the catbird are such cultural symbols that they become the stuff of great literature. <25 syllables>

38a. What's happening?
In Australia the cuccaburra has become very well-known through a children's song. <21 syllables>
Cuccaburra
38b. Who has become very well-known through a children's song?
In Australia the cuccaburra has become very well-known through a children's song. <21 syllables>
38c. What has made the cuccaburra very well-known?
In Australia the cuccaburra has become very well-known through a children's song. <21 syllables>

39a. What's happening?

Once hunted for its beautiful feathers and endangered the ostrich is now farmed for its meat. <23 syllables>
Ostrich
39b. Who is now farmed for its meat?
Once hunted for its beautiful feathers and endangered the ostrich is now farmed for its meat. <23 syllables>
39c. Why is the ostrich now farmed?
Once hunted for its beautiful feathers and endangered the ostrich is now farmed for its meat. <23 syllables>

40a. What's happening?
Although a wild bird, the jackdaw visits farms once harvest is complete to eat seeds from grains. <22 syllables>
Jackdaw
40b. Who visits farms once harvest is complete?
Although a wild bird, the jackdaw visits farms once harvest is complete to eat seeds from grains. <22 syllables>
40c. Why do jackdaws visit farms?
Although a wild bird, the jackdaw visits farms once harvest is complete to eat seeds from grains. <22 syllables>

41a. What's happening?
Some birds like the peregrine are increasing in numbers because they build nests on skyscrapers. <23 syllables>
Peregrine
41b. Who are increasing in numbers?
Some birds like the peregrine are increasing in numbers because they build nests on skyscrapers. <23 syllables>
41c. Why are birds like the peregrine increasing in numbers?
Some birds like the peregrine are increasing in numbers because they build nests on skyscrapers. <23 syllables>

42a. What's happening?
Although native to the Alps Europeans now only rarely can see ptarmigan. <21 syllables>
Ptarmigan
42b. What can Europeans now only rarely see?
Although native to the Alps Europeans now only rarely can see ptarmigan. <21 syllables>
42c. Who can now only rarely see ptarmigan?
Although native to the Alps Europeans now only rarely can see ptarmigan. <21 syllables>

43a. What's happening?
Certain members of the budgerigar family have been made famous by cartoons. <21 syllables>
Budgerigar
43b. Who has been made famous by cartoons?
Certain members of the budgerigar family have been made famous by cartoons. <21 syllables>
43c. What have cartoons done for the budgerigar?
Certain members of the budgerigar family have been made famous by cartoons. <21 syllables>

44a. What's happening?
The unexpected and dramatic changes in temperature have not affected the redpolls. <23 syllables>
Redpolls
44b. Who have not been affected by changes in temperature?
The unexpected and dramatic changes in temperature have not affected the redpolls. <23 syllables>
44c. What has not affected the redpolls?
The unexpected and dramatic changes in temperature have not affected the redpolls. <23 syllables>

45a. What's happening?
Places left by other birds which have moved on or died out now attract some of the harriers. <23 syllables>
Harriers
45b. Who are living in places left by other birds?
Places left by other birds which have moved on or died out now attract some of the harriers. <23 syllables>
45c. Where are some of the harriers living?
Places left by other birds which have moved on or died out now attract some of the harriers. <23 syllables>

46a. What's happening?
Ibises and other waders with long bills with which to stab their food are getting cancers. <22 syllables>
Ibises
46b. Who are getting cancers?
Ibises and other waders with long bills with which to stab their food are getting cancers. <22 syllables>
46c. What are ibises getting?
Ibises and other waders with long bills with which to stab their food are getting cancers. <22 syllables>

47a. What's happening?

Exotic birds like cockatoos have become favourites among television directors. <23 syllables>
Cockatoos
47b. Who have become favourites among television directors?
Exotic birds like cockatoos have become favourites among television directors. <23 syllables>
47c. Among whom have exotic birds like cockatoos become favourites?
Exotic birds like cockatoos have become favourites among television directors. <23 syllables>

48a. What's happening?
Clean freshwater ponds to feed and raise the young are essential to water birds such as kingfishers. <24 syllables>
Kingfishers
48b. Which water birds are clean fresh water ponds essential to?
Clean freshwater ponds to feed and raise the young are essential to water birds such as kingfishers. <24 syllables>
48c. What is essential to water birds such as kingfishers?
Clean freshwater ponds to feed and raise the young are essential to water birds such as kingfishers. <24 syllables>

49a. What's happening?
One of the most widely found ducks in Europe and North America are mallards. <20 syllables>
Mallards
49b. What is one of the most widely found ducks?
One of the most widely found ducks in Europe and North America are mallards. <20 syllables>
49c. Where are mallards widely found?
One of the most widely found ducks in Europe and North America are mallards. <20 syllables>

50a. What's happening?
Buzzards and many other birds are returning in Europe since DDT was banned. <21 syllables>
Buzzards
50b. Who are returning to Europe?
Buzzards and many other birds are returning in Europe since DDT was banned. <21 syllables>
50c. Why are buzzards returning to Europe?
Buzzards and many other birds are returning in Europe since DDT was banned. <21 syllables>

51a. What's happening?
Tits are thriving because gardeners and birders feed them in winter on sunflower seeds. <22 syllables>
Tits
51b. Who are thriving?
Tits are thriving because gardeners and birders feed them in winter on sunflower seeds. <22 syllables>
51c. Why are tits thriving?
Tits are thriving because gardeners and birders feed them in winter on sunflower seeds. <22 syllables>

52a. What's happening?
Because of their drab brown colouring larks are very hard to see in fields or in trees. <21 syllables>
Larks
52b. What are very hard to see in fields or in trees because of their drab brown colouring?
Because of their drab brown colouring larks are very hard to see in fields or in trees. <21 syllables>
52c. Why are larks very hard to see in fields and trees?
Because of their drab brown colouring larks are very hard to see in fields or in trees. <21 syllables>

53a. What's happening?
Orioles are said to have important genetic material worth saving. <20 syllables>
Orioles
53b. Who is said to have important genetic material?
Orioles are said to have important genetic material worth saving. <20 syllables>
53c. Why are orioles said to be worth saving?
Orioles are said to have important genetic material worth saving. <20 syllables>

54a. What's happening?
Goldfinches hide well in prairies and fields although they are a brilliant yellow colour. <21 syllables>
Goldfinches
54b. Who hides well in prairies and fields?
Goldfinches hide well in prairies and fields although they are a brilliant yellow colour. <21 syllables>
54c. Where do goldfinches hide well?
Goldfinches hide well in prairies and fields although they are a brilliant yellow colour. <21 syllables>

55a. What's happening?

Because it does not fly, many people don't realise that the penguin is also a bird. <23 syllables>
Penguin
55b. Who do many people not realise is also a bird?
Because it does not fly, many people don't realise that the penguin is also a bird. <23 syllables>
55c. Why do many people not realise that the penguin is also a bird?
Because it does not fly, many people don't realise that the penguin is also a bird. <23 syllables>

56a. What's happening?
Although it does not have brilliant feathers, the hawk is frequently photographed for calendars. <24 syllables>
Hawk
56b. Who is frequently photographed for calendars?
Although it does not have brilliant feathers, the hawk is frequently photographed for calendars. <24 syllables>
56c. For what is the hawk frequently photographed?
Although it does not have brilliant feathers, the hawk is frequently photographed for calendars. <24 syllables>

57a. What's happening?
Once killed by farmers but now protected by law one more often see magpies. <21 syllables>
Magpies
57b. Who were once killed by farmers?
Once killed by farmers but now protected by law one more often see magpies. <21 syllables>
57c. Who once killed magpies?
Once killed by farmers but now protected by law one more often see magpies. <21 syllables>

58a. What's happening?
Despite the banning of DDT farmers report a reduction of bald-headed eagles. <23 syllables>
Bald-headed eagles
58b. Whom do farmers report a reduction of?
Despite the banning of DDT farmers report a reduction of bald-headed eagles. <23 syllables>
58c. Despite of what do farmers report a reduction of eagles?
Despite the banning of DDT farmers report a reduction of bald-headed eagles. <23 syllables>

59a. What's happening?
Because of their great beauty European conservationists protect the habitats of swans. <24 syllables>
Swans
59b. Whose habitats do European conservationists protect?
Because of their great beauty European conservationists protect the habitats of swans. <24 syllables>
59c. Why do European conservationists protect the habitats of swans?
Because of their great beauty European conservationists protect the habitats of swans. <24 syllables>

60a. What's happening?
Literature, film and television have made the cuckoo Europe's most famous bird. <21 syllables>
Cuckoo
60b. What have literature, film and television made famous?
Literature, film and television have made the cuckoo Europe's most famous bird. <21 syllables>
60c. What have made the cuckoo Europe's most famous bird?
Literature, film and television have made the cuckoo Europe's most famous bird. <21 syllables>

61a. What's happening?
Because of their great beauty European conservationists protect the habitats of swans. <24 syllables>
Swans
61b. Whose habitats do European conservationists protect?
Because of their great beauty European conservationists protect the habitats of swans. <24 syllables>
61c. Why do European conservationists protect the habitats of swans?
Because of their great beauty European conservationists protect the habitats of swans. <24 syllables>

62a. What's happening?
Fishermen's nets can and often do accidentally catch birds like the osprey. <20 syllables>
Osprey
62b. What can fishermen's nets catch?
Fishermen's nets can and often do accidentally catch birds like the osprey. <20 syllables>
62c. What can often catch birds like the osprey?
Fishermen's nets can and often do accidentally catch birds like the osprey. <20 syllables>

1b. Sentence materials Experiment 1: German language condition

Familiarization phase:
Block 1:
1. Den Bestand des Rotkehlchens bedrohen streunende Hauskatzen in einigen Gegenden. <23syll>
2. Nur eine ganz besonders geschickte Katze kann große Hühner töten und abtransportieren. <25syll>
3. Etwas Schutz vor Katzen und anderen Jägern hat der Spatz durch sein Auftreten in Scharen. <23syll>
4. Einen anderen Schutz durch Nestbau in dünnem Gezweig hat die einzeln lebende Goldamsel. <24syll>

(word prompt) Rotkehlchen
Block 2:
5. Die sich in den letzten Jahren stark vermehrenden Marder gefährden besonders den Zaunkönig. <25syll>
6. Größere Vögel wie Möwen jagt ein ausgewachsener Marder auch gerne mal zur Abwechslung. <25syll>
7. Häher stoßen in Bedrohungssituationen extrem laute und abschreckende Schreie aus. <25syll>
8. Waldkäuze schrecken eine furchtsame Katze durch langanhaltendes ausdauerndes Kreischen ab. <25syll>

(word prompt) Kardinal
Block 3:
9. Ein Wellensittich wird nach seiner Flucht aus dem heimischen Käfig schnell zum Opfer von Katzen. >24syll>
10. Schon in manchem Haushalt überraschte eine freche Katze einen schlafenden Papagei. <24syll>
11. Bei einem Angriff können Pfauen einige ihrer schönen bunten Federn verlieren. <23syll>
12. Einer angriffslustigen Katze kann ein starker Gänserich gefährlich zusetzen. <24syll>

(word prompt) Papagei

Experimentsätze (Deutsch, items verteilt nach Position im Satz)
1-silbige Wörter am Satzanfang

1a. Was ist los?
Der Icht braucht karg bewachsene, weitläufige Lichtungen in den Wäldern um Beute zu fangen.
Icht
1b. Wer braucht karg bewachsene weitläufige Lichtungen?
Der Icht braucht karg bewachsene weitläufige Lichtungen in den Wäldern um Beute zu fangen.
1c. Was braucht der Icht?
Der Icht braucht karg bewachsene weitläufige Lichtungen in den Wäldern um Beute zu fangen. <25syll>

2a. Was ist los?
Der Nerps litt aufgrund chemischer Insektenbekämpfung unter akutem Nahrungsmangel.
Nerps
2b. Wer litt unter akutem Nahrungsmangel?
Der Nerps litt aufgrund chemischer Insektenbekämpfung unter akutem Nahrungsmangel.
2c. Worunter litt der Nerps?
Der Nerps litt aufgrund chemischer Insektenbekämpfung unter akutem Nahrungsmangel. <23syll>

1-silbige Wörter in der Satzmitte

3a. Was ist los?
Anders als seine Verwandten jagt der Barp seine Beute nicht im offenen Gelände.
Barp
3b. Wer jagt seine Beute nicht im offenen Gelände?
Anders als seine Verwandten jagt der Barp seine Beute nicht im offenen Gelände.
3c. Wo jagt der Barp seine Beute nicht?
Anders als seine Verwandten jagt der Barp seine Beute nicht im offenen Gelände. <23syll>

4a. Was ist los?
Ein an den Füßen gefesselter Gohl soll seine Artgenossen in ein Fangnetz locken.
Gohl
4b. Wer soll seine Artgenossen in ein Fangnetz locken?
Ein an den Füßen gefesselter Gohl soll seine Artgenossen in ein Fangnetz locken.
4c. Wohin soll der Gohl seine Artgenossen locken?
Ein an den Füßen gefesselter Gohl soll seine Artgenossen in ein Fangnetz locken. <23syll>

5a. Was ist los?
Auf die deutsche Rote Liste der vom Aussterben bedrohten Vögel setzte man den Haug.
Haug
5b. Wen setzte man auf die deutsche Rote Liste der vom Aussterben bedrohten Vögel?
Auf die deutsche Rote Liste der vom Aussterben bedrohten Vögel setzte man den Haug.
5c. Worauf setzte man den Haug?
Auf die deutsche Rote Liste der vom Aussterben bedrohten Vögel setzte man den Haug. <23syll>

6a. Was ist los?
Die nasskalte Witterung Anfang Mai führte zu großen Verlusten an Erstbruten beim Schwalm.
Schwalm
6b. Bei wem führte die nasskalte Witterung zu großen Verlusten an Erstbruten?
Die nasskalte Witterung Anfang Mai führte zu großen Verlusten an Erstbruten beim Schwalm.
6c. Was führte zu großen Verlusten an Erstbruten beim Schwalm?
Die nasskalte Witterung Anfang Mai führte zu großen Verlusten an Erstbruten beim Schwalm. <24syll>

2- und 3-silbige Wörter am Satzanfang

7a. Was ist los?
Den Sprosser ziehen das dichte Gestrüpp und die Sumpflandschaften des Amazonasgebiets an.
Sprosser
7b. Wen ziehen das dichte Gestrüpp und die Sumpflandschaften des Amazonasgebiets an?
Den Sprosser ziehen das dichte Gestrüpp und die Sumpflandschaften des Amazonasgebiets an.
7c. Was zieht den Sprosser an?
Den Sprosser ziehen das dichte Gestrüpp und die Sumpflandschaften des Amazonasgebiets an. <24syll>

8a. Was ist los?
Den Demer konnte man durch die Entwicklung strukturreicher Grünflächen in seinem Bestand verdoppeln.
Demer
8b. Wen konnte man in seinem Bestand verdoppeln?
Den Demer konnte man durch die Entwicklung strukturreicher Grünflächen in seinem Bestand verdoppeln.
8c. Wodurch konnte man den Demer in seinem Bestand verdoppeln?
Den Demer konnte man durch die Entwicklung strukturreicher Grünflächen in seiner Zahl verdoppeln. <25syll>

2- und 3-silbige Wörter in der Satzmitte

9a. Was ist los?
Verschiedene Gesangsdialekte kann der Turdus neu miteinander kombinieren.
Turdus
9b. Wer kann verschiedene Gesangsdialekte neu miteinander kombinieren?
Verschiedene Gesangsdialekte kann der Turdus neu miteinander kombinieren.
9c. Was kann der Turdus neu kombinieren?
Verschiedene Gesangsdialekte kann der Turdus neu miteinander kombinieren. <23 syll>

10a. Was ist los?
Höchstwahrscheinlich kann der Mobius seine angeschlagene Population wieder vergrößern.
Mobius
10b. Wer kann seine angeschlagene Population höchstwahrscheinlich wieder vergrößern?
Höchstwahrscheinlich kann der Mobius seine angeschlagene Population wieder vergrößern.
10c. Was kann der Mobius höchstwahrscheinlich vergrößern?
Höchstwahrscheinlich kann der Mobius seine angeschlagene Population wieder vergrößern. <25syll>

2- und 3-silbige Wörter am Satzende

11a. Was ist los?
Regloses Ausharren vor seiner Auserwählten während der Balzzeit kennzeichnet den Trogon.
Trogon
11b. Wen kennzeichnet regloses Ausharren vor seiner Auserwählten ?
Regloses Ausharren vor seiner Auserwählten während der Balzzeit kennzeichnet den Trogon.
11c. Was kennzeichnet den Trogon?
Regloses Ausharren vor seiner Auserwählten während der Balzzeit kennzeichnet den Trogon. <24syll>

12a. Was ist los?
Der Subventionsstop für den Reisanbau in der Europäischen Union bedroht den Lanner.
Lanner
12b. Wen bedroht der Subventionsstop für den Reisanbau?
Der Subventionsstop für den Reisanbau in der Europäischen Union bedroht den Lanner.
12c. Was bedroht den Lanner?
Der Subventionsstop für den Reisanbau in der Europäischen Union bedroht den Lanner. <24syll>

Fillers (Aufnahme nur in weiter Fokus-Lesart)

Was ist los?
1a. Der Limikol hat seine Nester in der einstmals schlammigen Uferzone verlassen. <23syll>
Was ist los?
2a. Der Kurol als eigentlicher Zugvogel sucht sich nun Wärmekraftwerke zum Überwintern. <24syll>
Was ist los?
3a. Die Segge findet in den von Jägern aufgestellten Fallen oft einen qualvollen Tod. <23 syll>
Was ist los?
4a. Die Blaumerle zeigt sich immer wieder inmitten von Großstädten wie Berlin oder München. <24 syll>
Was ist los?
5a. Als Weidevogel begleitet der Spint häufig tagelang weidende Schafe und Rinder. <23syll>
Was ist los?
6a. Der Triel braucht Wiesengründe mit einer ausgedünnten blütenreichen Vegetationsstruktur. <23syll>
Was ist los?
7a. Die Aller hat durch ein spezielles Zuchtprogramm eine Chance auf Neuansiedlung in Deutschland. <23syll>
Was ist los?
8a. Die Dommel läßt nachts in unseren Wäldern ein wirklich beängstigendes Brüllen ertönen. <24syll>
Was ist los?
9a. Die Prunella findet man in 27 Revieren rund um die Großstadt Leipzig. <23syll>
Was ist los?
10a. Der Grauguan gräbt für seine Eier meterlange Röhren statt ein Nest zu bauen. <22syll>
Was ist los?
11a. Die Menschen benannten den Stieglitz in verschiedenen Sprachen nach seinem eindringlichen Lockruf. <25syll>
Was ist los?
12a. In Dürrezeiten suchen Sandplütts im Süden Irans bei vierzig Grad oft vergebens nach Wasser. <25syll>
Was ist los?
13a. Als nur gelegentlichen Gast sortierte man den Schneefreck aus der Dokumentation aus. <23syll>
Was ist los?
14a. Durch die fortschreitende Vergrasung der Brachflächen verliert der Serin seinen Lebensraum. <23syll>
Was ist los?
15a. Erst vor einigen Jahrzehnten hat der Timal die westlichen Kanarischen Inseln besiedelt. <25syll>
Was ist los?
16a. Ein geübter Vogelfreund kann den Kehl einfach an seinem trillernden Gesang erkennen. <23syll>
Was ist los?
17a. Außer in Naturschutzgebieten sieht man den Schnack leider nur noch selten in Europ <23syll>
Was ist los?
18a. Im Rahmen eines neuen Zuchtprojektes vergrößerte der Drass seine Population. <23syll>
Was ist los?
19a. Aus völlig unerfindlichen Gründen frisst die Maina kein genmanipuliertes Getreide. <24syll>
Was ist los?
20a. Rund einhundert Meter vor Windkraftanlagen ändern Saker ihre Flugroute. <21syll>
Was ist los?
21a. Zwei fette Regenwürmer gleichzeitig herunterwürgen kann ein hungriger Klitz. <21syll>
Was ist los?
22a. Sein Gleichgewicht verliert durch zu heftiges Kopfnicken manchmal der in Österreich heimische Traul. <25syll>
Was ist los?
23a. Das in Europa verbotene DDT schadet den Eiern der asiatischen Ember. <24syll>
Was ist los?
24a. Vor ihr fliehende Gazellen erlegt schnell die unglaublich kühn fliegende Nago. <21syll>
Was ist los?
25a. Seine kunterbunten Schwanzfedern verliert im Herbst der sonst auffällig schöne Pickutt. <22syll>
Was ist los?
26a. Sein leuchtendes Scharlachrot verliert in Gefangenschaft der sonst so farbenprächtige Sichler. <24syll>
Was ist los?
27a. Fremde Vogellieder singt mit schöner Stimme der in Brandenburg heimische Buschrötel. <23syll>
Was ist los?
28a. Richtiggehende Tanzgemeinschaften zwecks Balz bildet im Frühjahr die tropische Goldpipr <24syll>
Was ist los?
29a. Dünne Äste und Zweige erklettert trotz seines großen Gewichts der geschickte Gaukler. <24syll>
Was ist los?
30a. Nur wenige Australienreisende erkennen bei ihren Wanderungen eine Tadorn <25syll>
Was ist los?
31a. Der Trauerschwanz fällt einer französischen Sonderverordnung für Gourmet-Restaurants zum Opfer. <24syll>

Was ist los?
32a. Der Larik siedelt mit seinen Nachkommen in ein speziell angefertigtes Gehege über. <25syll>
Was ist los?
33a. Den Achtaug kann man häufig in den Anden beim Klettern an steilen Felswänden beobachten. <24syll>
Was ist los?
34a. Der Ortolan bewohnt als Zugvogel im Winter afrikanische Savannengehölze. <24syll>
Was ist los?
35a. Der Aar frisst im Straßenverkehr außerhalb der Städte und Dörfer getötete Tiere. <23syll>
Was ist los?
36a. Mit Vorliebe frisst der Eick im Herbst rote und gelbe Blätter und im Frühling Weidenkätzchen. <24syll>
Was ist los?
37a. Nur äußerst ungern hört der Gnär singende männliche Artgenossen in seinem Revier. <23syll>
Was ist los?
38a. Den Klöft konnten Studenten trotz seiner völligen Unbekanntheit in ganz Deutschland nachweisen. <24syll>
Was ist los?
39a. Der Plütt frisst in ausgeprägten Dürrezeiten völlig verdorrtes Zitronengras. <21syll>
Was ist los?
40a. Der Schuck führt zur Balz eine Art Stepptanz mit akrobatischen Sprungeinlagen vor seiner Braut auf. <25syll>
Was ist los?
41a. Die Trappe führen Vogelschützer wegen des Bestandsrückgangs in der Vorwarnliste auf. <24syll>
Was ist los?
42a. Die Küsten ganz Mittel- und Westeuropas besiedelt der Orchis gemeinhin in Kolonien. <25syll>
Was ist los?
43a. Ein Fitis kann nur mit einwandfrei sauberem Gefieder nach seiner Nahrung tauchen. <22syll>
Was ist los?
44a. Auf Beutezug und bei Gefahr kann der Drongo seinen Flug plötzlich abbremsen um scharf zu wenden. <25syll>
Was ist los?
45a. Mithilfe eines Reflexes erschlägt der Otos Käfer und andere Insekten mit dem Schwanz. <25syll>
Was ist los?
46a. Schulkinder und Studenten wollen gemeinsam die verirrten Schraler vor dem Verdursten retten. <25syll>
Was ist los?
47a. Im Winter kann man den arktischen Tordalk im mediterranen Marokko beobachten. <24syll>
Was ist los?
48a. Menschliches Lachen kann der Amarant zur Freude von Zoobesuchern täuschend echt nachahmen. <24syll>
Was ist los?
49a. Mücken und kleine Obstfliegen fängt der Zilpzalp im für ihn charakteristischen Rüttelflug. <24syll>
Was ist los?
50a. Statt der Reise in den Süden suchen Braunellen verstärkt Winterquartiere in Deutschland auf. <24syll>
Was ist los?
51a. Vor allem Würmer und Insektenlarven frisst der in Kiefernwäldern beheimatete Girlitz. <25syll>
Was ist los?
52a. Auf seiner Futtersuche interessieren sogar junge Krokodile den Schuhschnabel. <24syll>
Was ist los?
53a. Eine große privat finanzierte Evakuierungsaktion rettete den Moorochs. <23syll>
Was ist los?
54a. Der Kahlschlag von jährlich rund 100.000 km² Wald gefährdet den Drost. <24syll>
Was ist los?
55a. Weder in Amerika noch in Europa gefährden Windkraftanlagen den Kaiserling. <24syll>
Was ist los?
56a. Laut Umweltverträglichkeitsprüfungen erschlagen Windkrafträder nur selten einen Bergmerol. <25syll>
Was ist los?
57a. In erster Linie bedroht der Verlust an Lebensraum durch Waldrodungen den kleinen Reeps. <23syll>
Was ist los?
58a. Kaum noch zu Gesicht bekommt man bei uns in diesem Winter die schillernde Blauracke. <22syll>
Was ist los?
59a. Mit nur einer Leimrute fängt ein Vogeljäger in nur einer Nacht bis zu 20 Tipserlis. <25syll>
Was ist los?
60a. Dringende Schutzmaßnahmen braucht nach Ansicht britischer Ornithologen der Freck. <21syll>
Was ist los?
61a. Den Sporn charakterisiert sein schriller langanhaltender Pfeifgesang zum Frühlingsbeginn. <23syll>
Was ist los?
62a. Der Walch hat durch die neuen EU-Gesetze besseren Schutz vor Jägern und Eierdieben. <24syll>
Was ist los?
63a. Der Puruh demonstriert bei seinem langwierigen Nestbau nahezu ästhetisches Empfinden. <25syll>

Was ist los?
64a. Die Schmerle erholt sich nur langsam seit dem Fangverbot in den EU-Vogelschutzrichtlinien. <24syll>
Was ist los?
65a. Die Röhle findet an Neubauten und sanierten Altbauten kaum noch potenzielle Nistplätze. <25syll>
Was ist los?
66a. Seinen wunderbaren Gesang lässt der kleine Gelbspötter in ruhigen Gärten erklingen. <23syll>
Was ist los?
67a. Viele Bewunderer hat die hier heimische Grünracke wegen ihrer schillernden Farbe. <24syll>
Was ist los?
68a. Hohes Gras und Gesträuch nutzt der Schönbürzel auf Urwaldlichtungen als für ihn sicheres Versteck. <25syll>
Was ist los?
69a. Aufgrund langanhaltender Dürreperioden hat der Witt seine Heimat verlassen. <22syll>
Was ist los?
70a. Im 17. oder 18. Jahrhundert verließ der scheue Waldrapp Mitteleurop <24syll>
Was ist los?
71a. Bis zu fünf unterschiedliche Gesangsvarietäten erlernt ein zweijähriger Schlör. <23syll>
Was ist los?
72a. Einen erheblichen Rückgang in seiner Population verzeichnete letztes Jahr der Noddy. <25syll>
Was ist los?
73a. Das verstärkte Abholzen von Savannengehölzen betrifft den bald ausgestorbenen Blauliest. <25syll>
Was ist los?
74a. Ab dem kommenden Jahr gefährdet genmanipuliertes Getreide den europäischen Wick. <24syll>
Was ist los?
75a. Vorwiegend in den Waldgebieten Tobagos trifft man den seit vielen Jahren streng geschützten Zipp. <25syll>

Filler-Sätze (in 3 Fokus-Lesarten)
1a. Was ist los?
Der Specht holt Insekten, Larven und Würmer aus toten und kranken Bäumen heraus.
Specht
1b. Wer holt Insekten, Larven und Würmer aus toten und kranken Bäumen heraus?
Der Specht holt Insekten, Larven und Würmer aus toten und kranken Bäumen heraus.
1c. Wo holt der Specht Insekten, Larven und Würmer heraus?
Der Specht holt Insekten, Larven und Würmer aus toten und kranken Bäumen heraus. <21syll>
2a. Was ist los?
Die verfallenen Dächer verödeter Gehöfte in der Mark Brandenburg liebt der Storch.
Storch
2b. Wer liebt die verfallenen Dächer verödeter Gehöfte in der Mark Brandenburg?
Die verfallenen Dächer verödeter Gehöfte in der Mark Brandenburg liebt der Storch.
2c. Was liebt der Storch?
Die verfallenen Dächer verödeter Gehöfte in der Mark Brandenburg liebt der Storch. <23syll>
3a. Was ist los?
Den Strauss befähigen seine extrem langen Beine zum Ausdauerlauf auf Durststrecken.
Strauß
3b. Wen befähigen seine extrem langen Beine zum Ausdauerlauf?
Den Strauss befähigen seine extrem langen Beine zum Ausdauerlauf auf Durststrecken.
3c. Wozu befähigen den Strauß seine extrem langen Beine?
Den Strauss befähigen seine extrem langen Beine zum Ausdauerlauf auf Durststrecken. <23syll>
4a. Was ist los?
Den Star ernannten die europäischen Tierschützer bisher zweimal zum Vogel des Jahres.
Star
4b. Wen ernannten die Tierschützer bisher zweimal zum Vogel des Jahres?
Den Star ernannten die europäischen Tierschützer bisher zweimal zum Vogel des Jahres.
4c. Wozu ernannten die Tierschützer den Star?
Den Star ernannten die europäischen Tierschützer bisher zweimal zum Vogel des Jahres. <24syll>
5a. Was ist los?
An ihren besonders einprägsamen Melodien erkennt man die Amsel.
Amsel
5b. Wen erkennt man an seinen besonders einprägsamen Melodien?
An ihren besonders einprägsamen Melodien erkennt man die Amsel.
5c. Woran erkennt man die Amsel?
An ihren besonders einprägsamen Melodien erkennt man die Amsel. <20syll>
6a. Was ist los?
Den Tukan mit seinem leuchtend bunten Schnabel kann man für mehrere hundert Dollar erstehen.
Tukan

6b. Wen kann man für mehrere hundert Dollar erstehen?
Den Tukan mit seinem leuchtend bunten Schnabel kann man für mehrere hundert Dollar erstehen.
6c. Wofür kann man den Tukan erstehen?
Den Tukan mit seinem leuchtend bunten Schnabel kann man für mehrere hundert Dollar erstehen. <25syll>
7a. Was ist los?
Geier wurden in großer Zahl bei den Bränden des letzten Jahres in Spanien getötet.
Geier
7b. Wer wurde in großer Zahl bei den Bränden getötet?
Geier wurden in großer Zahl bei den Bränden des letzten Jahres in Spanien getötet.
7c. Wobei wurden Geier in großer Zahl getötet?
Geier wurden in großer Zahl bei den Bränden des letzten Jahres in Spanien getötet. <23syll>
8a. Was ist los?
Die Lerche bestimmt jedes Jahr von März bis Juni das Klangbild in der märkischen Feldflur.
Lerche
8b. Wer bestimmt jedes Jahr das Klangbild in der Feldflur?
Die Lerche bestimmt jedes Jahr von März bis Juni das Klangbild in der märkischen Feldflur.
8c. Was bestimmt die Lerche jedes Jahr von März bis Juni?
Die Lerche bestimmt jedes Jahr von März bis Juni das Klangbild in der märkischen Feldflur. <23syll>
9a. Was ist los?
Den Ibis vertreiben die Sumpftrockenlegungen der letzten Jahre aus Ostasien.
Ibis
9b. Wen vertreiben die Sumpftrockenlegungen aus Ostasien?
Den Ibis vertreiben die Sumpftrockenlegungen der letzten Jahre aus Ostasien.
9c. Von wo vertreiben die Sumpftrockenlegungen der letzten Jahre den Ibis?
Den Ibis vertreiben die Sumpftrockenlegungen der letzten Jahre aus Ostasien. <23syll>
10a. Was ist los?
Die Drosseln geben im Frühjahr in unseren heimischen Wäldern ganz deutlich den Ton an.
Drosseln
10b. Wer gibt im Frühling in unseren heimischen Wäldern den Ton an?
Die Drosseln geben im Frühjahr in unseren heimischen Wäldern ganz deutlich den Ton an.
10c. Was geben die Drosseln im Frühjahr in unseren Wäldern ganz deutlich an?
Die Drosseln geben im Frühjahr in unseren heimischen Wäldern ganz deutlich den Ton an. <23syll>
11a. Was ist los?
Eine Wachtel sehen viele Leute höchstens im Restaurant zubereitet auf ihrem Teller.
Wachtel
11b. Was sehen viele Leute höchstens auf ihrem Teller?
Eine Wachtel sehen viele Leute höchstens im Restaurant zubereitet auf ihrem Teller.
11c. Wo sehen viele Leute eine Wachtel höchstens?
Eine Wachtel sehen viele Leute höchstens im Restaurant zubereitet auf ihrem Teller. <25syll>
12a. Was ist los?
Den Kuckuck haben Literatur und Film zu Europas bekanntestem Vogel gemacht.
Kuckuck
12b. Wen haben Literatur und Film bekannt gemacht?
Den Kuckuck haben Literatur und Film zu Europas bekanntestem Vogel gemacht.
12c. Wozu haben Literatur und Film den Kuckuck gemacht?
Den Kuckuck haben Literatur und Film zu Europas bekanntestem Vogel gemacht. <23syll>
13a. Was ist los?
Habichte stuft man auf der Roten Liste trotz ihres Schwundes nicht als gefährdete Art ein.
Habichte
13b. Wen stuft man nicht als gefährdet ein?
Habichte stuft man auf der Roten Liste trotz ihres Schwundes nicht als gefährdete Art ein.
13c. Als was stuft man Habichte auf der Roten Liste ein?
Habichte stuft man auf der Roten Liste trotz ihres Schwundes nicht als gefährdete Art ein. <24syll>
14a. Was ist los?
Den Fischadler fangen Fischernetze im offenen Meer oft unbeabsichtigt mit ein.
Fischadler
14b. Wen fangen Fischernetze oft unbeabsichtigt mit ein?
Den Fischadler fangen Fischernetze im offenen Meer oft unbeabsichtigt mit ein.
14c. Wo fangen Fischernetze den Fischadler oft ein?
Den Fischadler fangen Fischernetze im offenen Meer oft unbeabsichtigt mit ein. <23syll>
15a. Was ist los?
Die Flamingos verdrehen bei der Nahrungssuche in flachen Gewässern ihren Kopf.
Flamingos
15b. Wer verdreht bei der Nahrungssuche den Kopf?

Die Flamingos verdrehen bei der Nahrungssuche in flachen Gewässern ihren Kopf.
15c. Was verdrehen Flamingos bei der Nahrungssuche in flachen Gewässern?
Die Flamingos verdrehen bei der Nahrungssuche in flachen Gewässern ihren Kopf. <22syll>
16a. Was ist los?
Den Pirol kann man erst ab Mai mit seinem Balzgesang in unseren Wäldern hören.
Pirol
16b. Wen kann man erst ab Mai in unseren Wäldern hören?
Den Pirol kann man erst ab Mai mit seinem Balzgesang in unseren Wäldern hören.
16c. Wo kann man den Pirol ab Mai mit seinem Balzgesang hören?
Den Pirol kann man erst ab Mai mit seinem Balzgesang in unseren Wäldern hören. <22syll>
17a. Was ist los?
Pelikane können bei Kollisionen Militärflugzeuge zum Absturz bringen.
Pelikane
17b. Wer kann Militärflugzeuge zum Absturz bringen?
Pelikane können bei Kollisionen Militärflugzeuge zum Absturz bringen.
17c. Wozu können Pelikane Militärflugzeuge bei Kollisionen bringen?
Pelikane können bei Kollisionen Militärflugzeuge zum Absturz bringen. <22syll>
18a. Was ist los?
Die Ringelgans wird in nordamerikanischen städtischen Lebensräumen zum Ärgernis.
Ringelgans
18b. Wer wird in nordamerikanischen städtischen Lebensräumen zum Ärgernis?
Die Ringelgans wird in nordamerikanischen städtischen Lebensräumen zum Ärgernis.
18c. Wozu wird die Ringelgans in nordamerikanischen städtischen Lebensräumen?
Die Ringelgans wird in nordamerikanischen städtischen Lebensräumen zum Ärgernis. <24syll>
19a. Was ist los?
Der Kranich behält trotz des Klimawandels seine traditionellen Nestgründe bei.
Kranich
19b. Wer behält trotz des Klimawandels seine Nestgründe bei?
Der Kranich behält trotz des Klimawandels seine traditionellen Nestgründe bei.
19c. Was behält der Kranich trotz des Klimawandels bei?
Der Kranich behält trotz des Klimawandels seine traditionellen Nestgründe bei. <22syll>
20a. Was ist los?
Der Zeisig fällt mit seinem gestreiften Gefieder in unseren Nadelwäldern kaum auf.
Zeisig
20b. Wer fällt in unseren Nadelwäldern kaum auf?
Der Zeisig fällt mit seinem gestreiften Gefieder in unseren Nadelwäldern kaum auf.
20c. Wo fällt der Zeisig mit seinem gestreiften Gefieder kaum auf?
Der Zeisig fällt mit seinem gestreiften Gefieder in unseren Nadelwäldern kaum auf. <23syll>
21a. Was ist los?
In zumeist sicherer Entfernung fliegt die Gans über Windenergieanlagen hinweg.
Gans
21b. Wer fliegt in zumeist sicherer Entfernung über Windkraftanlagen hinweg?
In zumeist sicherer Entfernung fliegt die Gans über Windenergieanlagen hinweg.
21c. Worüber fliegt die Gans in zumeist sicherer Entfernung hinweg?
In zumeist sicherer Entfernung fliegt die Gans über Windenergieanlagen hinweg. <23syll>
22a. Was ist los?
Im Laufe von Jahrzehnten hat der Fink durch Fütterungen seine Gewohnheiten geändert.
Fink
22b. Wer hat in Jahrzehnten durch Fütterungen seine Gewohnheiten geändert?
Im Laufe von Jahrzehnten hat der Fink durch Fütterungen seine Gewohnheiten geändert.
22c. Was hat der Fink durch Fütterungen geändert?
Im Laufe von Jahrzehnten hat der Fink durch Fütterungen seine Gewohnheiten geändert. <24syll>
23a. Was ist los?
Seit der Durchsetzung des DDT-Verbots in Europa kehrt der Bussard langsam zurück.
Bussard
23b. Wer kehrt seit der Durchsetzung des DDT-Verbots langsam zurück?
Seit der Durchsetzung des DDT-Verbots in Europa kehrt der Bussard langsam zurück.
23c. Seit wann kehrt der Bussard langsam zurück?
Seit der Durchsetzung des DDT-Verbots in Europa kehrt der Bussard langsam zurück. <23syll>
24a. Was ist los?
Beim Zählen bereiten Dohlen den freiwilligen Helfern wegen ihrer Farbe Schwierigkeiten.
Dohlen
24b. Wer bereitet den Helfern Schwierigkeiten beim Zählen?
Beim Zählen bereiten Dohlen den freiwilligen Helfern wegen ihrer Farbe Schwierigkeiten.

24c. Weshalb bereiten Dohlen den Helfern Schwierigkeiten beim Zählen?
Beim Zählen bereiten Dohlen den freiwilligen Helfern wegen ihrer Farbe Schwierigkeiten. <25syll>
25a. Was ist los?
Die äußerst anpassungsfähigen Falken fühlen sich sowohl im Heideland als auch im Wald wohl.
Falken
25b. Wer fühlt sich sowohl im Heideland als auch im Wald wohl?
Die äußerst anpassungsfähigen Falken fühlen sich sowohl im Heideland als auch im Wald wohl.
25c. Wo fühlen sich die anpassungsfähigen Falken wohl?
Die äußerst anpassungsfähigen Falken fühlen sich sowohl im Heideland als auch im Wald wohl. <25syll>
26a. Was ist los?
Vor Jahrhunderten brachten Reisende den Fasan aus dem Fernen Osten nach Europa.
Fasan
26b. Wen brachten Reisende vor Jahrhunderten nach Europa?
Vor Jahrhunderten brachten Reisende den Fasan aus dem Fernen Osten nach Europa.
26c. Wann brachten Reisende den Fasan nach Europa?
Vor Jahrhunderten brachten Reisende den Fasan aus dem Fernen Osten nach Europa. <23syll>
27a. Was ist los?
Ihr hell leuchtendes Gefieder putzen sich die Goldfinken den ganzen lieben langen Tag.
Goldfinken
27b. Wer putzt sich sein leuchtendes Gefieder den ganzen Tag?
Ihr hell leuchtendes Gefieder putzen sich die Goldfinken den ganzen lieben langen Tag.
27c. Was putzen Goldfinken sich den ganzen Tag?
Ihr hell leuchtendes Gefieder putzen sich die Goldfinken den ganzen lieben langen Tag. <23syll>
28a. Was ist los?
Die Britischen Inseln mit ihrem feuchtmilden Klima ziehen Kiebitze dem Kontinent vor.
Kiebitze
28b. Wer zieht die Britischen Inseln dem Kontinent vor?
Die Britischen Inseln mit ihrem feuchtmilden Klima ziehen Kiebitze dem Kontinent vor.
28c. Was ziehen Kiebitze dem Kontinent vor?
Die Britischen Inseln mit ihrem feuchtmilden Klima ziehen Kiebitze dem Kontinent vor. <24syll>
29a. Was ist los?
Mit ihrem schrillen Geschrei überraschen Schnepfen immer wieder arglose Wanderer.
Schnepfen
29b. Wer überrascht immer wieder arglose Wanderer?
Mit ihrem schrillen Geschrei überraschen Schnepfen immer wieder arglose Wanderer.
29c. Womit überraschen Schnepfen immer wieder arglose Wanderer?
Mit ihrem schrillen Geschrei überraschen Schnepfen immer wieder arglose Wanderer. <23syll>
30a. Was ist los?
Fast überall in Mecklenburg kann man die Bachstelze an ruhigen Gewässern beobachten.
Bachstelze
30b. Wen kann man fast überall in Mecklenburg an ruhigen Gewässern beobachten?
Fast überall in Mecklenburg kann man die Bachstelze an ruhigen Gewässern beobachten.
30c. Wo kann man die Bachstelze an ruhigen Gewässern beobachten?
Fast überall in Mecklenburg kann man die Bachstelze an ruhigen Gewässern beobachten. <24syll>
31a. Was ist los?
Trotz ihres Namens singt die Nachtigall eher am Tag oder in der frühen Abenddämmerung.
Nachtigall
31b. Wer singt trotz seines Namens eher am Tag?
Trotz ihres Namens singt die Nachtigall eher am Tag oder in der frühen Abenddämmerung.
31c. Wann singt die Nachtigall?
Trotz ihres Namens singt die Nachtigall eher am Tag oder in der frühen Abenddämmerung. <25syll>
32a. Was ist los?
Bei Mangel an Nistmöglichkeiten vertreiben Schwalben andere Vögel aus deren Nestern.
Schwalben
32b. Wer vertreibt andere Vögel aus deren Nestern?
Bei Mangel an Nistmöglichkeiten vertreiben Schwalben andere Vögel aus deren Nestern.
32c. Wann vertreiben Schwalben andere Vögel aus deren Nestern?
Bei Mangel an Nistmöglichkeiten vertreiben Schwalben andere Vögel aus deren Nestern. <24syll>
33a. Was ist los?
Trotz seiner Kraft und Ausdauer frisst der Kondor mit besonderer Vorliebe Aas und Abfälle.
Kondor
33b. Wer frisst mit besonderer Vorliebe Aas und Abfälle?
Trotz seiner Kraft und Ausdauer frisst der Kondor mit besonderer Vorliebe Aas und Abfälle.
33c. Was frisst der Kondor mit besonderer Vorliebe?

Trotz seiner Kraft und Ausdauer frisst der Kondor mit besonderer Vorliebe Aas und Abfälle. <25syll>
34a. Was ist los?
Jagdspiele können betroffene Vögel wie das Haselhuhn auf den Tod nicht ausstehen.
Haselhuhn
34b. Welche Vögel können Jagdspiele nicht ausstehen?
Jagdspiele können betroffene Vögel wie das Haselhuhn auf den Tod nicht ausstehen.
34c. Was kann das Haselhuhn auf den Tod nicht ausstehen?
Jagdspiele können betroffene Vögel wie das Haselhuhn auf den Tod nicht ausstehen. <22syll>
35a. Was ist los?
Aufgrund seiner Geschicklichkeit kann der Albatross bei mittelstarkem Sturm sicher fliegen.
Albatross
35b. Wer kann aufgrund seiner Geschicklichkeit bei mittelstarkem Sturm sicher fliegen?
Aufgrund seiner Geschicklichkeit kann der Albatross bei mittelstarkem Sturm sicher fliegen.
35c. Weshalb kann der Albatross bei mittelstarkem Sturm sicher fliegen?
Aufgrund seiner Geschicklichkeit kann der Albatross bei mittelstarkem Sturm sicher fliegen. <23syll>
36a. Was ist los?
Zu festlichen Gelegenheiten verbreitet der Truthahn einen sehr angenehmen Bratenduft.
Truthahn
36b. Wer verbreitet einen sehr angenehmen Bratenduft?
Zu festlichen Gelegenheiten verbreitet der Truthahn einen sehr angenehmen Bratenduft.
36c. Wann verbreitet der Truthahn einen sehr angenehmen Bratenduft?
Zu festlichen Gelegenheiten verbreitet der Truthahn einen sehr angenehmen Bratenduft. <25syll>
37a. Was ist los?
Den Eisbären trifft der Pinguin allerhöchstens und mit viel Glück in Zoologischen Gärten.
Pinguin
37b. Wer trifft den Eisbären allerhöchstens in Zoologischen Gärten?
Den Eisbären trifft der Pinguin allerhöchstens und mit viel Glück in Zoologischen Gärten.
37c. Wo trifft der Pinguin allerhöchstens den Eisbären?
Den Eisbären trifft der Pinguin allerhöchstens und mit viel Glück in Zoologischen Gärten. <25syll>
38a. Was ist los?
Als besonders stressfeste Vögel konnten viele Seeschwalben die Ölpest überleben.
Seeschwalben
38b. Welche stressfesten Vögel konnten die Ölpest überleben?
Als besonders stressfeste Vögel konnten viele Seeschwalben die Ölpest überleben.
38c. Was konnten viele Seeschwalben überleben?
Als besonders stressfeste Vögel konnten viele Seeschwalben die Ölpest überleben. <23syll>
39a. Was ist los?
Mittlerweile profitieren Reiher von gezielten und umfassenden Artenschutzmaßnahmen.
Reiher
39b. Wer profitiert mittlerweile von gezielten Artenschutzmaßnahmen?
Mittlerweile profitieren Reiher von gezielten und umfassenden Artenschutzmaßnahmen.
39c. Wovon profitieren Reiher mittlerweile?
Mittlerweile profitieren Reiher von gezielten und umfassenden Artenschutzmaßnahmen. <25syll>
40a. Was ist los?
Im Sommer frisst die Wasseramsel in schnellfließenden Bächen lebende Insektenlarven.
Wasseramsel
40b. Wer frisst in schnellfließenden Bächen lebende Insektenlarven?
Im Sommer frisst die Wasseramsel in schnellfließenden Bächen lebende Insektenlarven.
40c. Was frisst die Wasseramsel im Sommer?
Im Sommer frisst die Wasseramsel in schnellfließenden Bächen lebende Insektenlarven. <24syll>
41a. Was ist los?
Glitzernde Steine und funkelnde Glasscherben interessieren die diebische Elster.
Elster
41b. Wen interessieren glitzernde Steine und funkelnde Glasscherben?
Glitzernde Steine und funkelnde Glasscherben interessieren die diebische Elster.
41c. Was interessiert die diebische Elster?
Glitzernde Steine und funkelnde Glasscherben interessieren die diebische Elster. <23syll>
42a. Was ist los?
Hohle Bäume in großstädtischen Parks und Grünanlagen beherbergen vermehrt den Kauz.
Kauz
42b. Wen beherbergen hohle Bäume in Parks und Grünanlagen vermehrt?
Hohle Bäume in großstädtischen Parks und Grünanlagen beherbergen vermehrt den Kauz.
42c. Was beherbergt vermehrt den Kauz?
Hohle Bäume in großstädtischen Parks und Grünanlagen beherbergen vermehrt den Kauz. <23syll>

43a. Was ist los?
Ausgedehnte Expansionsbewegungen in Richtung Asien vollzieht der Höckerschwan.
Höckerschwan
43b. Wer vollzieht ausgedehnte Expansionsbewegungen?
Ausgedehnte Expansionsbewegungen in Richtung Asien vollzieht der Höckerschwan.
43c. Was vollzieht der Höckerschwan?
Ausgedehnte Expansionsbewegungen in Richtung Asien vollzieht der Höckerschwan. <23syll>
44a. Was ist los?
In ölverseuchten Küstengewässern schwimmen immer wieder verendende Möwen.
Möwen
44b. Wer schwimmt immer wieder in ölverseuchten Küstengewässern?
In ölverseuchten Küstengewässern schwimmen immer wieder verendende Möwen.
44c. Wo schwimmen immer wieder verendende Möwen?
In ölverseuchten Küstengewässern schwimmen immer wieder verendende Möwen. <22syll>
45a. Was ist los?
Wasserverschmutzungen durch Motorboote vergiften auf unseren Seen viele Blesshühner.
Blesshühner
45b. Wen vergiften Wasserverschmutzungen auf unseren Seen?
Wasserverschmutzungen durch Motorboote vergiften auf unseren Seen viele Blesshühner.
45c. Was vergiftet auf unseren Seen viele Blesshühner?
Wasserverschmutzungen durch Motorboote vergiften auf unseren Seen viele Blesshühner. <25syll>
46a. Was ist los?
Eine von Region zu Region unterschiedliche Gesangsmelodie kennzeichnet den Buchfink.
Buchfink
46b. Wen kennzeichnet eine von Region zu Region unterschiedliche Gesangsmelodie?
Eine von Region zu Region unterschiedliche Gesangsmelodie kennzeichnet den Buchfink.
46c. Was kennzeichnet den Buchfink?
Eine von Region zu Region unterschiedliche Gesangsmelodie kennzeichnet den Buchfink. <24syll>
47a. Was ist los?
Stille Segler und Windsurfer sehen häufig den so seltenen und scheuen Haubentaucher.
Haubentaucher
47b. Welchen Vogel sehen stille Segler und Windsurfer häufig?
Stille Segler und Windsurfer sehen häufig den so seltenen und scheuen Haubentaucher.
47c. Wer sieht häufig den so seltenen Haubentaucher?
Stille Segler und Windsurfer sehen häufig den so seltenen und scheuen Haubentaucher. <24syll>
48a. Was ist los?
Ihre Brutplätze an der Nord- und Ostseeküste wechselt jedes Jahr die Brachschwalbe.
Brachschwalbe
48b. Wer wechselt jedes Jahr die Brutplätze?
Ihre Brutplätze an der Nord- und Ostseeküste wechselt jedes Jahr die Brachschwalbe.
48c. Was wechselt die Brachschwalbe jedes Jahr?
Ihre Brutplätze an der Nord- und Ostseeküste wechselt jedes Jahr die Brachschwalbe. <22syll>
49a. Was ist los?
Ein recht wunderliches Aussehen hat der in Australien beheimatete Emu.
Emu
49b. Wer hat ein recht wunderliches Aussehen?
Ein recht wunderliches Aussehen hat der in Australien beheimatete Emu.
49c. Was hat der in Australien beheimatete Emu?
Ein recht wunderliches Aussehen hat der in Australien beheimatete Emu. <22syll>
50a. Was ist los?
Zunehmende Altbausanierungen vertreiben den auch in Städten lebenden Kleiber.
Kleiber
50b. Wen vertreiben zunehmende Altbausanierungen?
Zunehmende Altbausanierungen vertreiben den auch in Städten lebenden Kleiber.
50c. Was vertreibt den auch in Städten lebenden Kleiber?
Zunehmende Altbausanierungen vertreiben den auch in Städten lebenden Kleiber. <23syll>
51a. Was ist los?
Die hier gebliebenen Vögel begrüßen den aus dem Süden zurückkehrenden Eisvogel.
Eisvogel
51b. Wen begrüßen die hier gebliebenen Vögel?
Die hier gebliebenen Vögel begrüßen den aus dem Süden zurückkehrenden Eisvogel.
51c. Wer begrüßt den aus dem Süden zurückkehrenden Eisvogel?
Die hier gebliebenen Vögel begrüßen den aus dem Süden zurückkehrenden Eisvogel. <24syll>
52a. Was ist los?

Pfeifenten finden außerordentlich gute Brutbedingungen in Westeuropa.
Pfeifenten
52b. Wer findet außerordentlich gute Brutbedingungen in Westeuropa?
Pfeifenten finden außerordentlich gute Brutbedingungen in Westeuropa.
52c. Was finden Pfeifenten in Westeuropa?
Pfeifenten finden außerordentlich gute Brutbedingungen in Westeuropa. <22syll>
53a. Was ist los?
Die Blaumeise weist neuerdings besorgniserregende Arealverluste auf.
Blaumeise
53b. Wer weist neuerdings besorgniserregende Arealverluste auf?
Die Blaumeise weist neuerdings besorgniserregende Arealverluste auf.
53c. Was weist die Blaumeise neuerdings auf?
Die Blaumeise weist neuerdings besorgniserregende Arealverluste auf. <22syll>
54a. Was ist los?
Gluckenten findet man an den Küsten und Seen ganz Mittel- und Westeuropas.
Gluckenten
54b. Wen findet man an den Küsten und Seen?
Gluckenten findet man an den Küsten und Seen ganz Mittel- und Westeuropas.
54c. Wo findet man Gluckenten in Mittel- und Westeuropa?
Gluckenten findet man an den Küsten und Seen ganz Mittel- und Westeuropas. <21syll>
55a. Was ist los?
Keinerlei Probleme mit Habitatsverlusten hat die anpassungsfähige Saatkrähe.
Saatkrähe
55b. Welcher anpassungsfähige Vogel hat keine Probleme mit Habitatsverlusten?
Keinerlei Probleme mit Habitatsverlusten hat die anpassungsfähige Saatkrähe.
55c. Was hat die anpassungsfähige Saatkrähe nicht?
Keinerlei Probleme mit Habitatsverlusten hat die anpassungsfähige Saatkrähe. <24syll>
56a. Was ist los?
Auf der Suche nach Wasserlöchern in der Wüste folgen die Beduinen dem Sperber.
Sperber
56b. Wem folgen die Beduinen auf der Suche nach Wasserlöchern?
Auf der Suche nach Wasserlöchern in der Wüste folgen die Beduinen dem Sperber.
56c. Wer folgt dem Sperber auf der Suche nach Wasserlöchern?
Auf der Suche nach Wasserlöchern in der Wüste folgen die Beduinen dem Sperber. <23syll>
57a. Was ist los?
Immergrüne Nadelwaldschonungen und Mischwälder bewohnt im Winter die Hupfdohle.
Hupfdohle
57b. Wer bewohnt im Winter Nadelwaldschonungen und Mischwälder?
Immergrüne Nadelwaldschonungen und Mischwälder bewohnt im Winter die Hupfdohle.
57c. Was bewohnt im Winter die Hupfdohle?
Immergrüne Nadelwaldschonungen und Mischwälder bewohnt im Winter die Hupfdohle. <23syll>
58a. Was ist los?
Neu entstehende Schilfanbauflächen in Südosteuropa besucht gerne die Reiherente.
Reiherente
58b. Wer bewohnt gerne neu entstehende Schilfanbauflächen?
Neu entstehende Schilfanbauflächen in Südosteuropa besucht gerne die Reiherente.
58c. Was bewohnt die Reiherente gerne in Südosteuropa?
Neu entstehende Schilfanbauflächen in Südosteuropa besucht gerne die Reiherente. <25syll>
59a. Was ist los?
Autos mit blauer, türkiser oder grüner Metalliclackierung verfolgt die Kohlmeise.
Kohlmeise
59b. Wer verfolgt Autos mit bestimmter Metalliclackierung?
Autos mit blauer, türkiser oder grüner Metalliclackierung verfolgt die Kohlmeise.
59c. Autos mit welcher Metalliclackierung verfolgt die Kohlmeise?
Autos mit blauer, türkiser oder grüner Metalliclackierung verfolgt die Kohlmeise. <24syll>
60a. Was ist los?
Scharfkantige Scherben, Bierdeckel und anderer herumliegender Müll verletzen den Sperling.
Sperling
60b. Wen verletzt herumliegender Müll?
Scharfkantige Scherben, Bierdeckel und anderer herumliegender Müll verletzen den Sperling.
60c. Was für Scherben verletzen den Sperling?
Scharfkantige Scherben, Bierdeckel und anderer herumliegender Müll verletzen den Sperling. <25syll>
61a. Was ist los?
Auf den Speisekarten gehobener Restaurants häufig zu finden ist das seltene Rebhuhn.

Rebhuhn
61b. Welcher seltene Vogel ist häufig auf Speisekarten zu finden?
Auf den Speisekarten gehobener Restaurants häufig zu finden ist das seltene Rebhuhn.
61c. Wo ist das seltene Rebhuhn häufig zu finden?
Auf den Speisekarten gehobener Restaurants häufig zu finden ist das seltene Rebhuhn. <25syll>
62a. Was ist los?
Die vielen Helfer konnten einen Großteil der Braunkehlchen nicht vor dem Tod retten.
Braunkehlchen
62b. Wen konnten die vielen Helfer nicht vor dem Tod retten?
Die vielen Helfer konnten einen Großteil der Braunkehlchen nicht vor dem Tod retten.
62c. Wer konnte einen Großteil der Braunkehlchen nicht vor dem Tod retten?
Die vielen Helfer konnten einen Großteil der Braunkehlchen nicht vor dem Tod retten. <23syll>

2. Word items, Experiment 1

2a. List of word prompts occurring in sentences (English language condition)

Target items

word length	position: initial	medial	final
one syllable	auks, terns,	brants, shags	rails, stilts,
more syllables	bitterns, gannets	dunlin, flickers	dotterels, kestrel

2b. Filler items occurring in sentences (English language condition)

word length	**position: initial**	**medial**	**final**
one syllable	crows, owls	hawk, quail,	grouse, storks
more syllables	blackbird, bluejay	ostrich, catbird	nightingales, finches

2c. List of single word prompts not occurring in sentences (English language condition)

word length	word
one syllable	jars, teals, swans, tits, smews, choughs, scaups, kites, larks
more syllables	merlin, cuckoo, mallards, osprey, magpies, scoters, wigeons penguin, hobby, baldheaded eagles, goldfinches, cuccaburra, orioles, buzzards, harlequin,

2d. List of word prompts occurring in sentences (German language condition)

Target Items

word length	position: initial	medial	final
one syllable	Icht, Nerps	Barp, Gohl,	Haug, Schwalm
more syllables	Sprosser, Demer	Turdus, Mobius,	Trogon, Lanner

2e. Filler items

word length	**position: initial**	**medial**	**final**
one syllable	Specht	Fink	Kauz,
more syllables	Tukan, Lerche, Reiher	Bussard, Kondor, Schnepfen,	Elster, Emu, Hupfdohle

2f. List of single word prompts not occurring in sentences (German language condition)

word length	word
one syllable	Minks, Storch, Reuf, Gans, Horm, Alk, Glör, Star, Zirk,
more syllables	Kleiber, Gentas, Blaumeise Vertigos, Geier, Aguja, Kranich, Pfeifenten, Kiebitze, Sperling, Junkos, Pitpit, Sperber, Rebhuhn, Skabios,

3. Familiarization phase (Experiment 1)

3a: Distribution of English items:

word length (in syllables)	position: initial	medial	final	total	overall
one syllable	0	2	0	2	12
two or more	3	5	2	10	

3b: Distribution of German items:

word length (in syllables)	position: initial	medial	final	total	overall
one syllable	0	1	0	1	12
two or more	3	5	3	11	

4. Oxford Placement Test (Allan, 2001)

Tab. 4: Oxford Placement Test, scores and corresponding rating of English language proficiency

score	corresponding rank
99-100	Functionally bilingual
95-98	Professional command – expert user
85-94	Highly proficient – very advanced user
75-84	Proficient – advanced user
67-74	Upper intermediate - competent user
60-77	Lower intermediate – modest user

5. Questionnaire

5a. Version in German

Bitte geben Sie Folgendes an: a) Name, b) Alter, c) Geschlecht d) Geburtsort e) Student: ja/nein
Bitte beantworten Sie die folgenden Fragen, bevor Sie mit dem Experiment anfangen:
f) Welche Sprache sprechen Sie zu Hause?
g) Welche anderen Sprachen sprechen Sie?
h) In welchem Alter haben Sie angefangen, Englisch zu lernen?
i) ..und für wie lange?
j) Haben Sie jemals in einem englischsprachigen Land gelebt?
k) Wenn ja, für wie lange?
l) Was war der Zweck des Aufenthalts (1. Reise, 2. Studium, 3. Au pair)?
m) Ungefähr wieviele Stunden haben Sie pro Woche Kontakt mit der englischen Sprache?
n) Schätzen Sie Ihre englischen Sprachkenntnisse ein auf einer Skala von 1-5:
(1= sehr gut, 2=gut, 3=mittelmässig, 4=schwach, 5=sehr gering)
o) Haben Sie Hörprobleme (akustisch)?
Vielen Dank für Ihre Mitarbeit!

5b. Version in English

Please state the following: a) name, b) age, c) sex d) place of birth e) Are you a student: yes/no
Before you begin the experiment, please answer these questions:

f) Which language do you speak at home with your family?
g) Which other languages do you speak?
h) Do you in general have any hearing problems? Thank you for your cooperation!

6. Percentages correct probe recognition without timing constraints

Tab. 6: Scores (% correct) per focus condition and experimental condition for German subjects and English controls, calculated over all cases (= no time-out) *N=2

	B1 (broad focus)	N1 (narrow focus)	B2 (narrow focus not on target)
German L1	87,9%	86,8%	87,9%
English L2	75,4%	78,9%	77,7%
English L1	100%*	86,2%	82,0%

7. Distribution of false no-answers in percentages

Tab.7: Distribution of false no-answers in percentages ('single words' had not been present in the previous 4 sentences, other word items are indicated according to their position in the sentence)

		B1 (broad focus) (%)	N1 (narrow focus) (%)	B2 (narrow focus not on target) (%)	total % across conditions
German L1	Single word	37.5	50.0	25.0	64.5
	Initial pos.	25.0	20.8	33.3	19.6
	Medial pos.	37.5	25.0	37.5	7.5
	Final pos.	0	4.2	4.2	8.4
English L2	Single word	48.8	49.1	35.7	61.5
	Initial pos.	18.6	20.8	27.1	8.5
	Medial pos.	18.6	13.2	24.3	12.0
	Final pos.	17.0	14.0	12.9	17.9
English L1	Single word	25.0	45.0	48.3	58.3
	Initial pos.	37.5	9.1	13.8	14.6
	Medial pos.	12.5	27.3	20.7	11.7
	Final pos.	25.0	18.2	17.2	15.5

8. Experiment 2: Effect of clefts

8a. Speech materials of Experiment 2 (cleft), English stimuli

Practice sentences

1. Is it the younger jellars that moved into those areas which were razed in summer fires?
   Some younger **jills** have moved into those areas which were razed in summer fires.
2. Is it the green tiris that used to live in grassy pasture meadows?
   The green **chibe** used to live in grassy pasture meadows.
3. Is it the quick rakos that have suffered greatly from land conservation?
   It's quick **shrikes** that have suffered greatly from land conservation.
4. Is it the yellow mitars that have started singing so early in the morning?
   It's yellow **grebes** that have started singing so early in the morning.
5. Is it the agile hollies that now overwinter in most parts of Western Europe?
   It's agile **toars** that now overwinter in most parts of Western Europe.

Targets (with in indication of sentence length in syllables)

a. cleft, +accent

1. Is it the frail kilnet that is now looking for juicy fruit?
   It's the frail **tulbul** that is now looking for juicy fruit. <15>
2. Is it the young seakam that flies away quickly when it is frightened?
   It's the young **phoebink** that flies away quickly when it is frightened. <17>
3. Is it the sick silgor that usually dwells at the seaside?
   It's the sick **verbin** that usually dwells at the seaside. <15>
4. Is it the green klegan that has shown up again on the endangered list?
   It's the green **trobon** that has shown up again on the endangered list. <17>
5. Is it the lean wokfer that was making a nest out of plastic cups?
   It's the lean **yilbir** that was making a nest out of plastic cups. <17>

b. cleft, -accent

6. Is it the short animal that was circling overhead yesterday?
   It's the **rare** jabber that was circling overhead yesterday. <16>
7. Is it the wild creature that is looking for dense green vegetation?
   It's the **shy** wibon that is looking for dense green vegetation. <18>
8. Is it the green animal that has stopped migrating to southern Europe?
   It's the **white** dobbin that has stopped migrating to southern Europe. <17>
9. Is it the large creature that sang in the garden last night?
   It's the **small** chubar that sang in the garden last night. <14>
10. Is it the strong creature that one might identify in early spring?
    It's the **hoarse** scober that one might identify in early spring. <17>

c. –cleft, +accent

11. Is it the talsins that often get sick from eating oil droplets?
    The grey **corbors** often get sick from eating oil droplets. <15>
12. Is it faykals that are swimming on the pond during the storm?
    The large **garbeys** are swimming on the pond during the storm. <15>

13. Is it the raygers that waddle down to the ocean edge to feed?
The white **gillbots** waddle down to the ocean edge to feed. <15>
14. Is it the deelins that flap their wings at the unwanted approach of seals?
Some rough **shobels** flap their wings at the unwanted approach of seals. <16>
15. Is it the geerals that want to nest on a church steeple?
Some wild **harbecks** want to nest on a church steeple. <13>

d. –cleft, -accent

16. Is it the huge animals that are extending their migration paths each year?
Some **small** torbies are extending their migration paths each year. <16>
17. Is it the lean creatures that move to several zoos and parks?
The **fat** merbens move to several zoos and parks. <14 syllables >
18. Is it the strong animal that has seen its nesting sites greatly reduced?
The **meek** vobet has seen its nesting sites greatly reduced. <15>
19. Is it the tall creatures that left the eastern mountains a long time ago?
The **short** tarbans left the eastern mountains a long time ago. <17>
20. Is it the shy animals that now eat trash at municipal trash sites?
The **tough** sambings now eat trash at municipal trash sites. <15>

Fillers

a. cleft, +accent

21. Is it the stale faykum that are suffering from city development?
It's the stale **gannets** that are suffering from city development. <17>
22. Is it the long rickmal that cannot escape hunters in autumn?
It's the long **gadwalls** that cannot escape hunters in autumn. <16>
23. Is it the lost noekors that chase other animals off course when they migrate?
It's the lost **dunlins** that chase other animal off course when they migrate. <17>
24. Is it the smart zaykon that are laying eggs again in the moss?
It's the smart **koyders** that are laying eggs again in the moss. <16 syllables>
25. Is it the strong tisreck that moves into parks in cities and towns?
It's the strong **flicker** that moves into parks in cities and towns. <16>

b. +cleft -accent

26. Is it the white creatures that are wading in saltpans and coastal marshes?
It's the **red** faytoks that are wading in saltpans and coastal marshes. <18>
27. Is it the light animal that spends the winter in Turkey and Greece?
It's the **dark** mukar that spends the winter in Turkey and Greece. <16>
28. Is it the real creature that really thrives on cold northern waters?
It's the **fake** gochard that really thrives on cold northern waters. <17>
29. Is it the old animal that loses territory to the city sprawl?
It's the **new** hoddy that loses territory to city sprawl. <16>
30. Is it the weak creature that is turning into a nuisance to farmers?
It's the **strong** thrasher that is turning into a nuisance to farmers. <18>

c. –cleft, +accent

31. Is it the white doeril that has recently developed deadly parasites?
The white **junco** has recently developed deadly parasites. <17>
32. Is it the loud keelu that fly in large flocks across the skyline?
Some loud **linkins** fly in large flocks across the skyline. <14>
33. Is it the small kollers that are finding ever more hedges to nest in?
Some small **linnets** are finding ever more hedges to nest in. <15>
34. Is it the huge layrsids that live on farms in Australia today?
Some huge **dintings** live on farms in Australia today. <15>
35. Is it the grey nolcafs that feed on apples and fruit they find in orchards?
Some grey **scoters** feed on apples and fruit they find in orchards. <16>

d. -cleft -accent

36. Is it the smart animals that are increasingly reliant on feeders?
The **shrewd** chiffchaffs are increasingly reliant on feeders. <16>
37. Is it the red creatures that are producing more eggs that safely hatch?
The **grey** tamrins are producing more eggs that safely hatch. <15>
38. Is it the fat animals that pursue larger ones to protect their young?
The **small** dunnocks pursue larger ones to protect their young. <15>
39. Is it the white creature that makes its nest on the ground in tall grass and weeds?
The **green** kugar makes its nest on the ground in tall grass and weeds. <16>
40. Is it the square animal that lives off fish, shellfish, and marine animals?
The **round** roller lives off fish, shellfish, and marine animals. <17>

8b. Experiment 2 (cleft), German stimuli

Practice sentences

2. Ist es die dumme Tirle, die nachts auf Jagd geht?
   Es ist die **weise** Eule die nachts auf Jagd geht.
3. Ist es der schnelle Kiekel, der nur sehr schwer zu fangen ist?
   Der schnelle **Graubart** ist nur sehr schwer zu fangen.
4. Ist es die grüne Gimba, die man von weitem her sehen kann?
   Die grüne **Tomta** kann man von weitem her sehen.
5. Ist es der schläfrige Titor, der in der kargen Steinwüste haust?
   Der schläfrige **Kitan** haust in der kargen Steinwüste.
6. Ist es der rosa Vogel, der die Federn stundenlang ordnet?
   Es ist die **lila** Riebe, die ihre Federn stundenlang ordnet.

Targets

a. cleft, +accent

1. Ist es der kühne Tarlot, der seine Federn aufstellt?
   Es ist der kühne **Dielbül**, der seine Federn aufstellt. <15>
2. Ist es der stolze Rankol**,** der auf dem höchsten Gipfel sitzt?
   Es ist der stolze **Geibar,** der auf dem höchsten Gipfel sitzt. <16>
3. Ist es derfaule Fielitt, der stundenlang auf einem Fuß steht?
   Es ist der faule **Kabu**, der stundenlang auf einem Fuß steht. <17>
4. Ist es die zähe Sickmin, der sich in Felsen aufhält?
   Es ist die zähe **Lumbe**, die sich in Felsen aufhält. <15>
5. Sind es die schwachen Gankirs**,** die ihre Jungen ausführen?
   Es sind die wachen **Merben**, die ihre Jungen ausführen. <16>

b. cleft, -accent

6. Ist es der schnelle Vogel, der kreischend am Nest Wache hält?
   Es ist der lahme **Nambay**, der kreischend am Nest Wache hält. <16>
7. Sind es die bunten Vögel, die meist unter Wasser schwimmen?
   Es sind die schwarzen **Zarben**, die meist unter Wasser schwimmen. <16>
8. Ist es der schlanke Vogel, der sich kaum den Ornithologen zeigt?
   Es ist der fette **Stärbich**, der sich kaum den Ornithologen zeigt. <18>
9. Ist es der dicke Vogel, der bei uns ein Ausnahmegast ist?
   Es ist der zarte **Terbek**, der bei uns ein Ausnahmegast ist. <17>
10. Ist es der junge Vogel, der Touristen mit seinem Gesang lockt?
    Es ist der alte **Trobon**, der Touristen mit seinem Gesang lockt. <18>

c. –cleft, +accent

11. Ist es der flinke Kiefpoll, der durch sein Geträller in Gärten auf?
    Der flinke **Drosbel** fällt durch sein Geträller in Gärten auf. <16>
12. Sind es die grauen Lartings, die angenehm und ausdauernd singen?
    Die grauen **Girburs** singen angenehm und ausdauernd. <14>
13. Ist es der teure Relkan, der häufig in Gefangenschaft verendet?
    Der teure **Lorbis** verendet häufig in Gefangenschaft. <16>
14. Ist es die helle Gietse, die verstärkt in Marokko siedelt?
    Die helle **Mirbel** siedelt verstärkt in Marokko. <14>
15. Ist es der schöne Kunral, der im tropischen Regenwald wohnt?
    Der schöne **Motbot** wohnt im tropischen Regenwald. <14>

d. –cleft, -accent

16. Ist es der starke Vogel, der auch dieses Frühjahr kein Nest anlegt?
    Der **schwache** Pilbit legt auch dieses Frühjahr kein Nest an. <15>
17. Sind es die lauten Vögel, die sich im weiten Feld verstecken?
    Die **scheuen** Schwirbiks verstecken sich im weiten Feld. <14>
18. Ist es der dumme Vogel, der schon lange unter Naturschutz steht?
    Der **kluge** Tengbal steht schon lange unter Naturschutz. <15>
19. Ist es der große Vogel, der nun gar nicht mehr nach Europa kommt?
    Die **kleine** Teibla kommt nun gar nicht mehr nach Europa. <15>
20. Ist es der kranke Vogel, der den Vogelfängern schon wieder entwischt?
    Der **schlaue** Trubal entwischt den Vogelfängern schon wieder. <16>

Fillers

a. cleft, +accent

21. Ist es der starke Kalwil, der zu den Langstreckenziehern zählt?
    Es ist der starke **Fistis,** der zu den Langstreckenziehern zählt. <17>
22. Ist es der schlichte Seikom, der sich am See mit Futter versorgt?
    Es ist die schlichte **Grankel,** die sich am See mit Futter versorgt. <17>
23. Sind es die edlen Keumanns, die verstärkt in Westeuropa nisten?
    Es sind die edlen **Fölser**, die verstärkt in Westeuropa nisten. <18>

24. Ist es die sanfte Sielte, der niedrige Vegetation aufsucht?
Es ist die sanfte **Morne,** die niedrige Vegetation aufsucht. <18>
25. Ist es der runde Kolter, der täglich in der Heide aufkreuzt?
Es ist der runde **Pektor,** der täglich in der Heide aufkreuzt. <17>

b. +cleft -accent

26. Ist es der träge Vogel, der auf der Nahrungssuche zwitschert?
Es ist der rege **Pienant**, der auf Nahrungssuche zwitschert. <16>
27. Ist es der grüne Vogel, der die Flagge Guatemalas ziert?
Es ist der lila **Quentzal,** der Guatemalas Flagge ziert. <17>
28. Ist es der helle Vogel, der aus Europa verschwindet?
Es ist der dunkle **Graulist,** der aus Europa verschwindet. <16>
29. Sind es die fetten Vögel, die nach Krustentieren stochern?
Es sind die schlanken **Sichler,** die nach Krustentieren stochern. <16>
30. Ist es der rosa Vogel, der seine Eier auf den Fels legt?
Es ist die rote **Teiste**, die die Eier auf den Fels legt. <16>

c. –cleft, +accent

31. Ist es der schnelle Folkan, der den Jägern regelmäßig davon rennt?
Der schnelle **Glairol** rennt den Jägern regelmäßig davon. <16>
32. Ist es der große Werlis, der mit viel Ausdauer und Kraft fliegt?
Der große **Hokto** fliegt mit viel Ausdauer und Kraft. <14>
33. Ist es der dicke Tursan, der sich nur schwer in seine Erdhöhle zwingt?
Der dicke **Lortus** zwängt sich nur schwer in seine Erdhöhle. <16>
34. Sind es die dünnen Gattos, die sich ausschließlich von Samen ernähren?
Die dünnen **Naimas** ernähren sich ausschließlich von Samen. <16>
35. Ist es die plumpe Lenge, die sich tagsüber kaum vom Fleck rührt?
Die plumpe **Piekra** rührt sich tagsüber kaum vom Fleck. <14>

d. -cleft -accent

36. Ist es ein schwerer Vogel, der sicher auf dürren Ästen sitzt?
Die leichte **Pirta** sitzt sicher auf dürren Ästen. <14>
37. Ist es ein sanfter Vogel, der sich sein Futter aus dem Tierpark holt?
Die dreiste **Rauke** holt sich ihr Futter aus dem Tierpark. <15>
38. Ist es ein wilder Vogel, der kaum noch in Küstennähe auftaucht?
Der rare **Schmaitzer** taucht kaum noch in Küstennähe auf. <15>
39. Ist es ein schwarzer Vogel, der artistisch durch die Luft schnellt?
Der weiße **Tandar s**chnellt artistisch durch die Luft. <13>
40. Ist es ein leiser Vogel, der als der Göttervogel der Maya gilt?
Der wilde **Zilkzal** gilt als der Göttervogel der Maya. <16>

9. List of word items, Experiment 2

9a. List of English target items of the recall part with classification:

target	similar	false	false
chubar	chugar	ditchwoe	lockleg
corbors	cortors	noddies	caspians
dobbin	dottin	tucken	tanag
garbeys	garkeys	redcols	grosfeaks
gillbots	gilltots	chickdee	pari
harbecks	harkecks	tudgers	flytas
jabber	jatter	wrenlar	noveck
merbens	merckens	lontears	horcowls
phoebink	phoetink	godwick	whimprel
sambings	samtings	plovers	minflas
scober	scroober	skimmer	terny
shobels	shockels	titmice	larklings
tarbans	tarkans	larocks	cockdows
torbies	torties	woodecks	sapsus
trobon	trocon	railor	curtey
tulbul	tulkul	alcid	tesher
verbin	verlin	chukar	gyrfa

vobet	vocket	gormick	tridgar
wibon	wickon	talfon	willet
yilbir	yirgir	merga	veery

9b. List of English filler items of the recall part with classification:

target	**similar**	**false**	**false**
chiffchaffs	chiffraffs	goshers	gecktos
dintings	dinkings	masto	telin
dunlins	dunpins	cromans	dartins
dunnocks	durrocks	kunpits	rulams
faytoks	faylocks	towher	brambling
flicker	flitter	tolink	mealark
gadwalls	gadralls	canpel	covy
gannets	gallets	trencos	skugas
gochard	gottard	mynah	troupal
hoddy	hoggy	egret	shearwa
junco	junto	lucor	ternat
koyders	koylers	weavers	sissels
kugar	kutar	ratop	kota
linkins	limtins	grackler	trover
linnets	lirrets	glaucous	troupies
mukar	mutar	garnack	kiska
roller	ronner	longstur	dinal
scoters	scollers	fulmar	musco
tamrins	tamlins	suttons	krotars
thrasher	thraffer	wigeon	aphid

9c. List of German target items of the recall part with classification:

target	**similar**	**false**	**false**
Dielbül	Gielbül	Diergil	Zurno
Drosbel	Grosbel	Droster	Zörgel
Geibar	Deibar	Pilke	Zirnor
Girbitz	Dirbitz	Pirgük	Zeuba
Kabu	Katu	Schmainor	Tolko
Lorbis	Norbis	Sirno	Tautel
Lumbe	Numbe	Tandor	Scherkfir
Merbe	Nerbe	Teida	Pundor
Mirbel	Nirbel	Teige	Pirkor
Motbot	Notbot	Fifko	Piego
Nambay	Lambay	Gilgon	Peuge
Pilbit	Tilbit	Horpu	Nessno
Scharbe	Zarbe	Trugol	Maupos
Schwirbik	Zirbik	Lopos	Liene
Stärbing	Zärbing	Lunka	Kriefun
Teiba	Peiba	Milwe	Kragun
Tengbal	Kengbal	Mosgat	Gargil
Terbek	Perbek	Naine	Drumbil
Trobon	Krobon	Nander	Dreimzel
Trubal	Krubal	Pepdu	Diedor

9d. List of German filler items of the recall part with classification:

target	similar	false	false
Fistis	Zistis	Pietel	Zirte
Glairol	Krairol	Querkor	Zarput
Grankel	Drankel	Rauba	Zaifko
Graunlist	Draunlist	Schake	Tupdu
Hokto	Tokto	Schärgel	Torink
Löffler	Nöffler	Schwieput	Tirpu
Lortus	Nortus	Tago	Targük
Morne	Norne	Tendol	Pinning
Naima	Laima	Geidor	Piega
Pektor	Tektor	Glaifun	Nönka
Piekra	Tiekra	Grambil	Ninko
Pienant	Tienant	Graumzel	Ninka
Pirta	Tirta	Lonko	Nesgat
Quentzal	Pentzal	Tenning	Nelwe
Rauke	Zauke	Trogun	Nelmi
Schmaitzer	Zaitzer	Zirkfir	Lönder
Sichler	Zichler	Lössna	Kundol
Tangar	Pangar	Menka	Kregol
Teiste	Peiste	Molmi	Graster
Zilkzal	Schilkzal	Pierink	Dalgon

10. Experiment 3: Effect of focus particles

10a. Speech materials of Experiment 3 (focus particles), English sentences
Practice sentences

1. A small raccoon scared only a yellow jill in the old shed.
2. The annual drought forced grey chibes to move to larger cities.
3. A tall tree offered green shrikes complete shade.
4. A ferocious roar woke the sleepy nockbill in the middle of the night.
5. The enigmatic cat puzzled only the wild mackbon in the park.

+ Particle +Accent +Target *(sentence accent in bold print)*

(1) What yellow animal did a small raccoon scare in the old shed?
A small raccoon scared only a yellow **dubbon** in the old shed.
(2) What starving animal did a grey hunter nurse with some fresh meat?
A grey hunter nursed even a starving **kilbit** with some fresh meat.
(3) What fearless animal did a deaf weasel notice at the last moment?
A deaf weasel noticed only a fearless **ombrey** at the last moment.
(4) What quiet animal did some rude children accuse for making a loud ruckuss?
Some rude children accused even a quiet **gabbet** for making a loud ruckuss.
(5) What singing animal did a hoarse singer mock in the attic?
A hoarse singer mocked even a singing **timboe** in the attic.

- Particle +Accent +Target

(6) What worthless animal did a lame thief steal from the local mall?
A lame thief stole a worthless **scolbor** from the local mall.
(7) What flailing animal did a shy author hold in his cozy attic?
A shy author held a flailing **karbel** in his cozy attic.
(8) What careful animal did a sharp razor cut in the middle of his claw?
A sharp razor cut a careful **cobbin** in the middle of his claw.
A sharp razor cut even a careful **cobbin** in the middle of his claw.
(9) What mature animal did some huge grizzlies eat far away from their lair?
Some huge grizzlies ate a mature **tumbel** far away from their lair.
(10) What quiet animal did some young kids tease in the kitchen?
Some young kids teased a quiet **neebat** in the kitchen.

+ Particle +Accent -Target

(11) What gliding animal did a frail donkey sense way high in the sky?
A frail donkey sensed only a gliding **cador** way high in the sky.

(12) What fancy animal did some shrewd students study in Vermont?
Some shrewd students studied only a fancy **merlin** in Vermont.

(13) What injured animal did some fine cashiers walk across the street?
Some fine cashiers walked even an injured **dunnock** across the street.

(14) What orphaned animal did a wild farmer raise in his yard?
A wild farmer raised even an orphaned **sustard** in his yard.

(15) What angry animal did a harsh teacher fear in the still of the night?
A harsh teacher feared only an angry **kestrel** in the still of the night.

- Particle +Accent -Target

(16) What silly animal did a lost driver move away from the the highway?
A lost driver moved a silly **tiskit** away from the highway.

(17) What fearsome animal did an old convict find in the wooden shed?
An old convict found a fearsome **hacky** in the wooden shed.

(18) What female animal did a fake dragon scare in the city zoo?
A fake dragon scared a female **fegget** in the city zoo.

(19) What funny animal did a cute todler chase all the way into the woods?
A cute toddler chased a funny **curlew** all the way into the woods.

(20) What sickly animal did a nice widow nurse in the cold market?
A nice widow nursed a sickly **ralter** in the cold market.

+ Particle -Accent +Target

(21) What kind of animal did a strong hunter hold in his shoddy shed?
A strong hunter held only a **famous** reeber in his shoddy shed.

(22) What kind of animal did a lean artist shove away from his model?
A lean artist shoved even a **rancid** kimbal away from his model.

(23) What kind of animal did some weird giraffe kick in their shared cage?
Some weird giraffe kicked even a **grouchy** camber in their shared cage.

(24) What kind of animal did a smart welder cast in his well-lit studio?
A smart welder cast only a **swooning** koalblink in his well-lit studio.

(25) What kind of animal did a meek cyclist see fly over her house?
A meek cyclist saw even a **yellow** sibberd fly over her house.

- Particle -Accent +Target

(26) What kind of animal did a long fellow lead to its tree?
A long fellow led a **fluffy** gombie to its tree.

(27) What kind of animal did a grey deacon join in the small lake?
A grey deacon joined a **flaky** rabbot in the small lake.

(28) What kind of animal did a cold rainstorm force to remain underground?
A cold rainstorm forced a **moody** labray to remain underground.

(29) What kind of animal did the frail cyclist free from the circus?
Some frail cyclist freed a **mangy** torba from the circus.

(30) What kind of animal did a new felon feel on her warm comforter?
Some new felon felt a **flimsy** verbin on her warm comforter.

+ Particle -Accent -Target

(31) What kind of animal did an ill lawyer move onto the sidewalk?
An ill lawyer moved only a **ruthless** ganta onto the sidewalk.

(32) What kind of animal did a tough agent shoot to smithereens?
A tough agent shot even a **dirty** shuntill to smithereens.

(33) What kind of animal did a drunk driver kill in the old car wash?
A drunk driver killed only a **gentle** wartler in the old car wash.

(34) What kind of animal did a green lizard smell while it dreamed?
Some green lizard smelled only a **gorgeous** siskin while it dreamed.

(35) What kind of animal did a warm grocer meet in front of his store?
Some warm grocer met only a **nosy** dartford in front of his store.

- Particle -Accent -Target

(36) What kind of animal did a wet runner hear in the low undergrowth?
A wet runner heard a **horrid** gadwell in the low undergrowth.

(37) What kind of animal did a wild welder scare with a shovel?
Some wild welder scared a **sordid** duntick with a shovel.
(38) What kind of animal did a young father catch in the middle of the day?
A young father caught a **tired** flicker in the middle of the day.
(39) What kind of animal did a mad woman show how to leave the forest?
A mad woman showed a **fuzzy** junco how to leave the forest.
(40) What kind of animal did an old inmate tell where the money was?
Some old inmate told a **clueless** mallard where the money was.

10b. Speech materials of Experiment 3 (focus particles), German sentences

Practice sentences

1. Welches Tier erschreckte die Katze im Schilf?
   Die Katze erschreckte nur eine weiße Ninte im Schilf.
2. Welches Tier zwang die letzte Dürre zur Nahrungssuche in Städten?
   Die letzte Dürre zwang sogar scheue Mieben zur Nahrungssuche in Städten.
3. Welche Tiere finden im hohen Strauch großflächig Schatten?
   Im hohen Strauch finden grüne Schraken großflächig Schatten.
4. Welches Tier jagte eine schwarze Katze im Stadtpark?
   Eine schwarze Katze jagte die wilde Girle im Stadtpark.
5. Welche Tiere weckte lautes Geschrei mitten in der Nacht?
   Lautes Geschrei weckte sogar die schlafenden Stimbler mitten in der Nacht.

+ Particle +Accent +Target

(1) Welches weiße Tier erschreckte der Marder im Lager?
Der Marder erschreckte nur einen weißen **Geibar** im Lager.
(2) Welches schwache Tier fütterte der Jäger mit etwas Fleisch?
Der Jäger fütterte sogar eine schwache **Lumbe** mit etwas Fleisch.
(3) Welches freche Tier verjagte das Wiesel im letzten Moment?
Das Wiesel verjagte nur einen frechen **Dielbrül** im letzten Moment.
(4) Welches stille Tier machten die Kinder für den Krach verantwortlich?
Die Kinder machten sogar den stillen **Kabu** für den Krach verantwortlich.
(5) Welches singende Tier ahmten fahrende Sänger auf dem Hof nach?
Fahrende Sänger ahmten sogar eine singende **Nisbe** auf dem Hof nach.

- Particle +Accent +Target

(6) Welches wertlose Tier stahl der Junge aus der Zoohandlung?
Der Junge stahl einen wertlosen **Lorbis** aus der Zoohandlung.
(7) Welches kreischende Tier hielt der Autor auf seinem kleinen Hof?
Der Autor hielt eine kreischende **Mirbel** auf seinem kleinen Hof.
(8) Welches junge Tier schnitt eine Sense mitten in die Klaue?
Eine Sense schnitt einen jungen **Drobel** mitten in die Klaue.
(9) Welches zähe Tier fraß ein Grizzly vor seiner Höhle?
Ein Grizzly fraß einen zähen **Motbot** vor der seiner Höhle.
(10) Welches winzige Tier quälten Kinder in der Küche?
Kinder quälten ein winziges **Giebeh** in der Küche.

+ Particle +Accent -Target

(11) Welches gleitende Tier sah der Esel weit hinter sich?
Der Esel sah nur eine gleitende **Naima** weit hinter sich.
(12) Welches scheue Tier untersuchten die Studenten in Vermont?
Die Studenten untersuchten nur einen scheuen **Fistis** in Vermont.
(13) Welches zahme Tier lockte ein Fußgänger mit Futter?
Ein Fußgänger lockte sogar einen zahmen **Glairol** mit Futter.
(14) Welches verwaiste Tier zog ein Maler im Haus auf?
Ein Maler zog sogar eine verwaiste **Grankel** im Haus auf.
(15) Welches wütende Tier schien der Lehrer sehr zu fürchten?
Der Lehrer schien nur den wütenden **Zilkzal** sehr zu fürchten.

- Particle +Accent -Target

(16) Welches verirrte Tier scheuchte ein Mann von den Gleisen?
Ein Mann scheuchte den verirrten **Kektor** von den Gleisen.
(17) Welches furchtsame Tier fand ein Häftling im Lagerhaus?
Ein Häftling fand eine furchtsame **Rauke** im Lagerhaus.
(18) Welches hungrige Tier halten Schlangen vom Futterhaus fern?

Schlangen halten einen hungrigen **Gralis** vom Futterhaus fern.

(19) Welches flinke Tier scheuchte das Kind in den Wald zurück?
Das Kind scheuchte einen flinken **Fölser** in den Wald zurück.

(20) Welches schwache Tier versorgte die Frau im Freigehege?
Die Frau versorgte eine schwache **Morne** im Freigehege.

+ Particle -Accent +Target

(21) Was für ein Tier hielt der Jäger in seinem Holzlager?
Der Jäger hielt nur einen **alten** Trobon in seinem Holzlager.

(22) Was für ein Tier setzte der Künstler auf den Schoß des Models?
Der Künstler setzte sogar einen **dicken** Nambay auf den Schoß des Models.

(23) Was für ein Tier trat der Hengst zielsicher im Stall?
Der Hengst trat sogar einen **lästigen** Stärbich zielsicher im Stall.

(24) Was für ein Tier fing ein Schüler in der Schulmansarde?
Ein Schüler fing nur einen **lila** Tengbral in der Schulmansarde.

(25) Was für ein Tier sah ein Radler vor dem Haus fliegen?
Ein Radler sah sogar eine **muntere** Zabe vor dem Haus fliegen.

- Particle -Accent +Target

(26) Was für ein Tier führte eine Ente in ihr Nest?
Eine Ente führte einen **kleinen** Terbek in ihr Nest.

(27) Was für ein Tier verscheuchte der Hund vom Dorfteich?
Der Hund verscheuchte einen **schwarzen** Trubal vom Dorfteich.

(28) Was für ein Tier zwang Schneefall dazu, Schutz zu suchen?
Schneefall zwang einen **wilden** Sibrit Schutz zu suchen.

(29) Was für einem Tier half ein Jogger aus der Falle?
Ein Jogger half einer **hackenden** Lerba aus der Falle.

(30) Was für einem Tier trat ein Fohlen auf den langen Schwanz?
Ein Fohlen trat einem **frechen** Schwirbik auf den langen Schwanz.

+ Particle -Accent -Target

(31) Was für ein Tier schoss der Förster in der Schutzzone?
Der Förster schoss sogar eine **seltene** Firka in der Schutzzone.

(32) Was für ein Tier griff die Natter tief im Urwald an?
Die Natter griff sogar einen **grauen** Hokto tief Urwald an.

(33) Was für ein Tier verschlang der Tiger auf der Stelle?
Der Tiger verschlang nur den **schlafenden** Sirgler auf der Stelle.

(34) Was für ein Tier fraß die Echse auf dem Felsen?
Die Echse fraß nur einen **mageren** Quentzal auf dem Felsen.

(35) Was fand ein Händler vor seinem Ladenfenster?
Ein Händler fand nur einen **roten** Lortor vor seinem Ladenfenster.

- Particle -Accent -Target

(36) Was für ein Tier hörten die Kegler im neuen Vereinshaus?
Die Kegler hörten eine **verirrte** Hirka im neuen Vereinshaus.

(37) Was für Tiere mögen Kamele auf ihrem Rücken?
Kamele mögen **kratzende** Schmaitzer auf ihrem Rücken.

(38) Was für ein Tier fing der Vater für seine Tochter?
Der Vater fing einen **schillernden** Kienant für seine Tochter.

(39) Was für ein Tier warnten Affen vor der Gefahr?
Affen warnten einen **müden** Tandar vor der Gefahr.

(40) Was für ein Tier setzte jemand mitten im Januar aus?
Jemand setzte eine **teure** Teise mitten im Januar aus.

11. Distribution of particles

Crosstabulation of particle by language

		language	
sentence type		German	English
no particle		10	10
with particle	sogar	6	0
	nur	4	0
	even	0	6

	only	0	4
total		20	20

12. List of word items, Experiment 3

12a. List of target items in the recall part (English) with classification:

target	**similar**	**false**	**false**
camber	camter	sheafill	shearill
cobbin	covin	jestrit	jestlit
dubbon	dugon	keeder	keefer
gabbet	garret	sistal	sisfal
gombie	gonzie	lubar	lumar
karbel	karnel	konkbar	konkrar
kilbit	kilfit	nesmal	nesgral
kimbal	kimqual	vabbar	vaggar
koalblink	koalkrink	collet	corret
labray	latray	gemto	genzo
neebat	neeshat	meldur	melfur
ombrey	omgrey	hilky	hilty
rabbot	ratzot	shistil	shissil
reeber	reeler	taddle	taffle
scolbor	scolfor	keafil	keashil
sibberd	sitterd	dultur	dulmur
timboe	timtoe	marlor	margor
torba	torva	climbo	climgo
tumbel	tumsel	clerret	clecket
verbin	verlin	seskal	sestal

12b. List of filler items in the recall part (English) with classification:

target	**similar**	**false**	**false**
cador	cavor	rubat	rufat
curlew	curnew	teebit	teevit
dartford	dartport	vebbet	vegget
dunnock	durrock	sceeber	sceefer
duntick	dumbick	millom	minnom
fegget	fesset	sostor	sosfor
flicker	flibber	carler	carser
gadwell	gadbell	rembit	remmit
ganta	ganza	colber	colter
hacky	haddy	ribbo	rinto
junco	junfo	floazer	floaner
kestrel	kesbel	donack	domack
mallard	maddard	dortfir	dortshir
merlin	merbin	deelock	deetock
ralter	raller	silbor	silfor
shuntill	shunmill	dinnel	dingle
siskin	sistrin	hollet	honnet
sustard	susquard	nober	noger
tiskit	tislit	galta	galfa
wartler	warfler	ruetar	rueglar

12c. List of target items in the recall part (German) with classification:

target	similar	false	false
Dielbrül	Dieltrül	Fesal	Femal
Drobel	Dromel	Grasik	Gramik
Geibar	Geilar	Keulor	Keutor
Giebeh	Giefeh	Tarlos	Tarfos
Kabu	Katu	Schiwo	Schiro
Lerba	Lerta	Gölza	Gölka
Lorbis	Lornis	Michon	Minon
Lumbe	Lumse	Grifra	Gritra
Mirbel	Mirfel	Zürstitz	Zürfitz
Motbot	Motlot	Stister	Stitzer
Nambay	Namday	Virku	Virsu
Nisbe	Nisge	Harma	Harta
Schwirbik	Schwirlik	Farnun	Farkun
Sibrit	Sifrit	Hutus	Hufus
Stärbich	Stärlich	Tulris	Turlis
Tengbral	Tenkral	Zammik	Zannik
Terbek	Tersek	Tumink	Tusink
Trobon	Troquon	Gleimig	Gleizig
Trubal	Trukal	Hortus	Horkus
Zabe	Zawe	Filsa	Filka

12d. List of filler items in the recall part (German) with classification:

target	similar	false	false
Fiekra	Firba	Traune	Trausche
Fistis	Fiskis	Golgur	Golchur
Fölser	Fölfer	Kwistal	Kwitschal
Glairol	Glaibol	Mustel	Mutzel
Gralis	Grabis	Kobitz	Konitz
Grankel	Grantel	Kergat	Kernat
Hirka	Hirva	Ginkel	Ginzel
Hokto	Hokro	Södter	Söwer
Kektor	Keklor	Terlin	Telzin
Kienant	Kielant	Graspit	Grasfit
Lortor	Lorzor	Glistis	Glisfis
Morne	Morbe	Reika	Reicha
Naima	Naida	Merte	Merse
Quentzal	Quenbal	Hojus	Hovus
Rauke	Rause	Tielwa	Tielza
Schmaitzer	Schmaiber	Kimtor	Kirfor
Sirgler	Sirgzer	Kaulo	Kauro
Tandar	Tanbar	Schläuber	Schläurer
Teise	Teische	Fenga	Fenna
Zilkzal	Zilkbal	Serdit	Sermit