

XVI. The interface of semantics with phonology and morphology

77. Semantics of intonation

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Abstract

This article concentrates on the meaning of intonation contours in English. It presents and combines results of Pierrehumbert and Hirschberg (1990) and Bartels (1999), among others, and adds new suggestions to issues that are unresolved there. In the resulting account, the H tone (often found in a falling contour) requires a salient proposition that the speaker is adding to the common ground; the H- tone (often found in a rising contour) requires a salient proposition that the speaker is putting up for question. The speaker- and addressee parameters employed by the intonation are shared with the interpretation of pronouns. The discussion concentrates on intonation in declaratives and in a range of interrogatives. It includes the role of intonation in vocatives and in echo questions.*

1. Introduction: between prosody/intonation and meaning.

Section 1.1. introduces to the mediating role of syntax between prosody and meaning. Section 1.2. places intonation in this picture and introduces to the analysis of intonation. The remainder of the article concentrates on the meaning of intonation contours in English.

1.1. Prosody and meaning.

When we parse a sentence, prosody and intonation seem to have a variety of effects on the interpretation of the sentence. Consider the prosodic divisions ‘|’ in the example (1) from Hirschberg (2004). (1a) has a compound reading of *rice wine*, i.e. a total of two ingredients are to be stirred in. In (1b), three ingredients, i.e. rice and wine and seasonings, are to be stirred in.

- (1) a. Stir in rice wine | and seasonings.
b. Stir in rice | wine | and seasonings.

Yet in the classical conception of generative grammar in (2) (e.g. Chomsky 1981, 1995) there is no direct connection between prosody/intonation and semantics. Instead, the

(5). The prosodic consequence, according to Jackendoff, is attraction of sentence stress, as in (5). The semantic interpretation has later been developed in the influential work of Rooth (1992). F requires the contextual presence of one or more alternatives that semantically share the background of the focus (in the cases discussed here: the non-focused parts of the sentence). In (5), they must share the background [x invited John] and be alternatives insofar they differ in x from the focus. These alternatives are in (5) alternative possible answers to the question: *Jane invited John, Sue invited John*, etc. Given Jackendoff's analysis in terms of the syntactic feature F, the analysis fits into the architecture of grammar in (2) in the same way as the analysis of (1) in (3): Syntactic elements (XPs, F) have consequences for prosody and have consequences for semantics. Different prosody ((1a)/(1b)), ((4)/(5)) reflects different syntax, which feeds into different semantic interpretations. Next to F(ocus), other information structure related features that have been argued to mediate between prosody and semantics are C(ontrastive) T(opic) (Büring 2003) and G(ivenness) (Féry & Samek-Lodovici 2006). Independent evidence for the syntactic nature of these features comes from their interaction with syntactic phenomena. For example, a natural class of focus movement and wh-movement to the same position is often analyzed in terms of the feature F (Haida 2007; see Truckenbrodt in press for the prosodic consequences of such a generalized F).

These information structure categories can show complex interactions with the semantic interpretation. Büring (1995: 109ff) accounts for the example (6) from Jacobs (1984) (the additions on the right are added here). With stress-placement as shown, the sentence only has a scope reconstruction reading (not all politicians are corrupt), while other stress-patterns also allow surface scope (e.g. *alle Politiker sind NICHT korrupt*, 'all politicians are NOT corrupt').

- (6) ALLE_F Politiker sind NICHT_F korrupt [aber MANCHE ... SCHON ...] (German)
 ALL_F politicians are NOT_F corrupt [but SOME ... ARE ...]

For the purpose at hand, the insight of Büring's account is rendered in a simplified form that employs only F (as marked in (6)), not the topics of Jacobs' and Büring's discussion. The reconstructed reading leads to an implicature that provides the required alternatives to the focused elements: *Not all ...* implicates that *some ... are ...*. In this implicature, the complex focus <all, not> finds the required contextual alternative <some, VERUM/are> with pairwise contrast (*all vs. some, not vs. verum/ARE*). The surface scope reading does not lead to a comparable implicature that would provide alternatives to the focus <all, not>. It is therefore ruled out by the alternative semantics of focus, which requires that the focus have contextual alternatives.

Pronoun interpretation also interacts with stress assignment, as in the classical example (7) from Lakoff (1971).

- (7) a. JOHN_i called BILL_k a REPUBLICAN and then he_i INSULTED him_k.
 b. JOHN_i called BILL_k a REPUBLICAN and then HE_k insulted HIM_i.

Lakoff's idea was that (7a) shows the unmarked construal, parallel between second and first clause, while stress on the pronouns leads to a marked interpretation, here the choice of inverse antecedents (see also Hirschberg & Ward 1991). The alternative semantics of focus leads to a more comprehensive account of the marked case (7b). A complex focus

<HE, HIM> is formed with the background [x insulted y]. The context must provide this background [x insulted y] with an instantiation of <x, y> different from the focus, i.e. an alternative to the focus. The context provides [x insulted y] on the assumption that John's calling Bill a republican constitutes an insult, with <x, y> = <John, Bill>. Under parallel binding of the pronouns, the alternative <John_i, Bill_k> would be referentially identical to the focus <HE_i, HIM_k>. Under inverse binding, the alternative <John_i, Bill_k> differs in reference from the focus <HE_k, HIM_i> as required by the alternative semantics of focus.

For semantic stress-effects of this kind, we do not seem to require additional connections between prosody/intonation and semantics in the grammar. It seems that the correct way of analyzing them is in terms of a modular account that relies on the indirect prosody-semantics connection given to us in the theory of F and CT and G. See also Baltazani (2002) and Ishihara (2010) for investigations in this domain.

1.2. Intonation and meaning.

The remainder of this article is about the meanings of intonation contours, largely concentrating on English. I primarily draw on Pierrehumbert & Hirschberg (1990) and Bartels (1999), who (building on Gussenhoven 1984) treat intonational meaning at a level of abstraction that is high and interesting enough for a semantics handbook. They show a number of differences in their conclusions and a range of open issues. I discuss what I think are the best parts of both and add some new elements, including a more detailed formalization in terms of presuppositions. I concentrate on H*/L* and H-/L-, central elements of the English intonation system for which a formal semantic account is within reach.

To begin with, consider (8), which shows that rising intonation [/] turns an elliptical utterance into a question and falling intonation leads to an interpretation as an assertion.

- (8) John and Mary are taking a break from work. John is getting up and looks at Mary.
- a. John: Coffee [/] (expressing: 'Do you want coffee?')
 - b. Mary: Coffee [\] (expressing: 'I want coffee.')

I assume the intonation analysis of English in Pierrehumbert (1980), Beckman & Pierrehumbert (1986). It has become the starting point for many investigations across languages, see Gussenhoven (2004), Ladd (2008). In this approach intonation contours are analyzed in terms of discrete H(igh) and L(ow) tones. The rise as in (8a) will stand for the sequence of tones L*H-H%, the fall in (8b) for the sequence H*L-L%. English contours from the nuclear stress to the right edge of an intonation phrase are composed of three tonal elements: First, a *pitch accent* on the nuclear stress; I concentrate on H* and L* in this article (see section 4.3 for other pitch accents). The same pitch accent often also occurs on preceding stressed elements as in (9) in section 2 below. The nuclear pitch accent is followed by a sequence of two edge tones. The first of them, H- or L-, is found in the area in between the nuclear stress and the end of the intonation phrase. The second of these, H% or L% is found at the right edge of the intonation phrase. The high and low regions defined by these tones can be seen separated in time in (10) and (12) below. H-/L- are analyzed as edge tones of the intermediate phrase, a smaller prosodic unit. They can also occur without the following H%/L% as in (13).

These tonal elements are conceived of as abstract morphemes (Gussenhoven 1984: ch. 6, Pierrehumbert & Hirschberg 1990, Bartels 1999, see also Bolinger 1957, 1989). The phonological side of these are the H or L tones that define high and low areas of the sentence melody. The semantic side is the semantic impact they bring to the utterance. What we want to get out of the semantic side is that (8a) constitutes a question and (8b) an assertion. I believe that these intonational morphemes need to be attached to the syntactic structure to fit into the architecture described here: As part of the syntactic structure, their semantic and phonological specifications are fed into the LF and PF components for interpretation. A specific suggestion for syntactic attachment is formulated in section 3.2.

There is a large array of descriptive observations in the literature about tunes that can be used on English example sentences and the nuances they seem to convey. The work of Bolinger (1957, 1986, 1989) in particular shows the great flexibility of tune choices. There are interactions with the syntactic sentence type, but the intonation often follows what the speaker wants to express. Gussenhoven (1984: ch. 6) initiated a search for more abstract meanings of elements of intonation contours in terms of the *common ground* (see Stalnaker 1978, 2002 and Clark 1996 on the notion common ground, though Gussenhoven employed a somewhat more narrow concept). The more specific suggestions of this search that I employ as a starting point are developed by Pierrehumbert & Hirschberg (1990), in the following *PH90*, and by Bartels (1999), in the following *B99*. We will see that B99 provides an approach to the flexibility of tune assignment. I often focus on cornerstone observations that seem to be promising for inferences about the tune meanings.

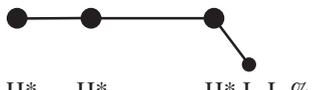
The intonation of declaratives is discussed in section 2, and the intonation of interrogatives in section 3. Related issues of tune meanings are addressed in section 4. The terms *declarative* and *interrogative* are here employed for syntactic sentence forms. The term *question* will sometimes also refer to the speech act.

2. Intonation in declaratives.

In this section the intonation of declaratives is discussed. Section 2.1. is about falling (H*L-) and rising (L*H-) intonation in declaratives. Section 2.2. about low intonation (L*L-) and section 2.4. about high intonation (H*H-) in declaratives. These latter two sections are separated by section 2.3. on the nature of intonational meanings, which will be crucial at that point.

2.1. H*L- as assertive, L*H- as non-assertive.

Bolinger (1957) distinguishes three pitch accents. His A accent, which he calls ‘assertive’, has two versions that would be analyzed as H*L-L% and H*L-H% in Pierrehumbert’s analysis. PH90: 290 also see these two as “neutral declarative intonation”, “appropriate when S’s goal is to convey information”. H*L-L% marks the standard assertion, as in (9) (PH90: 286).

- (9) 
- H* H* H* L-L %
- The TRAIN LEAVES at SEVEN. []

H*L-H% conveys assertion plus something else. The ‘something else’ may be plain continuation as in (10) (Beckman & Ayers 1993). The contour is also called *continuation rise*. However, it may also occur at the end of an utterance and add a note of uncertainty to what is asserted, as in (11) (B99: 34).

- (10)

H* L- H% H* H* L-L%

ANNA may know my name, and YOURS, TOO.

- (11) A: What’s your opinion – can we leave the car parked here?
 H* L- H%
 B: I THINK it’s alright.

The inverse contour, the rise, has its prototypical instantiation in L*H-(H%). L*H- is close to the C accent of Bolinger (1957), which he calls “anti-assertive”. L*H- is possible in declarative questions like (12) (Beckman & Ayers 1993, see also Bartels 1999: 228ff). The example (13) (PH90: 292) shows particularly clearly how the speaker can distance himself from the content with L*H-(H%) by turning declaratives into questions. (In this example, intermediate phrases are marked by round brackets, intonation phrases by square brackets.)

- (12)

L* H- H%

ANNA may know our names? [I]

- (13) Russian émigré joke; a staunch old Bolshevik is forced to confess publicly and reads:

L* H- L*H-H% L* H- L*H-H% L* H- L* H- H%

[(I was) (WRONG)] [(and STALIN) (was RIGHT)] [(I should) (APOLOGIZE)] [I]

The assertiveness of the fall resides in the H*L- combination according to Gussenhoven (1984), in the H* according to PH90, and in the L- according to B99. I find the position of PH90 convincing and review their motivation in connection with the additional combinations L*L- and H*H- on declaratives in the following sections. In addition, I develop a modification of the suggestion of B99. In the modification, H- has a question-related meaning. To begin with, (12) and (13) are questions and are marked by H-, while (9)–(11) are not questions and are marked by L-.

2.2. L*L- on declaratives: not new and not questioning.

The examples with L*L- in (14) and (15) differ from both groups H*L- and L*H- above.

- (14) [Question about wishes for birthday presents, where the desire for a Pavoni espresso machine is already mutually believed]

L* L* L* L-H%
WELL, I'd LIKE a PAVONI . . . [↘]

- (15) A: Let's order Chateaubriand for two.


B: I DON'T eat BEEF [↘] [conveys that A should have had this in mind]

They share with the H*L- cases in (9)–(11), with which they share the L-, that they are not question-like utterances. This separates them from the H- cases in (12) and (13), which have a clearly questioning flavor.

The L*L- cases also differ from the H*L- cases in (9)–(11). As pointed out by PH90, the H* in regular assertions like (9)–(11) correlates with the newness of the propositions presented there. The L* in (14) and (15), on the other hand, signals that the proposition is already given in the common ground. Thus, (14) is the repetition of an already jointly known wish. The reply in (15) could be said with H*L-L% in which case it would present this information as new. The realization with L* in (15) has an insulting effect according to PH90, because it suggests that the addressee should have had this in mind.

Adapting the suggestion that Gussenhoven (1984: ch. 6) makes for the fall, PH90 make the notion of newness conveyed by H* more precise in suggesting that the speaker seeks to add this information to the common ground, the shared beliefs or shared knowledge of speaker and addressee. This means that it must be new relative to the common ground. For example, in (16), (PH90: 290), the speaker may assume that the information is not new to the addressee. The speaker may still suggest to add this to the common ground in the sense that it is then also mutually believed. For this to work, the information must be new in the common ground, i.e. not already mutually believed.

- (16) 
You TURKEY [] You DELIBERATELY DELETED my FILES []

There are then two reasons not to mark something as new in that sense and to choose L* instead: it may not be believed by the speaker at the time of the utterance, as in (12) and (13), or it may be believed by the speaker but taken to be in the common ground already, as in (14) and (15). In both cases it makes sense that the speaker does not want to instruct the addressee to add the (salient) proposition to the common ground.

2.3. Greetings and vocatives: relevance of salient propositions.

This section makes a digression concerning the domain on which intonational meanings operate, by way of preparation for the discussion of H*H- on declaratives in the following

section. What do intonational meanings operate on? PH90: 289 illustrate their idea with the example [George(H*) likes pie(H*)]. Here an open expression [x likes y] is formed into which $x = \text{George(H*)}$ and $y = \text{pie(H*)}$ are instantiated. The meaning of H* operates on the instantiation of the elements carrying H*. It is not easy to distinguish this suggestion from that of Hobbs (1990), who simply assumes that intonational meanings operate on the propositional content.

An important innovation was argued for by B99. She postulated it for the assertive meaning she assigns to L-. This assertive meaning, she argued, operates on a salient proposition (rather than on the compositional at-issue content). While her assertive meaning for L- is not adopted here, her discovery that intonational meaning can operate on salient propositions is generally assumed for all intonational meaning here. Many of Bartels' arguments carry over to the current account, as will be seen in section 3. In the current section initial motivation for it is shown in connection with vocatives and greetings. For these the deployment of salient propositions leads to an arguably better fit of these cases with the meaning of H* in PH90 than the discussion by PH90 (with different propositions to modify) was able to provide.

According to PH90, the contour involving L* in (17) is chosen because there is no content of the greeting that could be added to the common ground. They call these elements 'extrapositional'.

- (17) L* L* L-H%
GOOD MORNING [_/]

Notice, however, that greetings with H* as in (18) are entirely possible. A talk show host would greet his audience with the intonation in (18b). This would be excluded by PH90's treatment, where there is no propositional content to be added to the common ground.

- (18) a. H* H* L-L% b. H* H* L-L%
GOOD MORNING [\] GOOD EVENING [/] ladies and gentlemen!

Employing salient proposition, we can say that the intonational meanings operate on the salient propositions 'I wish you a good morning' and 'I wish you a good evening' in these cases. This is marked as to be added to the common ground in (18). In (17), we could adopt PH90's original explanation, assuming the presence of content is optional. However, it is also possible that the speaker presents his wishing a good morning as given in the sense of predictable from the context: 'We both knew that I would wish you a good morning'. It might be taken to be predictable from the time of day and the fact of the encounter, or from similar greetings on earlier days. This may lead to the conventionalized flavor of the intonation pattern in (17).

I turn to vocatives. PH90: 293f point out that *Anna* is spoken with H* as in (19a) in case the speaker does not yet have Anna's attention, and with L* as in (19b) if the speaker already has Anna's attention. When the vocative follows the clause as in (19c), L* is the only choice.

- (19) a. H* L- H* L-L% b. L* H- H* L-L%
ANNA [\] your LUNCH is ready ANNA [/] your LUNCH is ready

- c. H* L- L*L-L%
Your LUNCH is ready, ANNA [__]

PH90's analysis of this is preliminary: The frequent use of L* harmonizes with their understanding that L* here marks an extrapositional element. However, the use of H* in (19a) is not compatible with a more precise analysis. An extrapositional element would not provide propositional content that the addressee could be instructed to add to the common ground.

A more complete account can be given in terms of salient propositions. The salient proposition is the one that underlies the interpretation of the vocative: 'Anna is the addressee of the utterance', or, more informally, 'I am talking to you, Anna'. Where this is common ground, the speaker has Anna's attention. Where the speaker does not have Anna's attention, it is not common ground that Anna is the addressee: Anna may not be aware of being the addressee, or the speaker may not realize that Anna is aware of being the addressee. In (19a), then, Anna's being the addressee is not common ground initially. H* is used as an instruction to add this proposition to the common ground. Notice that the addition of this to the common ground is typically equivalent to getting Anna's attention in two ways: (a) by way of H* marking 'I am talking to you' as to be added to the common ground, and (b) by making her listen (i.e. getting her to add something to the common ground in the first place). If the proposition is already in the common ground, i.e. if the speaker already has Anna's attention as in (19b), L* is used. (We may take the medial H- in (19b) to convey continuation, see section 4.2.) For the analysis of (19c), a context in the sense of Kaplan (1989) for the interpretation of the sentence is assumed. It is taken to include the parameters S(peaker) and A(ddressee). This context is relevant (a) to the interpretation of pronouns, for example 2nd person is [+A, -S], (b) for the identification of the addressee of the utterance in the meaning of the vocative and (c) for the identification of S and A in the intonational meanings (more on this in section 3.2). In (19c) the sentence that precedes the vocative is addressed to Anna. Anna is the addressee A of that sentence. We know this because addressee-reference to Anna is possible with second-person pronouns in that sentence. This happens to be illustrated with the pronoun 'your' in (19c). Therefore, by the end of the sentence, Anna's being the addressee can not be presented as new information any more. L* is therefore the only choice on the final vocative.

Portner (2007) assigns to vocatives expressive meaning in the sense of Potts (2005) (see also article 94 (Potts) *Conventional implicature*): either a requests for attention ('calls') or a reiteration of addresseehood ('tags' and 'addresses', the latter with an additional expressive element). He assumes that the classification rests on the intonation. In current terms the requests for attention are the vocatives marked H*. The current discussion is compatible with Portner's basing the distinction on the intonation. It seems that the intonation can derive the request for attention and the reiteration of addresseehood from a single underlying vocative meaning, as shown above. See Portner (2007) for other aspects of vocatives.

In summary, the pitch accents on simple greetings and vocatives fit with the analysis of H* in PH90, if the analysis is cast in terms of salient propositions. Since they are still assertion-like and not questions (cf. also the L- in (17)), the motivation for choosing L* is that the relevant proposition is already in the common ground, or presented that way.

Equipped with a notion of what intonational meanings operate on, we now return to the discussion of declaratives. After H*L-, L*H- and L*L- we will now address H*H- on declaratives. We apply our understanding of what intonational meanings operate on to declaratives as follows. In declaratives, the most salient proposition is the content of the declarative. It is therefore the first choice for intonational meanings to operate on. However, other choices are not excluded, in particular where the first choice is blocked, as we will see.

2.4. H*H-: news and a question.

Consider then the sequence H*H- on declaratives. H* asserts the content of the declarative and H- adds a separate question. In (20), the impact of the utterance is paraphrased by PH90: 290 as ‘My name is Mark Liberman, and are you expecting me, or, am I in the right place?’. Similarly, (21) is an utterance by a young woman who was asked after a movie whether she liked it. It conveys, according to PH90: 290, ‘I thought it was good, but do you agree with me?’

- (20) M. L. approaches a receptionist to find out whether he is in the right place for his appointment:



H* H* H- H%
My name is MARK LIBERMAN [-]

- (21) H* H* H-H%
I THOUGHT it was GOOD [-]

PH90 point out that the impact is different from L*H-H% (lacking the assertive H*). Use of L*H-H% in (20) would suggest that Mark Liberman has forgotten his name, and in (21) that the speaker has forgotten her impression of the movie. This supports the assertive role of H* in (20) and (21).

Hirschberg & Ward (1995) discuss similar cases of H*H-H% on declaratives, including the contrast in (22). In (22a) the caller, in addition to asserting her whereabouts, asks the DJ something along the lines of whether the DJ has heard of Skokie. A similar question is not possible in (22), since everyone has heard of Chicago.

- (22) Chicago radio station DJ: Good morning Susan. Where are you calling from?
 a. H*H-H%
 Caller: I'm calling from SKOKIE? [-]
 b. # H*H-H%
 Caller: I'm calling from CHICAGO? [-]

Hirschberg & Ward (1995) suggest that H*H-H% is employed (in addition to the assertion) “to elicit information about whether the hearer can relate this propositional content to the hearer’s own private belief space” (Hirschberg & Ward 1995: 410). They suggest that this component (though not the assertive part) is also present in the

L*H-H% contour. I adopt the suggestion that the rise (here: H-) seeks to “elicit information”, i.e. generates a question. I also agree in regard to the content of the question that arises in the examples at hand. I differ from Hirschberg & Ward (1995) only in that I think that we need to leave the choice of what is asked partly to the pragmatics. In (12) and in (13), the question that is posed is not about the connection to the addressee’s knowledge. Rather, the content of the proposition is put up for question there. I suggest that H- puts up a salient proposition for question. In (12) and (13), this is the content of the declarative. In (20)–(22), the content of the declarative is marked as to be added to the common ground by H*, and so cannot be simultaneously put up for question. Another salient proposition is therefore marked as put up for question. It is contextually chosen. Since utterances generally call on the addressee to connect what is being said to their beliefs, and since questions generally elicit addressee beliefs or knowledge, it seems reasonable that the most salient proposition that might be recoverably asked about is typically one in the connection between what is being asserted and the addressee’s relation to it, as in (20)–(22a). In the absence of such a salient proposition, as in (22b), it is not recoverable what proposition H- might mark, and infelicity results. I will return to this infelicity below.

Notice that (20)–(22) add striking support for Bartels’ discovery of intonational meaning in terms of salient propositions. The propositions on which the meaning of H- operates are very clearly not the literal meanings of these utterances, and are very clearly contextually chosen in these cases.

In comparison with other contours, H*H- in (20)–(22) shares with H*L- in (9)–(11) the newness of the asserted proposition, in contrast to the L* cases in (12) and (13) (not believed) and in (14), (15), and (19b) (given). Thus H* plausibly marks a proposition as new in the sense of ‘to be added to the common ground’.

H*H- in (20) and (21) shares with L*H- in (12) and (13) the questioning impact. This is here attributed to the H- that these cases share. The L- examples in (9)–(11) and in (14), (15), and (19b) do not show the questioning impact.

2.5. Summary: intonation in declaratives.

The preceding cases seem to motivate an assignment of meanings to the H tones as in (23). The L tones may be meaningless.

- (23) a. H* marks a salient proposition as new in the sense of an instruction by the speaker to add the proposition to the common ground of speaker and addressee.
 b. H- marks a salient proposition as put up for question by the speaker.

(23) applies as follows to the four classes we saw. The H*L- assertions in (9)–(11) are marked as to be added to the common ground by H* (and are not put up for question). The L*H- questioning utterances in (12) and (13) are put up for question by H- (and not marked as to be added to the common ground). The L*L- weak assertions in (14), (15) and (19b) are not put up for question (and thus remain statements, perhaps due to the declarative form); they are not marked as to be added to the common ground because their content is assumed to be given. The H*H- cases in (20) and (21) are marked as to be added to the common ground by H*, and a second salient proposition in the context is marked as put up for question by H-.

3. Intonation in interrogatives.

The intonation of interrogatives is a complex area. The following sections navigate it by going back and forth between observations from the literature that give the account empirical support and formal semantic suggestions that make the analysis more precise.

Section 3.1. introduces to an elementary puzzle concerning the intonation in interrogatives. It shows how the suggestion about H- developed above approaches this. Section 3.2. offers an implementation of the meanings of H- and H* in terms of presuppositions. Section 3.3. applies the presuppositional analysis to the cases in 3.1. in detail and to other instances of yes/no-questions. Section 3.4. shows how the implicature that there is a true answer to a question is often crucial for an understanding of intonation in interrogatives. Section 3.5. discusses the high-rise in yes/no-questions. Section 3.6. addresses the accommodation of the presuppositional question meanings. Sections 3.7. and 3.8. treat the rise in echo-wh-questions and the friendly rise in wh-questions.

3.1. First interrogative intonation and the relevance of salient propositions.

Let us begin the discussion of interrogative intonation with an old puzzle. Yes/no-questions are felt to be typical with rising intonation as in (24a). Wegener (1885) called German rising intonation “Verwunderungston”, ‘tone of wondering’, which we may read as a suggestion that the rise is inherently related to a question. I partly agree. In examples like the elliptical (8a) and the declaratives (12), (13), and (20)–(22), the intonation that includes H- seems to add questioning impact. There is no other source of the questioning impact in sight. However, as pointed out by Kretschmer (1938) in Vienna with comparable German examples, questions are of course not generally marked with a rise. Wh-questions as in (24b) are often felt to be typical with a fall, and alternative questions as in (24c) require the final fall. Thus it would be wrong to tie rising intonation too closely to the questioning speech act. Notice that the interpretation of the alternative question in (24c) has the possible answers {you went to Berlin, you went to Potsdam}. ‘Yes’ and ‘no’ are not possible answers. Rising intonation as in (24d) turns this into a yes/no-question with the possible answers {you went to Berlin or to Potsdam (“yes”), you didn’t go to Berlin or to Potsdam (“no”)}. The use of rising intonation in (24d) is parallel to (24a), except that the proposition that is put up for question in (24d) happens to contain a disjunction.

- (24) a. Did you go to BERLIN [↑] L*H-(H%)
 b. Where did you GO [↓] H*L-(L%)
 c. Did you go to BERLIN or to POTSDAM [↓] H*L-(L%)
 d. Did you go to BERLIN or to POTSDAM [↑] L*H-(H%)

Deviating from most previous literature (apart from Wegener 1885) I suggest that H- carries questioning meaning after all. My suggestion draws on Bartels’ analysis of the contours in (24) to which I return, and on Bartels’ insight of the relevance of salient propositions. Implementing the questioning meaning in terms of salient proposition, H- does not mark questions more generally. It only marks a salient proposition as put up for question. It is a primitive question indicating and question generating device that does not have the complexity to keep up with the semantics of interrogatives, which employs

sets of propositions (see e.g. Karttunen 1977). Nor does it always come into play when there is a questioning speech act. In (24a) then, the salient proposition ‘you went to Berlin’ is put up for question, and can be marked as such by H-. Similarly in the yes/no-question (24d), where the salient proposition ‘you are going to Berlin or to Potsdam’ is put up for question. In (24b) and (24c), no salient proposition is put up for question in a similar fashion. In a first approximation, there is therefore no motivation for employing H- in these cases. The move to assign the stronger questioning meaning (rather than absence of assertion) to H- is motivated by cases like the elliptical (8a) and the declaratives (12), (13), and (20)–(22), all of which are turned into questions by the intonation, without another source of the questioning impact in sight.

For further developing this picture below, I employ a more formal implementation of the relevance of salient propositions. This is developed in the following section.

3.2. A formal implementation of intonational meanings.

The relevance of salient propositions in intonational meanings is reminiscent of the relevance of salient individuals to the interpretation of definite descriptions. In the formalization of Heim (1982), this arises for definite descriptions from a presupposition over the referent of a syntactic index. The presupposition can only be satisfied if the index has an antecedent for which the presupposition is true (unless it is accommodated). A salient and unique index is required (Heim 1982: 165, 233–236 for uniqueness). In such an account, the meaning of definite descriptions is stated as in (25). Here g is a variable assignment and i is a syntactic index. Using this as a point of orientation, we may define the meanings of H* and H- in English in (26). S and A stand for speaker and addressee.

(25) $\llbracket \llbracket \text{the NP} \rrbracket_j \rrbracket^g$ is defined as $g(i)$ iff $g(i) \in \llbracket \text{NP} \rrbracket^g$

- (26) Let English have the intonational morphemes $\langle \text{H}^*, \text{new}_j \rangle$ and $\langle \text{H}^-, \text{question}_j \rangle$, where j is an index of type proposition. Let these morphemes right-adjoin to a syntactic constituent α . Then (ignoring the phonology in the semantic interpretation):
- $\llbracket \llbracket \alpha \langle \text{new}_j \rangle \rrbracket \rrbracket^{g,S,A}$ is defined as $\llbracket \llbracket \alpha \rrbracket \rrbracket^{g,S,A}$ iff S is adding $g(j)$ to the common ground of S and A.
 - $\llbracket \llbracket \alpha \langle \text{question}_j \rangle \rrbracket \rrbracket^{g,S,A}$ is defined as $\llbracket \llbracket \alpha \rrbracket \rrbracket^{g,S,A}$ iff S is putting up $g(j)$ for question.

The interpretations are presuppositions on the interpretation of α . In the typical case, α is an unembedded sentence, the intonational morphemes are taken to be syntactically attached to it, and to contribute a presupposition to its interpretation by (26). The content that the intonational meanings modify is not the meaning of α , but a salient proposition, $g(j)$ in (26). Just as the definite description ‘the book’ will look for a unique salient antecedent that is a book in the context, so $\langle \text{H}^*, \text{new}_j \rangle$ will now look for a unique salient antecedent proposition in the context that S adds to the common ground of S and A. The presupposition is satisfied, and the meaning of its sister α defined, if $\langle \text{H}^*, \text{new}_j \rangle$ finds such an antecedent. (I return to accommodation in section 3.6.) Similarly, $\langle \text{H}^-, \text{question}_j \rangle$ will look for a unique salient antecedent proposition that S puts up for question. We must assume that α is linearly ordered before the intonational morphemes and is interpreted first, so that the salient propositional antecedents for p are those that are salient *after* the

interpretation of α . The linear order of course corresponds to the fact that the edge tone H- is a tone of the right, rather than the left edge.

Notice that the logic of search for an antecedent proposition comes out in a more specific way in (26) than in Barel's more general suggestion that salient propositions are relevant. Consider first our comparison case. In the interpretation of *the book*, the antecedent must be a uniquely salient book. It need not be a uniquely salient individual as such, nor the most salient individual of all. Similarly, the consequence of (26) is that an antecedent proposition for H* is a uniquely salient *speaker-asserted* proposition, not a uniquely salient proposition as such, nor the most salient proposition of all. Similarly, an antecedent proposition for H- is a uniquely salient *proposition put up for question by the speaker*. It need not be the most salient of all salient propositions. This seems to be very reasonable. For example, in *I'm calling from SKOKIE?* in (22a), H* finds a uniquely salient proposition that can be taken to be asserted by the speaker, namely the content of the declarative. H- finds a uniquely salient proposition that can be taken to be put up for question by the speaker, namely something along the lines of *You know Skokie*.

This suggestion is applied to the cases of section 3.1. in the following section and is further pursued after that. Notice for now that there is good evidence that the parameters S and A in (26) are shared between the intonational interpretation and the interpretation of α . This aspect of (26) adequately restricts the interaction of intonation with embedded clauses. I take S and A to be the part of a context in the sense of Kaplan (1989), which also serves for the interpretation of personal pronouns. This correctly restricts intonational meanings to be interpreted relative to the actual speaker and addressee of an utterance, unless S and A shift in case of quotations. Thus in (27a) the final rise cannot be triggered by the embedded question, because its proposition is put up for question by John, not by the speaker. (The parameters S and A have not shifted here: John is still referred to in the third person in the embedded clause.) This is different in (27b), where the quotation can be marked by intonation (Bolinger 1946, Bolinger 1989: 40f). Here the rise is triggered by the embedded yes/no-question "Should I bring a present". With quotational embedding, the parameters S and A shift to those of the quote, as can be seen by the use of a first person pronoun for John in the quote. Thus, the intonational meaning can here be adjoined to the quote (the quote is then α in (26)). The shifted speaker-parameters in the quote (with S = John) then license H-, since the shifted speaker John is putting this proposition up for question. Consider then also (27c). In the first person present, a rise is marginally licensed by such an embedded question, even though the most unmarked intonation would employ a fall that corresponds to the assertive character of the entire utterance. Where the marginal rise is used, the embedded proposition 'I should bring a present' is an antecedent that can be taken to be put up for question by the speaker. The speaker shows by the rising intonation that s/he is not just reporting about her wondering, but putting this proposition up for question in the context of the utterance.

- (27) a. John wondered if/whether he should bring a present [] # [/]
 b. John wondered: "Should I bring a present" [/]
 c. I wonder if I should bring a present [] (#) [/]

In short, (26) correctly captures that intonational meanings are interpreted relative to the referents of 'I' and 'you'.

Are the presuppositions in (26) normally satisfied by independent speech act components or do we need to assume that they are typically accommodated? The answer depends on one's favorite assumptions about such independently established speech act components. There are suggestions about them since at least Ross (1970). More recent work includes Gunlogson (2001), Krifka (2001, 2011) and, for German, Gärtner (2000, 2002), Schwabe (2007a,b) and Truckenbrodt (2006a,b). Since there is no established consensus, the issue is largely left open here. I will advance on the following assumptions: Declaratives carry the seeds of assertions in them. Syntactic interrogatives carry the seeds of question speech acts in them. Furthermore, I will argue below that accommodation of the presuppositions in (26) is fairly straightforward. Where it occurs, it will be seen to *establish* a speech act. I will often ignore the issue of presupposition satisfaction vs. accommodation. The presuppositional analysis is primarily motivated indirectly in the parallel to definite descriptions that allows us to make sense of the relevance of salient propositions. An alternative implementation might pursue conventional implicatures in the sense of Potts (2005).

I nevertheless think that there are cases that are suggestive of a search for unique and recoverable antecedents, in the way familiar from definite descriptions. For one thing, we can now analyze (22b) as a failed search for an antecedent that results in presupposition failure. It is infelicitous in its context in the same way in which a definite description without an identifiable referent/antecedent is infelicitous in a given context ('Hi Susan, where are you calling from? I am calling from Skokie. # I like the cat.'). For another thing, consider again alternative questions. Why isn't a rise permitted in (24c), given that two propositions are put up for question, 'you went to Berlin' and 'you went to Potsdam'? A plausible answer is that they are parallel and both put up for question, and thus neither of them is uniquely recoverable. This is comparable to definite descriptions. *The raven* in (28) has no unique salient antecedent, since the two antecedents in question are parallel.

- (28) A small raven and a large raven were sitting on a fence. # *The raven* opened its wings and . . .

In summary, a formal implementation of intonational meanings was given in which Bartels' relevance of salient propositions finds its place. H* presupposes that the speaker is adding a proposition to the common ground. H- presupposes that the speaker is putting up a proposition for question. The context parameters S and A are shared with the interpretation of personal pronouns. The relation to these propositions is comparable to the relation between a definite description and its antecedent.

3.3. Applications to the three 'standard' cases and to further yes/no-questions.

Let us then account for (24a–c) in the presuppositional analysis. The examples are repeated here as (29a–c).

- (29) a. Did you go to BERLIN [↑] L*H-(H%)
 b. Where did you GO [↑] H*L-(L%)
 c. Did you go to BERLIN or to POTSDAM [↑] H*L-(L%)

When does the alternative-proposition come into play? The classical analysis of yes/no-questions [q?] is that they are hidden alternative questions, i.e. their possible answers are {q, not q}, see e.g. Karttunen (1977). Bolinger (1978b) presented interesting arguments against this. His suggestion, put in these terms, is that their set of possible answers is the singleton set {q}. For embedded questions, he distinguishes whether-questions {q, ¬q} from if-questions {q}. Bartels suggests that unembedded yes/no-questions can similarly have either the meaning {q} or the meaning {q, ¬q}. In the former case, q is particularly salient, in the latter case, ‘q ∨ ¬q’ is particularly salient. Bartels suggests that (31), (32) and (33b) are of the latter kind. The intonation here endorses the alternative proposition, with a sense of “keeping the addressee to the point.” These suggestions are adopted here.

Is there some way of adding stability to the assumptions about salient propositions with interrogatives? I believe there is. Showing this in the following section will require another formal excursion.

3.4. The implicature that there is a true answer.

A question is a request for the truth among the possible answers defined by the question (Karttunen 1977, Groenendijk & Stokhof 1997). In posing a question, the speaker will normally assume that there is a truth to the matter, i.e. that there is a true answer. In wh-questions, the existential implicature that we saw above is exactly this assumption. In (34a), for example, Mary can be taken to implicate that there is a true answer, i.e. that Bill brought something to the party. This assumption is attributed to the person asking the question, i.e. to Mary in (34a). In (34b), it is still attributed to Mary. It seems that the speaker of the utterance (34b), who here reports Mary’s question, need not share that assumption.

- (34) a. Mary to John: What did Bill bring to the party?
 b. Mary asked John what Bill brought to the party.

The implicature is formulated in a general form in (35).

- (35) If T is the set of true answers of a question Q (i.e. T is the meaning of Q according to Karttunen 1977), then a person asking Q implicates $T \neq \emptyset$.

- (35) is applied to a wh-question meaning following Karttunen in (36). It derives the existential implicature that we saw.

- (36) Q in w: Who does John like?
 $T = \{p \mid p(w) \ni \exists x p = \lambda w' \text{ likes}'(w')(j,x)\}$
 Implicature: $\{p \mid p(w) \wedge \exists x p = \lambda w' \text{ likes}'(w')(j,x)\} \neq \emptyset$
 $\Leftrightarrow \exists p, p(w) \wedge \exists x p = \lambda w' \text{ likes}'(w')(j,x)$
 $\Leftrightarrow \exists x \exists p, p(w) \wedge p = \lambda w' \text{ likes}'(w')(j,x)$
 $\Leftrightarrow \exists x \text{ likes}'(w)(j,x)$
 ‘John likes someone in w.’

- (37) shows the application of (35) to the meaning of an alternative question, again following Karttunen. It derives that the disjunction of the alternatives is implicated.

The second case involves the singleton yes/no-questions, which we now need to review with our assumptions further evolved. *Did you go to Berlin?* in (29a), for example, puts up for question ‘you went to Berlin’. At the same time, ‘you went to Berlin’ is the implicature of this question by (38a) on a singleton meaning. How might this be reconciled? The assignment of H-, which additionally puts up for question ‘you went to Berlin’, may be taken as a way of backgrounding, suppressing or weakening this implicature, by foregrounding the questioning aspect. By contrast, in the singleton question (30), the implicature ‘John has a car now’ is not put up for question by the intonation. It is endorsed by H* which we may here take to be an endorsement of the implicature that John has a car now. In this case the seeds of the questioning speech act that come from the interrogative sentence form seem to be overridden.

For the questions in (31), (32), and (33b), we follow Bartels in treating them as hidden alternative questions. Deriving Bartels ‘alternative-proposition’ from (35) not only gives this proposition a non-arbitrary source. It also seems to complete Bartels’ analysis. The question that did not receive a full answer there is why the presence of the alternative-proposition (overtly or covertly) brings with it the impact of ‘keeping the addressee to the point’. Deriving it from (35) seems to fill this gap: The alternative-proposition is the existence of a true answer. It can also be paraphrased ‘there is a true answer’. Where the speaker highlights this element, s/he highlights that s/he is out for the truth. This is plausibly the source of the effect of ‘keeping the addressee to the point’.

We have now made Bartels’ discovery of the relevance of salient propositions precise in two respects. For one thing, we have a presuppositional account (with a formal parallel in definite descriptions) that calls salient propositions on the plan to begin with. For another, we were able to identify a recurrent source of salient propositions in connection with falling interrogatives, namely their implicatures that there is a true answer. With this, let us turn to additional empirical observations.

3.5. High-rise in yes/no-questions.

Yes/no-questions also allow a H*H-H% rising pattern. PH90: 291 give the example in (40). They note that the H*H-H% is more likely when the expected answer is ‘yes’, while a choice of L*H-H%, according to them, transports more of a sense that the issue is really open to S.

- (40) H* H- H%
May I INTERRUPT you? [-]

Two examples from B99: 126 are shown in (41) and (42).

- (41) H* H-H%
You’re BACK already? [-]

- (42) A: (Showing B how to make a blouse) This is the left sleeve; and here is the right one.
B: H* H-H%
Is there any DIFFERENCE between them? [-]

The remarks by PH90: 290f about this case are tentative. The assumed contribution of H* goes in the expected direction, insofar a weakly assertive impact is added by H*. However, it would seem to be too strong to assume that the speaker of these questions instructs the addressee to add a full yes-answer to the common ground. This would seem to be in conflict with the questioning impact. The current extensions allows us to develop a more detailed understanding of the weak effect at hand.

Recall first from the discussion of H*H-H% on declaratives in section 2.4. that H* and H- cannot operate on the same proposition because they would require incompatible speech-acts of this proposition. In declaratives, the primary speech act is that of an assertion, and the context supports an assertion interpretation in (20)–(22). It is plausible that H* identifies this as a salient speaker-asserted proposition and takes it as its antecedent, so that H- then has to look for another proposition, one put up for question by the speaker, to mark. That is what we saw. In the interrogative sentences in (40)–(42), a question-interpretation is supported by the context (and in (40) and (42) by the sentence form). Here it is plausible that H- finds the proposition put up for question as its antecedent. In this case, then, H* is left to look for a (different) speaker-asserted proposition to modify. We look for this proposition in the neighborhood of the implicature of a true answer. We assume that (40)–(42) are singleton yes/no-questions, i.e. the content of their implicature is identical to the proposition put up for question. We must independently assume that this implicature can at best survive the questioning impact in a weaker form. It is compatible with the questioning impact, for example, that the speaker assumes, or supposes, that the answer is ‘yes’. Let us assume that this is what remains of the implicature. In (42), then, the *content* of the implicature is ‘there is a difference between them’, but the *fact* of the implicature would be ‘I suppose that there is a difference between them’. Since endorsing the content of the implicature by H* would lead to an interpretation that conflicts with the questioning intention, it is reasonable to maintain that H* instead operates on the proposition that corresponds to the *fact* of the implicature, i.e. ‘I suppose that there is a difference between them’. This would correctly represent the weak effect of H* in yes/no-questions.

3.6. Accommodation.

The suggestion that H- has a meaning connected to simple question speech acts is motivated by the way this separates the declarative examples with H- (questioning) from those without (not questioning). It is also motivated by examples like (8), repeated here as (43) with additions. In both kind of cases, it seems likely that the question-meaning comes directly from the intonation, since there is no other source for it in sight. In the current account, intonational meaning can induce a question meaning with the help of presupposition accommodation. In (43) the meanings presupposed by the intonation are shown on the right. We get the correct results if the intonational presuppositions are accommodated here. I make the standard assumption that unembedded presuppositions are requirements over the common ground, and that their accommodation is addition to this common ground (Stalnaker 1978, 2002). The result of accommodation in (43a) is then that it is part of the common ground of John and Mary that (as presupposed) John is putting up for question whether Mary wants coffee. In other words, it is then established in the common ground that John is asking this question. Similarly in (43b).

- (43) John and Mary are taking a break from work. John is getting up and looks at Mary.
- a. John: Coffee [/] L*H-H% H-: John presupposes:
John is putting up for question whether Mary wants coffee
- b. Mary: Coffee [\] H*L-L% H*: Mary presupposes:
Mary is adding to the common ground: Mary wants coffee

Lewis (1979) argues that for presuppositions not otherwise satisfied, accommodation is the normal case. Here I discuss the two possible obstacles to accommodation that I am aware of and where they might intervene with accommodation in (43). (i) Accommodation may be refused for reasons of plausibility. *My brother* or *my cat* may be accommodated, but *my palace* or *my elephant* are more likely to prompt questioning. Similarly, *my desire to ask you a question* is likely to be accommodated, but *my desire to live on the moon* is not. This criterion does not seem to interfere with accommodation in (43), since putting up something for question or asserting something are harmless, expected actions in a conversation. (ii) Accommodation generally works well where the speaker is the expert on the matter to be accommodated. In the standard example of accommodation of *my brother*, the speaker is the expert on the existence of such a brother. The addressee will typically be trusting enough to go along. The addressee will, on the other hand, not normally accommodate something s/he is the expert on and didn't know about, such as the referent of *your brother*. Similarly, in 'Did I tell you about my satisfaction with the outcome of the case?', the satisfaction is easily accommodated, since it is in the realm of the speaker's thoughts, of which the speaker alone is an expert. On the other hand, *your satisfaction with the outcome of the case* cannot normally be accommodated since the addressee's feelings are in the expertise of the addressee. For this criterion, the questioning meaning of H- is unproblematic: It is in the realm of the speaker's thoughts what he may intend to put up for question. No addressee-contribution beyond listening seems to be required for this speech act to succeed. Matters are more complex for the presupposition of H* that the speaker is adding a specific proposition to the common ground. While the speaker's intention of doing so is straightforward to accommodate, satisfaction of this presupposition also requires the addressee's accepting the relevant proposition into the common ground. The supposition that the addressee will do so is embedded in the mutual knowledge about the relation between the two, on the basis of which the speaker also offers his information. This will typically include assumptions about the accepted expertise of the speaker in the issue he talks about. It therefore does not seem to be out of place in most cases. Notice in support of this that 'your trust in me' or 'your learning this from me' are not unreasonable presuppositions to offer for accommodation in many contexts. At the same time, the presupposition is a strong one. If such presuppositions occur, addressee objection to them is certainly a possibility and does of course occur.

It may be interesting in a more general way that the assertive impact that is attributed to H* in (26a) seems to be a way of deriving the notion of assertion of Stalnaker (1978). Stalnaker's notion of assertion is that the content of the assertion is added to the common ground, unless the addressee objects. This is what results if the presuppositional meaning of H* is accommodated. First, the accommodation of (26a) requires the addition of the content to the common ground. Second, accommodation is more generally subject to the

Let us pursue the difference in these terms. Asking for new information is the normal case. Here we find the fall of *wh*-questions, as in (44b). I return to this case below. For now, let us pursue (44a). How do you ask for a repetition of preceding information? Consider (46), without rising intonation. Why is it odd for B to ask this question? What seems to be at work is a default assumption that the preceding utterance has become part of the common ground after it occurred, in the absence of an objection. Furthermore, that B's question with a fall in (46) does not count as an objection, i.e. it is not enough of a sign that the preceding utterance was not understood. Therefore, B's question is infelicitous because the answer to it is already in the common ground, and no sensible intention of the question can be inferred.

- (46) A: Rita married Jim Montague.
 B: # WHO did Rita marry? [N]

This would mean that asking for a repetition of a preceding utterance requires a clear sign that the default assumption (that the preceding utterance has been added to the common ground) does not apply. It seems plausible that the rise somehow generates this sign. How might this work? My answer is tentative and leaves some issues unresolved. For the reading of (44a) in which the echoed utterance is understood but not believed, a plausible antecedent proposition for H- is 'You asked where John went'. Put up for question by H-, this amounts to 'Are you asking where John went?'. This is the clearest possible sign that the echoed utterance has not become part of the common ground. We must leave open where exactly this antecedent proposition comes from: It might be the echoed speech act (a non-local antecedent of H-) or it might be the true answer of the echo question (a local antecedent of H-). For the reading of (44a) in which the echoed utterance was not completely understood, a plausible antecedent proposition for H- is 'You asked where someone went'. Put up for question by H-, this amounts to 'Are you asking where someone went?'. This is still a very clear sign that the preceding utterance was not understood. The source is again not uniquely clear: The antecedent proposition might be the echoed speech act, perhaps with existential closure for the non-understood part. Or it might be the implicature of the existence of a true answer to the echo question, which would be derived from the echo question interpretation 'Of which x are you asking where x went?'. In all these interpretations, it seems that the presupposition of H- must be accommodated.

We will not settle what distinguishes signs of objection to the preceding utterance from non-signs. A reasonable hypothesis is that challenges to the preceding utterance becoming common ground must in some sense be 'direct attacks'. Choosing H- to signal 'Are you asking where John/someone went?' is a direct challenge to the preceding speech act. In (46), on the other hand, the relation is more indirect: B's question would make sense if it was assumed that A's utterance has not become common ground. It may also play a role in (46) that the H* of the fall most likely endorses the implicature of a true answer, 'Rita married someone'. Thus part of the preceding utterance is acknowledged. In addition, the chance to signal with the use of H- that the preceding utterance was not understood was not taken.

Notice that there is independent support for the notion that the true answer to a question can be marked by the intonation. This seems to be the case in rhetorical questions like (47). In rhetorical yes/no-questions the answer that is recognizably assumed to be

true is typically the negation of the uninverted interrogative. Here the use of H* can be seen as endorsement of that negated (and indirectly asserted) proposition.

- (47) H*L-L%
 Why should I pay for that? Am I my brother's KEEPER? [∅]
 (H* operates on the salient true answer 'I am not my brother's keeper')

Let us then complete the analysis of (44b). We now assume that the preceding speech act is becoming part of the common ground, despite the inability of B to resolve the reference of the pronoun. We may assume for concreteness that this is possible with a temporary e-type interpretation of the pronoun (Evans 1980, Heim 1990), here: 'the one Rita married'. No sign is therefore required that the preceding speech act has not become part of the common ground. H* might endorse 'you asked where someone went'. Thus, the difference between (44a) and (44b) can be made sense of in the current account: In (44a), but not in (44b), the rising intonation with H- is required to generate a sign that the preceding utterance has not become part of the common ground.

B99: chs. 5, 6 pursues a different idea about the rise in echo-questions. She suggests that in cases like (48) the rise has the motivation and effect of not asserting the existential implicature because the addressee knows it already. However, this would wrongly predict that the rise is also obligatory in (49), where the addressee also already knows the existential implicature. Examples like (16) also support the suggestion of PH90 that assertive addition to the common ground is possible where the addressee already knows the proposition.

- (48) A: Rita married Jim Montague on Sunday
L* H-H%
 B: Rita married WHO on Sunday [∅]
- (49) A: Rita married someone.
 B: Who did Rita marry [∅] (or [∅])

In summary, it seems that the function of the rise in echo-questions is to generate a sign that the echoed utterance has not become part of the common ground, and thus to clarify that the echo-question asks for a repetition or clarification of that utterance.

3.8. The friendly rise in wh-questions.

We took the fall to be the default intonation in wh-questions. However, a friendly rise is optionally also possible as in (49) and many other cases. The variation between fall and friendly rise contrasts with the obligatory echo-question rise in (44a) and (48). It also contrasts with a strong preference for a fall in sentences in which the echo-questions seeks to clarify the reference of a pronoun as in (44b) and in (50), which does not have echo-question syntax.

- (50) A: Rita married him.
H* L-L%
 B: WHO did Rita marry [∅]

This friendly rise is also seen in the examples (51) and (52) from Schubiger (1958: 59). She describes the connotation as “regardful; interested request for information” (Schubiger 1958: 58).

(51) a. A: I was on holiday last month.

L*H-H%

B: Where did you GO [/]

b. A: Ireland.

L*H-H%

B: How did you LIKE it [/]

(52) To somebody showing a new purchase:

L* H-H%

How much did it COST you [/]

Let us develop an analysis. Notice first that something similar to ‘keeping the addressee to the point’ with a [∅] also occurs with wh-questions, as in (53). Here ‘keeping the addressee to the point’ blocks the option of the friendly rise.

(53) a. Tell me the truth. Who left? [∅] #[/]

b. Well, SOMEONE left. Who is it [∅] #[/]

I suggest the following understanding of these choices. First, since the typical fall in wh-questions presupposes a speaker-assertion of the existential implicature, it presupposes a speaker-assertion that there is a true answer (see section 3.4). In (53), this point is in the foreground. In other falling wh-questions and in alternative questions, where the fall similarly signals the existence of a true answer, the pragmatic effect of the fall is not as strong as with yes/no-questions: Only yes/no-questions have a standard alternative choice, namely highlighting by H- that a salient proposition is put up for question. The pragmatic effect of insisting on the existence of a true answer is here more striking, because an alternative without it would have been among the standard choices.

Second, we need to add a further source of salient propositions for the friendly rise. We obtain a plausible result if we take the speech act of the question into account. Following Hintikka (1975) the interpretation of ‘Where did you go?’ would be ‘Bring it about that I know where you went’. Putting a propositional form of this up for question results in ‘Will you bring it about that I know where you went?’. This would seem to add friendliness. It would show that it is up to the addressee to answer. (The addressee might prefer not to share the answer or might not know it.) I suggest that the source of the friendly rise in (51) and (52) is to be sought along these lines. We may assume that this is not a ‘standard’ choice in the sense of the preceding paragraph, because it accesses the speech act, unlike the two choices available for yes/no-questions.

An indication that it’s up to the addressee to answer would not be appropriate in (53), where the speaker of the question is clearly out for the truth, and thus also for an answer that makes the truth known.

In (49), then, the friendly rise also signals that it’s up to the addressee whether s/he wants to answer, i.e. whether s/he wants to share this information. Here the addressee

used an indefinite object in the preceding utterance. Revealing the individual behind it would be a further step in sharing information. It now correctly follows that the friendly rise is a less likely intonation pattern in (50) and (44b), where the referent of a personal pronoun is asked for. Here the addressee of the question has already tried to share the relevant information in the use of the personal pronoun (even though unsuccessfully, since the referent of the pronoun was not recovered). There is no point then in signaling with the friendly rise that the addressee may prefer to keep this information to herself.

I sum up the discussion of the intonation in interrogatives. It seems that the meanings for H* and for H- that were first motivated with declaratives also fare well in the analysis of interrogative meanings. In the course of developing this point, a range of formal aspects were addressed: Presuppositional meanings for H* and H- were suggested, their accommodation was discussed, and it was motivated that the implicature that there is a true answer is a particularly salient proposition with interrogatives.

4. Other tune meanings and related issues.

This section briefly raises a number of issues not addressed above: Do English L* and L- carry meaning (section 4.1.)? What about continuation rises (section 4.2.)? What meanings do English complex pitch accents carry (section 4.3.)? Can the intonation encode the distinction between declaratives and interrogatives (section 4.4.)?

4.1. Do English L* and L- carry meaning?

L* does not seem to carry any discernible meaning in English. However, there is no harm in assigning it meaning that is the negation of the meaning of H*, as in PH90. If no meaning is assigned to L*, we must ensure that L* is only chosen where H* is not appropriate. This would follow if the choice between L* and H* is subject to presupposition maximization (Heim 1991), so that H* with its presupposition is chosen for modification of the most salient available proposition where the context allows it.

The issue is more complex with L-, for which B99 postulates assertive meaning. The examples discussed here are compatible with adding a weakly assertive meaning to L-. However, the account above also leaves no clear motivation for such a move. Consider first declaratives. In many cases, H*, the standard choice, will contribute an assertive impact independently. Where it does not and where we still want some assertive impact in a weaker sense (speaker endorsement), as in (14) and (15), L- might in principle provide it. However, it is not clear whether it could not also come from morphosyntactic elements of the declarative sentence form or from the pragmatics, given the propositional meaning of the declarative. In various interrogatives, Bartels suggests that L- corresponds to an endorsement of different salient propositions by the speaker. Given the revisions above, however, (a) these salient propositions are all independently implicatures that there is a true answer, and thus, as implicatures, independently endorsed by the speaker and (b) they are often endorsed by the speaker with the H* that accompanies the L- in these cases and that signals assertion of the implicature in the current analysis. At this point, there is no clear motivation for additional speaker-endorsement of these propositions by L-.

In summary, the current account is compatible with assigning L* a meaning that is the negation of H* and with assigning L- a meaning of speaker endorsement, but there is no clear evidence for either of these moves.

4.2. Continuation.

High right edges are also known to signal continuation. PH90: 302ff show that this applies to both H- and H% in English. They suggest that H- “indicates that the current phrase is to be taken as forming a part of a larger composite interpretative unit with the following phrase” (PH90: 302) and that H% indicates that the utterance is to be interpreted “with particular attention to subsequent utterances” (PH90: 305). The direction pursued here is that there is an H- morpheme with questioning meaning and a separate H- morpheme with continuation meaning. This is compatible with the discussion in Gussenhoven (2004: ch. 5) where different paralinguistic motivation is suggested for the H/L-contrast in its relation to questions vs. statements (‘size code’) and in relation to continuation (‘production code’). In English, the typical continuation rise in statements is the H*L-H% (without H-) seen in (10) while the yes/no-question contour is L*H-H% (with H-). The continuation-marking function of H- is seen on H- tones at the end of intermediate phrases that are not also intonation phrase boundaries (PH90: 302ff). There are some open issues in regard to the H*H-L% contour as in (54) from PH90: 291. In this particular occurrence, H- is not questioning or non-assertive, but its final occurrence also does not indicate continuation.

(54) Mostly they just sat around and knocked stuff. You know.

H*H-L%	H*H-L%
The SCHOOL [—]	Other PEOPLE [—]

One might explore a definition of the ‘continuation’ H- in which the relevant proposition *forms part of a larger interpretative unit*, though not necessarily with following material. It might be typically used for indicating such a unit with following material. On the other hand, its occurrence in (54) could highlight that ‘they talked about the school’ and ‘they talked about other people’ also form part of a larger interpretative unit, ‘they knocked stuff’, regardless of whether this includes following material.

4.3. English complex pitch accents.

In addition to H* and L*, English also has the complex pitch accents L*+H, L+H*, H*+L and H+L*. The starred tone is more narrowly associated with the stressed syllable, and the other tone precedes or follows it, not necessarily on the same syllable. These differences carry pragmatic meaning in English. For example, the L+H* seems to be more often used when the new (H*) element is also contrasted. The L*+HL-H% contour can be used to express uncertainty or incredulity (Hirschberg & Ward 1992). A range of observations and hypotheses can be found in PH90. In their account, the meanings of H* (new) and L* (not new) are retained in the complex pitch accents. In addition, the L+H accents (L*+H and L+H*) invoke a semantic scale on which the accented element is located. The H+L accents (H*+L, H+L*) indicate that support for what is expressed should be inferable in the common ground. See also Hobbs (1990) for suggested revisions. Parallels to German modal particles are explored in Schubiger (1965, 1980).

4.4. Declarative/interrogative.

In many languages yes/no-questions are not distinguished from declaratives by morphosyntactic means. The distinction rests on the intonation. One such case, Brazilian

Portuguese (BP) is investigated in Truckenbrodt, Sandalo & Abaurre (2009). The Campinas variety investigated shows H+L* L- on assertions, L+H* L- on yes/no-questions and L*+H L- on *surprise questions* which seem to be functionally equivalent to English declarative questions (Gunlogson 2001):

BP H+L* is like English declarative+[H*] (declarative with assertion: It was raining[\\])
 BP L+H* is like English interrogative+[H-] (yes/no-question: Was it raining[/])
 BP L*+H is like English declarative+[H-] (declarative question: It was raining[/])

The paper offers a decomposition of the Brazilian Portuguese tunes in which the L*+H surprise/declarative question contour of BP shares the L* with the BP declarative (with assertion) and shares the L+H with the BP yes/no-question. The analysis thus identifies the star on the BP L* as the contribution that is provided by the English sentence form declarative, and the BP sequence L+H as the contribution that is provided by the English yes/no-question intonation (with a meaningful English H- in the current analysis). The study is limited in scope, and other question types were not investigated.

Aboh & Pfau (2011) present a final floating L tone that distinguishes unembedded yes/no-questions from declaratives in Gungbe. They show that the floating L also appears in embedded yes/no-questions and not in embedded declaratives. In embedded position the two clause types are additionally distinguished by different conjunctions.

5. Summary.

The connection between intonational meaning and semantics is partly provided by the notion of an intonational morpheme. If this is attached to the syntactic structure as in (26), it can be interpreted in phonology and in semantics. The element shared with the semantic interpretation is the context in the sense of Kaplan (1989), which includes the parameters speaker and addressee. The intonational interpretation arguably shares these with the interpretation of personal pronouns.

According to (26), the intonational meanings do not operate on the meaning of the constituent they attach to, but on a salient proposition. The relevance of salient propositions, discovered by Bartels (1999), is here implemented in terms of presuppositional meanings of intonational elements.

The English H* is hypothesized to presuppose that the salient proposition is being added to the common ground by the speaker. This is a minimally strengthened version of the suggestion for H* in Pierrehumbert & Hirschberg (1990) and the suggestion of Gussenhoven (1984) for the fall. In its strengthened form, its accommodation (which is assumed to be allowed up to addressee objection) generates an assertion in the sense of Stalnaker (1978).

The English H- is hypothesized here to presuppose that the salient proposition is being put up for question by the speaker. This is a suggested revision of earlier accounts that treat (L*)H- as non-assertive. The strengthened version generates (by presupposition accommodation) a questioning speech act. This is seen as an advantage in particular with rising elliptical utterances and with declaratives marked with H-. These show no other source for a questioning impact. It also correctly accounts for the typical deployment of H- in yes/no-questions as opposed to wh- and alternative questions. This specific

suggestion for H- necessitates the assumption of a second H- morpheme with ‘continuation’ meaning.

Throughout a case was made that these meanings are adequate insofar they account for a range of renditions of declaratives and interrogatives with their pragmatic impact. The salient propositions employed in the discussion were: the content of a declarative, the connection of what is asserted to the addressee’s knowledge, the propositional interpretation of vocatives and of greetings, the implicature that there is a true answer of an interrogative, the true answer, and contextually salient propositions (you want *coffee*). It was also hypothesized that the fact of a weakened implicature (the speaker supposes that there is a true answer) and question speech acts can serve as salient propositions.

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