Do we know the answer? – Variation in yes-no-question intonation[*]

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1.   Introduction

It is generally assumed that a question intonationally is accompanied with a certain question tune, usually characterized by a final rise in pitch (e.g. Bolinger 1978). Haan (2001) in a production study of Dutch question intonation, for instance, has shown that in 86.6 % of the cases a question is realized with a final rise. In particular, yes-no-questions with declarative syntax are marked with this feature to a 100 % (cf. (1a)), whereas 94 % of the yes-no-questions with question syntax (cf. (1b)), and only 64 % of the wh-questions exhibit a final rise (cf. (1c)). Since Haan's aim is to compare several acoustic features generally associated with the intonation of questions with those of statements, her study is not concerned with the intonational variation *within* a certain question type. In other words, the study does not discuss why speakers do have an intonational choice with respect to the final rise. Yet, 6 % of the syntactically inverted yes-no-questions have *not* been produced with a final rise.

(1)   A declarative question as a subtype of yes-no-questions (a), a yes-no-
       question, marked by inversion (b), and a wh-question (c) (examples from
       Haan 2001: 70).

    a.   Renée heeft nog vlees over?
        "Does Renée have any meat left?"
    b.   Heeft Renée nog wat vlees over?
        "Does Renée still have some meat left?"
    c.   Wat heeft Renée nog voor vlees over?
        "What kind of meat has Renée still left?"

If we consider German question intonation, the tonal characteristics of yes-
no-questions seem to match the general pattern of a final rise in pitch. According
to the intonational accounts of Standard German yes-no-questions ending low in
pitch have not been proved (e.g. von Essen 1964, Féry 1993, Grice & Baumann
2000).[1] Although carried out in different frameworks, the studies of von Essen
(1964) and of Féry (1993) seem to agree on the basic intonational properties of
question intonation in Standard German. Yes-no-questions are characterized by a
final rise in pitch, and the accent pattern can either be falling (2a and 3a) or
rising (2b and 3b). In the notation of the autosegmental metrical model of
intonation (Pierrehumbert 1980, Ladd 1996) on which the present study is based,
too, the final rise is expressed by a high boundary tone as in (2) and (3).

(2) Yes-no-question "Entscheidungsfragen" (von Essen 1964:45f.)[2]

    a.   **H*L**   **H%**

    b.   **L*H**   **H%**

    Ist der B̲o̲te schon dagewesen?

    "Has the messenger already been here?"

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[1] But see Kohler (1977:199) who explicitly points to both rising and falling yes-no-questions
     as a consequence of his model of intonation.

[2] The tonal transcription in (1) is our adaptation of von Essen's pitch contours.

(3) A fall-rise in (a) and a simple rising tone in (b) (Féry 1993:91, 87)

    a.   **H*   L   H%**

            Mögen Sie ROGGENbrötchen?

            "Do you like ryebread rolls?"

    b.   **L*   H**

            Tauschen Sie auch BRIEFmarken?

            "Do you also exchange stamps?"

In this model, a pitch contour is decomposed into the tonal levels low (L) and high (H). Additionally, two different categories of tones are assumed, i.e. pitch accents and boundary tones.[3] Boundary tones are associated with the end of an intonation phrase and the tonal symbol carries the percentage (%) as a diacritic. Pitch accents can either be monotonal (L or H) or bitonal (a combination of L and H). Pitch accents are associated with metrical strong syllables and are marked with an asterisk (*) as a diacritic.

In contrast to the intonational accounts of German mentioned above, yes-no-questions with *falling* intonation seem to occur in Standard German as well. In a corpus study of conversational data of Northern German, a variety closely related to the Standard, Selting (1995:234) observes 51 yes-no-questions with rising intonation but also 14 with falling intonation.[4] We make a similar

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[3] A third category, phrase accents, is assumed as well. Since phrase accents are not relevant for the present study, we leave them aside here. For further discussion of phrase accents within the theory of intonational phonology, see the work of Pierrehumbert & Beckman (1988), Ladd (1996), and Grice, Ladd & Arvaniti (2000).

[4] Selting provides also a functional differentiation of falling and rising patterns: a falling tune is related to re-focussing of a conversational topic (p. 264ff), while rising tunes are related to new-focussing topics (p. 247ff).

observation in our corpus of Upper Saxon German that contains several hours of free conversations as well as map task dialogues (Anderson et al. 1991).[5]

In a recent study on Bari Italian, a variety spoken in the South of Italy, Grice and Savino (1997) analyzed yes-no-questions in map task dialogues. Since Italian uses no distinct question syntax, the authors are particularly interested in how speakers signal confirmation and information questions intonationally. The authors hypothesize that the information status of the answer may be related to the accent pattern of the question. A sentence as (4) can be interpreted in three ways: either as a statement (4a), or as an information question (4b), or as a confirmation question (4c).

(4)   Vado a destra (Grice & Savino 1997:29)
        a.   statement   "I go to the right."
        b.   QUERY   "Do I go to the right?"   L+H* L-L%
        c.   CHECK   "So, I go to the right?"   H+L* L-L%

                                                    and   L+H* L-L%

Following the notational conventions of map task speech, Grice and Savino distinguish between QUERIES, which can be referred to as 'information questions' (Bolinger 1989), and CHECKS, i.e. 'confirmation questions' (Bolinger 1989). They observe that QUERIES (4b) generally are realized with a rising pitch accent followed by a low phrase accent plus low boundary tone (L+H* L-L%). CHECKS (4c), on the other side, exhibit two distinct intonation patterns: a CHECK might either be realized like a QUERY or alternatively it can be realized with a falling pitch accent (H+L* L-L%). Grice and Savino conclude that the choice of accent pattern for CHECKS depends on information structure.

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[5] Surprisingly, Grice & Baumann (2000) do not report any instances of yes-no-questions with falling intonation although the intonation system proposed (GToBI) is empirically based on map task dialogues as in the present study.

If a CHECK is realized by means of a rising pitch accent, the speaker is asking for *new* information – as it is the case for QUERIES –, while a falling pitch accent signals that the question refers to *given* information. In recent follow up studies, Grice and Savino (2003a, b) extend their notation of information structure in that they take the speaker's consciousness into account. Thus, a three-way distinction of information status arises: besides given and new information speakers are conscious about accessible information as well. The intonation pattern that speakers use to indicate information or confirmation questions depends on the speaker's degree of confidence in the information being asked.

Based on the Italian findings and on the observed intonational variation in yes-no-question intonation in our corpus, this paper addresses the question whether intonational variation is predictable. The hypothesis is that the choice of a certain question tune is related to the information being asked due to its contextual embedding. If a speaker has an expectation of the answer since it has been subject to the previous conversation, the intonational question tune differs from a question where the speaker has no clue to the answer. This is to be tested on a corpus of spontaneous conversational speech of Upper Saxon German (henceforth USG).

2.   The corpus

2.1   Subjects

The speech data for the present study comes from recordings, which we have made in the city of Leipzig. A larger city is assumed to function as a center of a dialect and represents the regional variety.[6] Leipzig belongs to the central eastern

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[6] See also the research project on German dialect intonation, which focuses on urban varieties from all geographical parts of Germany (Auer et al. 2000).

part of the German dialect area and is classified as "Upper Saxon" (e.g. König 1998, Bergmann 1998, Russ 1998). In order to analyse the regional variety of Leipzig, subjects have been selected fullfilling the criteria of being born and raised in the urban area of Leipzig. Four male speakers have participated in this study. The age of the subjects ranges from 25 to 65 years.

2.2   Recordings

The recordings have been made at the subjects' homes in order to achieve maximal naturalness in conversation. Two subjects have participated in each conversation. The recordings have been made using a portable Sony DAT-recorder and two Sony tie-clip condenser microphones (ECM-TS125). A recording session consists of three parts: first, subjects have to summarize a story, which had been presented before on a video screen, and to discuss whether the story is fictional or based on actual events; second, the map task game (Anderson et al. 1991, Claßen 2000) has been carried out. Each subject functions as the instruction giver and the instruction receiver once, resulting in two map task conversations per session; third, a free conversation. The speech data chosen for the analysis here consist of four map task dialogues and two conversations (= four subjects).

The recording procedure for the map task is as follows. Two subjects are separated by a shield, thus, participants cannot see each other's map. One of them, the instruction giver, has to describe as accurately as possible a route, which is painted on the map. The instruction receiver's task is to draw the route on his map. Both maps contain a starting point and several different symbols, e.g. a caravan, a dragon fly, a fisherman. However, the two maps differ in three ways: (a) symbols are placed in a different order, (b) not every symbol occurring on one map is given on the other map, (c) symbols are labeled with different names. This procedure causes lively conversations and forces information and

confirmation questions. The participants have been informed that the experiment deals with how exactly information may be coded and transmitted. For that reason, they have been told, that deviations from the original route will be measured. Instructions have been not to gesture, but only to speak with each other.[7] No time limit for the task has been given. The map tasks chosen for this study are maps II and III taken from Claßen (2000).[8]

2.3   Data processing

Speech data have been digitized at a sampling rate of 16 kHz, 16 bit, mono format. The sound files have been transcribed and analyzed using Praat (© Boersma & Weenink 1992-2002). A total of four map task dialogues and two conversations have been analyzed in this study. The speech data have been transcribed according to GAT conventions (Selting et al. 1998), i.e. a system for transcribing conversational data. Phrases have been labeled intonationally using Pierrehumbert's (1980) tone-sequence model as a basis. Labeling has been based on auditory perception and visual inspection of F_0 traces.

2.4   Materials

In Standard German as well as in Upper Saxon German (USG), a yes-no-question may either have SVO or verb-subject-inversion syntax (cf. (5a) vs. (5b)). The syntactical construction of (5a) resembles a declarative while the verb initial position of (5b) syntactically marks a yes-no-question. For the present study questions of type (5b) have been chosen to avoid confusion with declarative intonation patterns. This might have been the case if we would have

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[7] As a consequence of the task, subjects have in fact only been looking at their respective maps since they have been engaged with the task. Thus, no eye contact and almost no attempt to gesture have occurred.
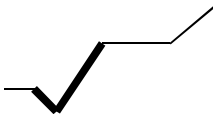
[8] I am grateful to Kathrin Claßen at the IMS Stuttgart who provided me her map task files.

considered yes-no-questions with declarative syntax. In total, 38 yes-no-questions with verb initial position have been detected in the corpus.

(5) a. A yes-no-question with SVO syntax

Der Marko **weiß** das?   – Ja / Nein

The Marko **know** it?   – Yes / No

"Marko does know it?"

b. A yes-no-question with VSO syntax

Weiß der Marko das?   – Ja / Nein

Know the Marko it   – Yes / No

"Does Marko know it?"

3. Intonation in Upper Saxon German yes-no-questions

The tonal analysis of yes-no-questions reveals two different intonation patterns which are shown schematically in (6a) and (6b). Both patterns contain a rising pitch accent, labeled as L*H. The starred tone (L*) is associated with the metrical strongest syllable, i.e. the syllable bearing word stress. The boundary tone, however, varies: speakers of Leipzig Upper Saxon exhibit both rising (6a) and falling patterns (6b). Out of 38 questions analyzed, the majority of cases, 74 % or 28 questions, are realized with a high boundary tone, thus with an overall rising intonation pattern. 26 % of the questions are realized with falling intonation.

(6) a.   L* H   H%   b.   L* H   L%

A typical example of a yes-no-question with rising intonation is given in Figure 1. The nuclear rising pitch accent is realized on the penultimate syllable of the phrase final word *Desperados* – a kind of beer (cf. (7)). The phrase contains a rising pitch accent, L*H as in (6), which is followed by a final rise on the last syllable. We analyze the final rise as a high boundary tone, H%. The tonal association with the text is given in (7).
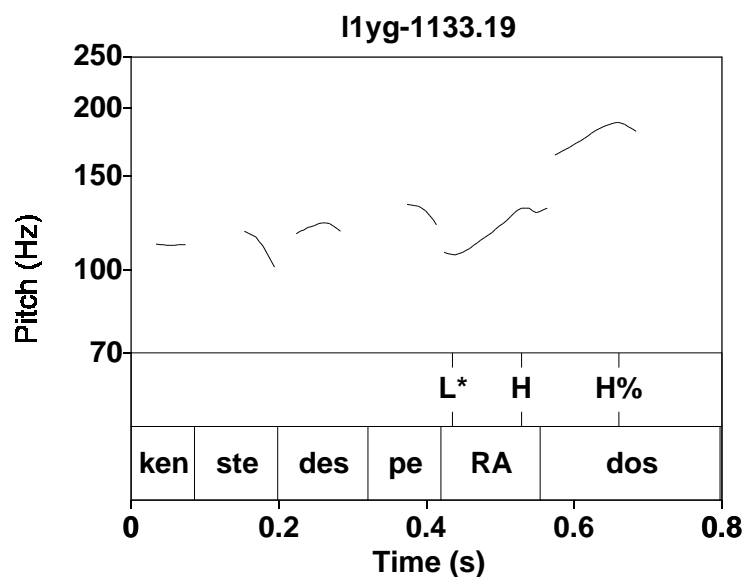

Figure 1: Pitch track of the phrase "Do you know Desperados?".

(7)   Kennst du Des.pe.ra.dos?   "Do you know Desperados?"

                            | |

                       L*H H%

Figure 2 displays a typical yes-no-question with falling intonation. Again, the nuclear accent is a rising one (cf. (6)) realized on the penultimate syllable of the phrase final word. In contrast to (7), the pitch falls to the end of the phrase, exhibiting a low boundary tone. See (8) for the tune to text relation.

If we compare the USG tonal patterns with those of Standard German, we observe two kinds of differences. First, with respect to the nuclear pitch accents

which may occur in a yes-no-question, Standard German exhibits an intonational choice between a nuclear falling and rising pitch accent (cf. (2) and (3)). In USG, on the other side, we only observe a rising pitch accent in our corpus (cf. (6)). We find, thus, a distributional restriction concerning the type of pitch accent in USG as shown in Table 1.
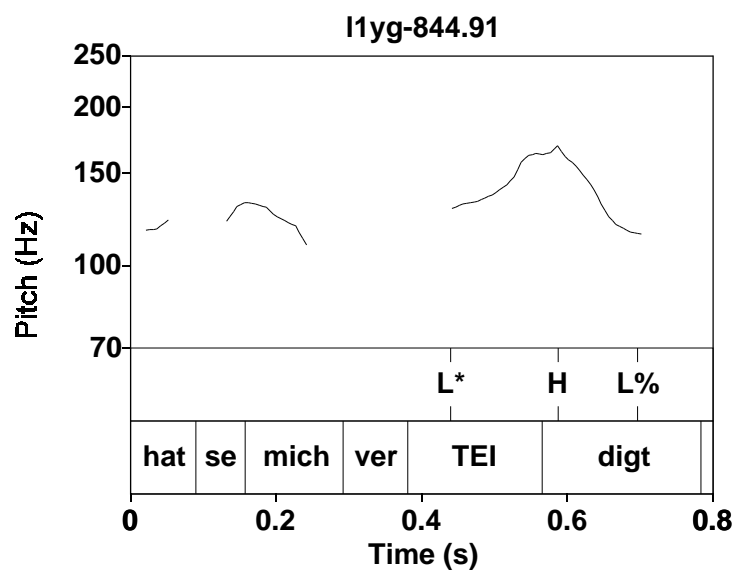
Figure 2: Pitch track of the phrase "Does she have defended me?".

(8)   Hat sie mich ver.tei.digt?   "Does she have defended me? "

                | |

           L*H L%

Table 1. Distribution of question tunes in USG and Standard German.

	USG	Standard German
Yes-no-question	L*H H%	L*H H%
tunes	-	H*L H%
	L*H L%	-

Second, with respect to the boundary tones, we find both a low and a high boundary tone in USG, while both von Essen (1964) and Féry (1993) do not report any low boundary tones for yes-no-questions (see Table 1). However, in conversational speech of Northern German, which is closely related to Standard German, yes-no-questions with falling intonation occur (Selting 1995). Since the speech materials of von Essen and of Féry are read speech and that of Selting and our study is spontaneous speech, the absence of yes-no-questions with falling intonation might be a characteristic of read speech.

4.   Intonational variation and information structure

Our tonal analysis of USG yes-no-question intonation results in two distinct intonational patterns (cf. Table 1). This section is concerned with an attempt to relate these patterns to information structure. The hypothesis is that the observed intonational variation is related to the speakers' expectation of the information status of the information being asked for. This assumption is based on the work by Grice and Savino on Italian map task dialogues (1997, 2003a, b). Their results show that the choice of pitch accent type depends on the speaker's degree of confidence in the information status of the answer. In order to define the information status of the answer we have to consider the context. From the content of the conversation prior to the question we are able to discover whether the information being asked for has been subject of discussion or not. If the interlocutors have mentioned the topic of an answer before, we conclude that the speaker may have an expectation of the answer. The expectation is based on contextual and situational information. If the speaker does not know the answer, i.e. the information status of the answer is open, the information status of the answer has not been subject of the previous conversation.

A different interpretation of the variation between rising and falling intonation in questions is proposed by Bartels (1999). In her model, Bartels concentrates on interclausal dependencies to account for the observed intonational variation and leaves interactive attitudinal aspects aside due to their complex contextual interaction. In particular, Bartels does not consider the factor speaker expectation which has been shown to be valid by Grice & Savino. According to Bartels three distinct intonational patterns may accompany a yes-no-question in English (see Table 2). With respect to the main pattern *rise*, Bartels additionally distinguishes between a *low* and a *high* rise.

Table 2. Accent patterns in English yes-no-questions
(from Bartels 1999:124ff)

	low rise	high rise	fall	fall-rise
Intonation pattern in yes-no-questions	L* H-H% (L*H-L%)	H* H-H%	H* L-L%	H* L-H%
Presence of ASSERT morpheme	[-ASS]	[-ASS]	[+ASS]	[+ASS]

In her analysis, Bartels develops a pragmatic concept of *assertiveness*. Any sentence, independent whether a statement or a question, may receive an abstract assertiveness morpheme. Then, a feature [+ASS] is attached to that sentence. In the other case this feature is absent. Further, she distinguishes two types of yes-no-questions, namely *whether-questions* and *if-questions*.[9] The former show a close relation to alternative questions in the sense that they are semantically and pragmatically equivalent. In this respect, *whether-questions* bear a two-way

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[9] Bartels proposes the terms *whether-question* and *if-question* due to her analysis of a yes-no-question's capacitiy to be embedded in clauses with the conjunction *whether* or *if*. By conducting this kind of syntactic test, Bartels analyzes the underlying structure of direct yes-no-questions.

presupposition of the proposition itself, while *if-questions* show an absence of a sentential presupposition in that they put their surface proposition under discussion. Based on the categorical distinction of two types of yes-no-questions, Bartels argues that *whether-questions* bear the feature of *assertiveness* due to their presuppositional properties. On the other side, *if-questions* have no assertiveness-feature attached since they lack a sentential presupposition. Bartels' intonational analysis reveals a correlation between the assumed phrase tones and the assertiveness-feature: a low phrase tone (L-) represents the tonal implementation of the assertiveness morpheme attached to the utterance, while a high phrase tone (H-) signals the absence of that morpheme (cf. Table 2). What remains open, to my view, however, is the phonetic reality of the low phrase tone. In other words, the assumption of phrase tones and their meaning with respect to assertiveness seems to be motivated by theoretical concerns.

Since we are dealing with conversational speech we follow the approach by Grice and Savino considering the conversational background of the speakers as an analysis cue to the speaker's choice of intonational pattern. Thus, we assume that the conversational context provides evidence for the speaker's expectation about an answer.

Consider the context of (7) which is given in (9). In this passage of the conversation, speaker 1 (s1) is telling a story about a disco night that he has been to with some friends. At that place they have had a lot of different drinks. At that time of the conversation s1 is asking speaker 2 (s2) whether he knows Desperados, a kind of beer (line 3). s1 does not know whether s2 has been to that place, too, or whether he has had that kind of beer elsewhere since this has not been topic of the conversation before. s1 has, thus, no contextual or situational clue to know the answer. We may thus conclude that s1 has no expectation about the answer, i.e. he is asking for new information (=information question).

Intonationally, this phrase ends high. The rising pitch accent is followed by a high boundary tone (cf. Fig. 1).

(9)   **l1yg-1133.19**

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       1   s1:   wir ham (.) alles möglische getrunken
                 we have been drinking everything
       2         wir ham
                 we have
 -> 3            kennst du desperados
                               L*H  H%
                 do you know desperados
       4   s2:   ne
                 no
       5   s1:   das is so n (.) so n komisches bier
                 that's a a funny beer
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The context of a typical example of a yes-no-question with falling intonation (cf. (8)) is given in (10). The two interlocutors (s1 and s2) are talking about a good friend of theirs. This person has had a conversation with another friend. Since s2 often behaves jokey, the friend of s1 and s2's friend believes that s2 can never be serious. The conversation passage here is about the person talking to s1's friend that s2 cannot be serious. From the previous context we know that s2 knows his friend very well and vice versa. Thus, he assumes that his friend has defended him. s2 is convinced that his friend must have defended him. So he expects the answer to be yes, which s1 is then confirming. In this example, s2 asks for given information due to his expectation of the answer. The question can be classified as a confirmation question. The question *Hat sie mich verteidigt?* "Does she have defended me?" in line 5 is realized with a nuclear rising pitch accent but falling intonation, i.e. a low boundary tone (cf. Fig. 2).

(10)   **l1yg-844.91**

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       1   s1:   er hat=s
                 he has
       2         er hat=s ihr dann noch ma so (-) gesagt
                 he has been saying it to her
       3   s2:   m=m
                 m=m
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      4          was hat se wie hat sie reagiert
                 what does she how does she have responded
  -> 5          hat sie misch verteidigt
                                     L*H  L%
                 does she have defended me
      6          ey
                 ey
      7  s1:    eh ja
                 eh yes
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To sum up, the analysis of the two contexts given above reveals that speakers tend to utter two different kinds of yes-no-questions. In fact, this is true for all of the 38 analyzed yes-no-questions in our study. We observe the distinction made by Bolinger (1989) between information and confirmation questions in our USG data as well. Moreover, we observe a correlation between these two kinds of questions and their intonational shape. A yes-no-question ending in high pitch is an information question, where the speaker has no expectation of the answer (cf. (9)). In this case, the information status of the answer has not been subject of the previous conversation. However, a yes-no-question may end in low pitch. A question like this we may classify as a confirmation question (cf. (10)). In this case, the speaker has an expectation of the answer. The conversational or situational context provides enough information so that the speaker has an idea of the information status of the answer.

5.   Conclusions and discussion

For the present study, we have examined intonation patterns of yes-no-questions in Upper Saxon German (USG). With respect to the syntactical structure of the yes-no-questions we have chosen the VSO-type to avoid confusion with declarative patterns (SVO-type). The yes-no-questions have been extracted from a corpus of conversational speech containing both map-task dialogues and free conversations. Thus, every question is embedded in a natural conversational

context. The tonal analysis reveals that a yes-no-question in USG may be expressed by two distinct intonational patterns, i.e. an overall falling and an overall rising intonation pattern. In terms of a tone-sequence analysis (e.g. Pierrehumbert 1980), the former is indicated by a low, the latter by a high boundary tone. Concerning the pitch accents, a yes-no-question contains obligatorily a rising nuclear pitch accent (L*H). The overall falling pattern, however, occurs less frequently in the corpus than the overall rising pattern.

Based on the results of Grice & Savino (1997, 2003a, b) we have conducted a contextual analysis to relate the distinct intonation patterns to a different information status of the answer. As for pitch accents in Bari Italian, the intonational variation found in the boundary tones in USG is accompanied by the speaker's expectation of the information status of the answer. A low boundary tone signals that the speaker has an expectation of the answer, that is, he is asking for mutually shared information. This is a case of a confirmation question (Bolinger 1989). On the other side, a high boundary tone signals that the speaker is asking for new information that has not previously been mentioned in the conversation. The speaker has no expectation of the answer in this particular case. This is a true information question (Bolinger 1989). Our results indicate that the choice of the boundary tone depends on the degree of confidence of the speaker as to whether the answer contains given or new material. Thus, languages differ in the phonological entities, which signal the degree of the speaker's confidence.

The results presented here may also explain the intonational variation in Dutch yes-no-questions observed in Haan's (2001) data. Even if the production task that Haan carried out did not provide any further context to the subjects, it could be the case that the absence of the final rise in 6 % of the yes-no-questions is due to the fact that the speakers might have had an expectation of the answer

in that particular situation of the recording. However, this has to be left hypothetical since we by no means come to know what the speakers had in mind.

If we compare the results of USG question intonation with Standard German we observe that yes-no-questions with falling intonation seem not to occur in Standard German (e.g. von Essen 1964, Féry 1993, Grice & Baumann 2000). A first interpretation may lead us to assume that falling intonation in USG yes-no-questions is a dialect specific intonation pattern. However, Selting (1995) in her analysis of conversational data of North West German, a variety that is comparable to that of Standard German, also observes yes-no-questions ending low. The speech data of the present study and Selting's data consist of spontaneous conversational speech while the speech materials of von Essen (1964) and (Féry 1993) consist of isolated read sentences or read questions answer pairs without any further context. From that, we assume the intonational variation observed in USG yes-no-questions to be due to the type of data, i.e. spontaneous speech, rather than a dialect specific phenomenon.

The type of material of the present study has caused us to follow the approach of Grice and Savino (1997) rather that that of Bartels (1999) interpreting the intonational variation. We have shown that a contextual analysis provides information about the speakers' expectation of an answer to a yes-no-question. However, a further analysis of our data might even prove Bartels model although we have no phrase tones assumed for USG yet.

Further research on this topic has to consider yes-no-questions with declarative syntax (SVO-type). As mentioned before, we concentrated on yes-no-questions with verb initial position in order to avoid confusion with declarative intonational patterns. Considering yes-no-questions with declarative syntax, we have to be aware not analyzing simple declaratives. Using conversational data, however, provides us from this kind of error, since we may decide a declarative to be a yes-no-question on the basis of the context plus the

interlocutor's behavior. If a speaker in a *certain context* explicitly replies a *yes* or *no*, we may claim that the previous phrase must have been a yes-no-question.[10] An analysis that is based on the intonation phrase as a domain does not need to draw on the classical relation between syntax and sentence mood. A rather pragmatic approach leads to the desired results.

Indeed, preliminary analysis of declarative yes-no-questions reveal a similar behavior, that is, we can observe an interaction between boundary tones and information structure. This may even support Gunlogson (2001) who analyzed declaratives with rising and falling intonation in English. Her conclusion is that the interplay of sentence type, intonation and context makes a declarative function as a question. On the contrary, this might contradict Haan's (2001) analysis of the pragmatic function of sentence type. She proposed a correlation where only a declarative yes-no-question carries the pragmatic function of a confirmation question, and only a yes-no-question with question syntax corresponds to an information question. As far as the yes-no-questions with question syntax are concerned, this proposal has already been refuted by the present study.

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[10] We are aware of the fact that in conversational data a *yes* or *no* may have the status of a backchannel. However, analyzing the speakers' behavior plus additional context we may differentiate between backchannels and yes-no-questions. Still, we will certainly find ambiguous cases, which we then simply have to exclude from the materials. As an example of a successful conversational analysis of this kind of data see Selting (1995).

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