



Accenting Accessible Information

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Abstract

In a perception experiment in German, subjects judged the appropriateness of three types of nuclear pitch accent (including deaccentuation) on non-pronominal anaphoric referring expressions, which were either textually or inferentially accessible from the preceding context. Results confirm that accessible information can indeed be accented – and in some cases must be. However, not all accents are equally appropriate. The type of accent preferred depends on the relation between the antecedent and the anaphor. Results further suggest a continuum of degrees of activation for referring expressions which is to some extent iconically reflected by the pitch height on the lexically stressed syllable of the target word.

1. Introduction

In studies on the realisational aspect of information structure in West Germanic languages, it is commonly assumed that *new* information is marked by a pitch accent, while *given* information is deaccented (cf. [1]). However, closer investigations of the prosodic marking of given and new information are rare, especially those taking into account different *degrees* of givenness. Among other factors, the type of contour produced on a discourse referent or proposition could be crucial for the interpretation of its cognitive status, as postulated by [2] for English or [3] for German.

The results of a perception experiment in German [4] suggest that the type of pitch accent does indeed play a role in the marking of different degrees of givenness. In that experiment, target referents were either auditorily or visually primed, or not primed at all, corresponding to what we called given, accessible and new information (cf. section 2). In general, accent type H* was felt to be the most appropriate marker for new information, while for given referents pitch accent type H+L* was preferred over H*, although deaccentuation (i.e. no accent at all) was most acceptable.¹ Since there was only indirect evidence for a preferred marking of the category ‘accessible information’, and since only one type of accessibility (cf. section 2.1) – namely situational accessibility due to visual priming – had been tested, there was an obvious need for further experiments.

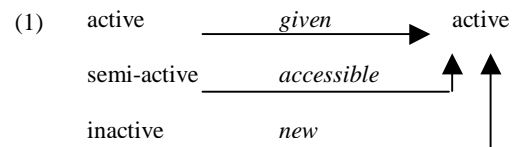
The present study reports on such a follow-up experiment, investigating different types of textual and inferential accessibility and their intonational marking.

2. Theoretical Grounding

Many studies on givenness do not regard the distinction between given and new information as an either-or dichotomy

but rather as a continuum. However, the number of degrees of givenness varies considerably, ranging from three to practically infinite [6]. Following [7], we call the minimal extra category between the poles given and new *accessible information*.

In his cognitive approach, Chafe ([7]:73) defines the three information states in terms of the activation cost a speaker has to invest in order to transfer an idea from a previous state into an active state. If a referent is already active in the listener's consciousness at the time of the utterance, it is *given*; if a referent becomes activated from a previously semi-active state, it is *accessible*; if a referent becomes activated from a previously inactive state, it is *new*. These three degrees of givenness are illustrated in (1):



2.1. Types of Accessibility

The category accessible information can be further divided into *textually accessible*, *situationally accessible* and *inferentially accessible* information [8].

Textual accessibility of a referring expression requires an explicit (coreferential) antecedent which is either *displaced* (i.e. which has not been mentioned in the last two or three clauses and is thus only semi-active) or *currently evoked* [9]. Currently evoked items are generally considered fully active in the hearer's mind, thus representing given information.

A referent is *situationally accessible* if it is part of the extra-textual context. This includes, e.g., the participants in a conversation and the surrounding items.

The third category, *inferential accessibility*, is the most complex and diverse one. Inferentially accessible referring expressions (Prince's [10] *Inferrables*) do not have explicit antecedents. They are (semi-)activated via a *bridging inference* [11] from another entity already present in the hearer's discourse model. In Prince's ([10]:233) example

- (2) I got on a bus yesterday and the driver was drunk.

the entity *the driver* can be inferred from *a bus* assuming the shared piece of knowledge between speaker and hearer that buses have drivers. If there are competing antecedents for an inferable item, the ‘correct’ choice normally depends on the plausibility of the bridging inference (cf. [12]).

Inferential accessibility can be provided by purely logical (lexical) relations like synonymy or hyponymy, or by the establishment of a – generally culture-specific – *scenario* [13] or semantic frame [14], which automatically co-establishes a set of (semi-active) referents.

¹ The pitch accent types, which will recur in the course of this paper, are GToBI categories (cf. [5]).

This study concentrates on the prosodic marking of textually accessible but displaced referring expressions (i.e. those not mentioned in the immediate context) and different kinds of inferentially accessible items.

2.2. The Marking of Accessibility

Most studies on accessible information are only concerned with the referents' *morphosyntactic* marking (e.g. [10], [15], [16]). This level of coding expresses the degree of a referent's identifiability due to assumptions on the shared knowledge between speaker and hearer – or, in Prince's terms, the (according to the speaker) assumed degree of familiarity with a referent in the hearer's mind. There is some agreement that (at least in English and German) accessible referents are often expressed by a definite NP in subject (and topic) position, as *the driver* in (2).²

However, there is no agreement on a systematic *prosodic* marking of accessible referents – possibly because inferable items in the examples given in the literature are often in prenuclear position, which is prosodically less salient. Lambrecht ([8]:107), e.g., is of the opinion that accessible information does not have a direct phonological correlate. It can be either accented or unaccented, the actual choice depending on various discourse factors. Chafe ([7]:75), on the other hand, argues that there is no difference between accessible and new referring expressions, since both are generally marked by accented full NPs. Brown ([17]:75) claims that inferentially accessible items are marked by pitch prominence (she equates pitch prominence with high pitch), whereas textually accessible but displaced items are not. Allerton ([18]:140ff.) postulates that it is the kind of lexical relationship between antecedent and anaphor which is essential for the question of accenting or deaccenting. Other, more phonologically oriented studies (e.g. [2]) suggest that the type of pitch accent is a relevant cue for the degree and type of accessibility of a referent, an assumption which has been tested in the experiment discussed below. The choice of pitch accent types tested here is based on findings by [2] for American English and – to some extent – [3] for German, who claim that medial peak accents (H*) generally mark new information, early peak (H+L*) as well as downstepped (!H*) accents mark accessible information, and given information is unaccented.

We claim that the two different levels of coding (morphosyntax and prosody) correspond to different levels of givenness. While the morphosyntactic marking expresses the referent's identifiability based on shared knowledge between speaker and hearer, prosody (in particular pitch accent type) is used to mark the degree of activation of a referent in the assumed (immediate) consciousness of the hearer. A third, pragmatic, level might be superimposed on the other levels: If a speaker wishes to present a constituent as particularly newsworthy, he can highlight this constituent irrespective of its activation degree. This is common e.g. in contrastive utterances, in which even clearly given items (like pronouns)

² However, there is no one-to-one correspondence between identifiability and definiteness. Generic NPs, e.g., may be either indefinite and designate identifiable referents (as in *A book is a useful thing to have*), or definite designating unidentifiable referents (as in *She is now studying the whale*) (cf. [8]:82f.).

may be 'focussed' by virtue of an accent with an extra high pitch peak.³

In sum, the speaker's choice of linguistic marking of a semi-active (anaphoric) referring expression depends on a number of factors (cf. [19]), two of which were investigated in the experiment described below: the recency of mention of the antecedent and the semantic relation between antecedent and anaphor.

3. Perception Experiment

3.1. Hypotheses

The experiment investigates the intonational marking of accessible referents in nuclear position. The basic hypothesis is that the type of accessibility of a referent correlates with the type of pitch accent (including deaccentuation) used for marking it.

In particular, and to some extent based on observations by [18], eight different relations between a textually given antecedent and an anaphor (the target referent) were tested with regard to listeners' preferred pitch accent type on the target referents. The relations included the same expression recurring after three intervening clauses (**textually displaced**), symmetrical lexical relations like **synonymy** (*Apfelsine – Orange 'orange'*) and **converseness** (*teacher – pupil*), asymmetrical lexical relations like **hypernymy-hyponymy** (*alcohol – whisky*) and **meronymy** (whole-part; *bottle of wine – cork*) in both orders, and a **scenario** condition (*courtroom – judge*). The hypothesised preferences of the anaphors' intonational marking and their assumed degree of activation within the category 'accessible information' are given in Table 1.

Table 1: Summary of Hypotheses.

Degree of Activation	Type of Accessibility	Hypothesised Pitch Accent Type Preferences ⁴
active		no accent > H+L* = H*
↓ semi-active ↓	synonymy	no accent > H+L* = H*
	text. displaced	no accent > H+L* > H*
	part-whole (meronymy)	
	hyponym-hyponym	
	converseness	
	whole-part (meronymy)	H+L* > H* > no accent
hyponym-hyponym		
scenario		
inactive		H* > H+L* > no accent

³ The basic idea of a distinction between the two cognitive categories of identifiability and activation, having to do with the assumed states of referents in the minds of speaker and hearer, and the pragmatic category of focus (and topic), having to do with the relation between entities or propositions in an utterance, is adopted from [8].

⁴ The '>' symbol is to be interpreted as 'preferred over', the '=' symbol as 'no difference'.

3.2. Setup

26 native speakers of German listened to 20 short texts read by a female speaker. The sentences were visually presented on a screen at the same time. The texts were composed of one or more context sentences, a target sentence, and a following sentence (in order to avoid a paragraph final intonation contour on the target sentence). The preceding context included a referring expression that served as an antecedent for the target referent.

Six of the 20 texts displayed a target referent with an explicit antecedent (textually displaced)⁵, the remaining 14 texts had target referents that were accessible only via a bridging inference from the antecedent (inferentially accessible; two texts for each of the seven relations). The greater number of contexts with textual accessibility counterbalanced the greater number of relations in the category of inferentially accessible information.

The naturally spoken target sentences were resynthesised with the speech analysis and manipulation tool Praat [21], resulting in three different versions of each target sentence: the target referent, which generally surfaced as a grammatical object with a definite article, either carried a nuclear H* or H+L* pitch accent, or was deaccented (with the nuclear pitch accent assigned to the preceding verb, cf. Figure 1). The first part of each target sentence was held constant. An example is given in (3). The antecedent and anaphor (a whole-part relation) are underlined:

- (3) Er hatte für seine Freundin zur Feier des Tages eine sehr gute Flasche Wein gekauft. Behutsam entfernte er den Korken. Dann schenkte er ein.
To celebrate, he had bought a very good bottle of wine for his girl friend. Carefully, he removed the cork. After that, he served it.

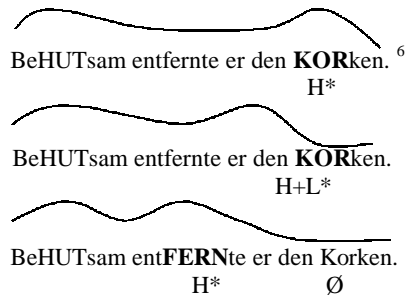


Figure 1: Schematised intonation contours of the target sentence “Carefully, he removed the cork”.

After training in five practice trials, the subjects judged the contextual appropriateness of the target sentence’s intonation patterns on a seven point scale. Each subject was

⁵ The first and second mention of the referring expression was separated by three clauses. In the first of these clauses the topic was shifted, since topic continuation considerably enhances the degree of accessibility (cf. Centering Theory, e.g. [20]).

⁶ Capital letters indicate accented syllables, bold face letters indicate nuclear accents. GToBI-notations are restricted to nuclear accents. The symbol Ø, which is not part of the GToBI annotation scheme, here indicates lack of accent.

presented only one of the three versions of each target sentence. The task was self-paced, and subjects were allowed to listen to the texts more than once.

3.3. Results

The appropriateness judgements were z-transformed so that each subject had a mean score of 0 and a standard deviation of 1. As a general result, we found a highly significant interaction between accent type and type of accessibility ($F(14, 6.41) = 8.42; p < .001$). Table 2 shows a summary of the posthoc tests (Scheffé) that were conducted. The order of items follows that of Table 1. Here, the symbol ‘>’ indicates ‘significantly preferred over’, the symbol ‘=’ ‘no significant difference’.

Table 2: Summary of the results.

Type of Accessibility	Pitch Accent Type Preferences
synonymy	no accent > H+L* = H*
textually displaced	no accent > H+L* > H*
part-whole (meronymy)	no accent > H+L* = H*
hyponym-hypernym	no accent > H+L* = H*
converseness	no accent = H+L* > H*
whole-part (meronymy)	H+L* > H* > no accent
hypernym-hyponym	H* = H+L* > no accent
scenario	H* = H+L* = no accent

4. Discussion

The results clearly confirm the basic hypothesis that the factors ‘type of accessibility’ and ‘type of pitch accent’ are highly correlated. However, the order of accent type preferences varies considerably across different semantic relations, as postulated in the more specific hypotheses and confirmed in most cases (at least in tendency) in the perception experiment. The findings indicate that accessible information cannot be treated as a uniform category – at least not in terms of a consistent prosodic marker – which is in line with claims e.g. by Lambrecht [8], who denies a direct phonological correlate of accessible information. However, this should not be interpreted as tantamount to saying that the intonational marking of an accessible referring expression is arbitrary. The choice of pitch accent type (including deaccentuation) rather depends on the relation between the antecedent and the anaphor, and – in the case of asymmetrical lexical relations like meronymy or hyponymy – on the order of occurrence, as predicted in [18].

It is no surprise that synonyms were treated like fully active referents (i.e. deaccentuation was significantly preferred over both kinds of accent), since the bridging inference between antecedent and anaphor requires only little activation cost. Somehow less expected, however, was the finding that the anaphors of hyponym-hypernym and part-whole relations showed the same distribution of accent type preferences, i.e. were treated as (near) active as well. On the other hand, when presented in the reverse order (i.e. in hypernym-hyponym and whole-part relations), the anaphors were preferably marked by a pitch accent. This implies that the speaker invested more coding effort, indicating a lower degree of activation of the target referent assumed in the hearer’s mind. In other words, while the mention of the hyponym *whisky*, e.g., co-establishes the hypernym *alcohol*,

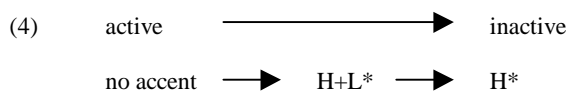
the reverse is not the case, at least not to the same extent. We can conclude that a more general expression (hypernym or whole) obviously does activate and co-establish a set of subordinate referents, but not to a degree that would allow deaccentuation.

The judgements of the whole-part relation may serve as evidence for this assumption. Here, neither deaccentuation nor H* (the pitch accent type which normally marks newness) was preferred, but H+L*, suggesting a special status of this pitch accent type as an ‘accessibility accent’ used for marking information between the poles given and new. Less direct evidence of this ‘intermediate’ status of H+L* is provided by the textually displaced condition: deaccentuation was significantly preferred over H+L*, and the latter was in turn significantly preferred over H*. This suggests a textually given item recurring after three clauses has a slightly lower degree of accessibility than an antecedent’s synonym or hypernym mentioned in the immediate context. This is possibly due to a necessary search in the working memory in the case of displaced items, which requires a little more activation cost.

The status of H+L* is not always clear-cut, however: while in the hypernym-hyponym condition H+L* was considered equally as appropriate as H* for marking the anaphor, in the converseness condition H+L* was felt to be equally appropriate as deaccentuation.

In the scenario condition, overall results did not show significant differences, since preference judgements varied considerably between the two target texts. In the first text, a courtroom scenario was established, with *the judge* as target referent; in the second, a picnic scenario, with *the paper plates* as the target referent. While *the judge* was considered most appropriately marked by deaccentuation, pitch accent types H* and H+L* were preferred for marking *the paper plates*. Presumably, not all elements that are activated once a scenario or semantic frame is established get activated to the same degree. Thus, a possible explanation for the subjects’ scores is that the referent *the judge* was regarded to be more prototypical or higher ranked (and thus more active) within the courtroom scenario than *the paper plates* within the picnic scenario.

In sum, the findings point to a scale or continuum of intonational marking, along which differing degrees of activation are expressed:



This scale also suggests a somewhat iconic use of pitch height, which is compatible with Gussenhoven’s [22] Effort Code: the higher the pitch on a lexically stressed syllable, the newer (or more newsworthy, in the case of contrastive but active items) the discourse referent. This generalisation appears to hold at least for German and English (cf. [2]), but may be valid for a wider range of languages.

5. Acknowledgements

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