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Accentual preferences and predictability

An acceptability study on split intransitivity in German

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Abstract

The difference in the default prosodic realization of simple sentences with unergative vs. unaccusative/passive verbs (assigning early nuclear accent with unaccusative/passive verbs but late nuclear accent with unergative verbs) is often related to the syntactic distinction of their nominative arguments as starting off in different hierarchical positions. Alternative accounts try to trace this prosodic variation back to asymmetries in the semantic or pragmatic contribution of the verb to an utterance. The present article investigates the interaction of the assignment of default nuclear accent with the predictability of the verb. In an experimental study testing the acceptability of nuclear accent assignment, we confirmed that the predictability of the verb influences accentual preferences (such that highly predictable verbs are preferably not accented). However, the experiment also reveals that the unaccusativity distinction cannot be accounted for by means of pragmatic phenomena of this type: the two verb classes are associated with distinct accentual patterns in the baseline condition, i.e., without the predictability manipulation.

1. Introduction

In simple sentences with an intransitive verb and an argument there are two options of prosodic accent patterns to realize the sentence. Example (1) illustrates a realization with the nuclear accent on the subject, while (1b) is an utterance with the nuclear accent on the verb. Words marked in small capitals bear the nuclear accent throughout this paper.

(1) a. MARIA kommt.

      'MARY is coming'.

    b. Maria SINGT.

      'Mary is SINGING'.

It has been claimed that the contrast in (1) corresponds to the default prosodic realizations of particular verb classes and may appear out of the blue (see Chafe, 1974:115; Jacobs, 2001:645f.; Kahnemuyipour 2009:103; Legate 2003; Sasse 1987:520; Zubizaretta and Vergnaud 2005; for German see Féry, 1993:33, 2011; Kratzer and Selkirk, 2007:115ff.; Uhmann, 1991:199).

In previous research, different lines of thought have been developed to explain this phenomenon. A first model type is based on syntax. According to this view, the contrast between (1a) and (1b) relates directly to differences in the syntax of intransitive verbs. In particular, the surface subject of unaccusative verbs such as *come* in (1a) is assumed to be an argument that is internal to the verb projection, while

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the subject of unergative verbs such as *sing* in (1b) is an external argument. The prosodic difference in (1) follows from the syntactic difference being reflected through syntax-prosody mapping (see Kahnemuyipour, 2009; Legate, 2003; Selkirk, 1995; Zubizaretta and Vernaud, 2005; for German, Kratzer and Selkirk, 2007; Uhmann, 1991). In this view, unaccusative verbs pattern with passive verbs whose nominative DP also originates as a verbal complement. Correspondingly, simple sentences with passive verbs are claimed to show the same basic prosodic pattern as unaccusative verbs (compare (1a) with (2)).

(2)   MEIN FAHRRAD wurde gestohlen.

        'MY BIKE was stolen.'

Alternative accounts of the different prosodic structures associated with simple intransitive sentences as illustrated in (1) and (2) refer to various functional factors, among them semantic properties of the verb (e.g., (dis)appearance) and the argument (e.g., animacy) (see Allerton and Cruttenden, 1979; Faber, 1987; Hirsch and Wagner, 2011 on English; Contreras, 1976 and Hatcher, 1956 on Spanish). Several of these studies argue that the observed prosodic differences can be traced back to information structural preferences for interpreting intransitive clauses. Thus, an agent constituent (in contrast to a patient constituent) is a likely sentential topic. Similarly, animates are more likely topics than inanimates. The background idea is that particular verb classes are associated with different discourse configurations in all-new contexts, prompting either topic – comment or sentence focus structures.

Another factor that has been identified as crucial for the assignment of nuclear accent in simple intransitive sentences is the predictability of a lexical item in a given context (see Bolinger, 1972; Féry, 1993:32; Gussenhoven, 1984:40; Krifka, 1984). In examples such as (3) the verb is highly predictable in the context of the respective

subject referents and will not receive the nuclear accent in an out-of-the-blue utterance.

(3) a. EINE BIENE summt.

A BEE is buzzing.

b. EIN CHOR singt.

A CHOIR is singing.

This factor is clearly orthogonal to the verb class distinction introduced above: note that the examples in (3) contain unergative verbs, for which a syntax-based account would predict a nuclear accent on the verb, as indicated in example (1b).

The goal of the present study is to investigate accent assignment in simple intransitive sentences and determine the role of predictability in this process. In order to find evidence for the influence of the predictability of the verb on the prosodic realization of intransitive sentences, we carried out an experimental study on the acceptability of different prosodic realizations of simple utterances with passive and unergative verbs. In two experiments we tested the impact of predictability on the intuition of the default accentual patterns. We thus want to investigate whether (a part of) the prosodic differences that have been attributed to the syntax of split intransitivity can receive an alternative explanation resulting from informational properties of the sentences at issue.

The study proceeds as follows: Section 2 outlines in detail the approaches to default accentual patterns with simple intransitive sentences as illustrated in (1). The aim of this theoretical discussion is to identify the conflicting predictions that are implied by these approaches. Following this outline, the main research question is introduced in detail in Section 3, in which the factor predictability and its assumed impact on the accentual patterns with intransitive sentences are discussed and the

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experimental implementation of predictability is introduced. Section 4 presents the experimental studies and their results. Section 5 discusses the consequences of the empirical findings for our assumptions about the mapping between syntax and prosody and the role of predictability on the assignment of nuclear accent.

2. Syntax-Phonology Mapping

2.1 Prosody of intransitive sentences

According to the autosegmental-metrical approach to intonation (Beckman and Pierrehumbert, 1986; Gussenhoven, 2004; Ladd, 1996; Pierrehumbert, 1980), any intonation phrase contains at least one pitch accent and a boundary tone. The last pitch accent in a phrase is referred to as the nuclear accent. The function of pitch accents is to highlight information as opposed to boundary tones which signal prosodic phrasing (Grice and Baumann, 2007; Gussenhoven, 2004; Ladd, 1996).

Focus-to-accent theory claims that a semantic focus is expressed by means of a pitch accent (Gussenhoven, 1984), which usually is the last or nuclear accent. Prenuclear pitch accents and prosodic phrasing are preserved even if they are associated with given constituents (Baumann and Grice, 2006; Féry and Kügler, 2008). In the prenuclear part of the sentence, pitch accents are not necessarily erased as a consequence of information structure, but at most slightly compressed. Post-nuclearly, however, pitch-accents are extremely reduced due to the large compression of the register in this part of the sentence, which is often referred to as deaccentuation (Ladd, 1996). In a neutral accent pattern of a sentence, thus, the last content word bears the nuclear accent, cf. (1b).

In case of an early nuclear accent with post-nuclear deaccented constituents following, only a narrow focus reading is available (cf. Féry, 2011; Gussenhoven, 1984; Selkirk, 1984, 1995). The postfocal words are contextually given. However, following analyses in Schmerling (1976), Fuchs (1976, 1984), Jacobs (1991/2), and Féry (1993:32) among others, certain intransitive sentences such as (1a) have a neutral accent pattern with the subject bearing the nuclear accent and no accent on the verb. This effect is analysed as being due to the integration of the subject and verb into one prosodic phrase.

The prosodic analysis in this paper is based on the intonational grammar of German developed in Féry (1993), assuming only bitonal nuclear pitch accents. The most natural pitch accent as a nuclear accent in declarative sentences is the simple falling tone H*L (Féry, 1993:82). Hence, the prosodic realization of (1) would be as in (1)'.

(1)' a.   H*L   L%

          MARIA kommt.

      b.   H*L L%

          Maria SINGT.

2.2 Syntax-based approach

The starting point for the syntactic understanding of the prosodic contrast in (1) is the distinction of two classes of intransitive verbs depending on the syntactic properties of their single argument. The distinction at issue is postulated within the unaccusativity hypothesis, which distinguishes between unaccusative and passive verbs whose single argument is internal to the VP and unergative verbs whose single argument is external (Alexiadou et al. Eds., 2004; Belletti, 1988; Burzio, 1986; Grimshaw, 1987; Levin and Rappaport-Hovav, 1995; Perlmutter, 1978). Assuming that syntactic relations

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1 correspond one-to-one to theta roles (Baker, 1988), this distinction correlates with

2 thematic properties: the internal argument of unaccusative and passive verbs is a

3 patient/theme while the external argument of unergative verbs is an agent. The

4 reflexes of this distinction in the syntax are diverse and involve language-specific

5 variation. To the properties that have played a crucial role in establishing this

6 distinction belong the selection of auxiliaries (in languages such as Dutch, German,

7 Italian), the formation of agentive nominalizations (English, German, Persian), the

8 availability of an impersonal passive (Dutch, German), the availability of a resultative

9 construction (English, German), and the well-formedness of discontinuous noun

10 phrases (German) (Abraham, 2001; Alexiadou et al., 2004; Burzio, 1986; Fanselow,

11 1992; Grewendorf, 1989; Haider, 1984; Kahnemuyipour, 2009; Levin and Rappaport-

12 Hovav, 1995). Based on such criteria, the inventory of intransitive verbs has been

13 classified in unaccusative and unergative verbs. Typical unaccusative verbs are the

14 verbs of existence/appearance as well as verbs of change of state, e.g., *arrive, fall,*

15 *break, melt, sink, burn, die, (dis)appear*. Typical unergative verbs are activity verbs,

16 e.g., *play, work, sing, speak, dance, laugh* (Alexiadou et al., 2004; Levin and

17 Rappaport-Hovav, 1995; Perlmutter, 1978; Sorace, 2000).

18   The crucial claim of the unaccusativity hypothesis is that the nominative argument

19 (i.e., the surface subject) of these two verb classes originates in different syntactic

20 positions. With unaccusative verbs, the nominative DP is merged as a verbal

21 complement, i.e., as part of the VP, while with unergative verbs the nominative DP is

22 merged at a higher position, presumably the specifier of vP, see (4) for a German V-

23 final structure. According to this view, unaccusative verbs pattern with passive verbs

24 whose nominative DP also originates as a verbal complement. The syntactic

25 difference between the two intransitive verb classes is reflected in the mapping of

syntactic constituents to prosodic phrases which eventually results in the contrast in

(4). However, the derivational steps that lead to the syntax-to-prosody mapping differ

across frameworks. Previous research accounted for this difference by postulating

rules referring to the syntactic relation of the single argument of the verb. The

assumption that the nuclear accent is assigned to the metrical sister that is

selectionally dependent (S-NSR in terms of Zubizarreta, 1998), accounts for the

observed facts: since the DP is a complement of the unaccusative verb, it is assigned

the nuclear accent, which is not the case with unergative verbs. In phase-theoretical

approaches, the vP constitutes a phase while the VP projection does not do so

(Chomsky, 2001). The spellout domain of the vP phase is the complement of its head:

i.e., the DP argument of unaccusative/passive verbs is part of this domain but the DP

argument of unergative verbs is outside of this domain (as specifier of the vP). This

difference is reflected in phrasing: unaccusative/passive verbs are spelled out in the

same phase and constitute a single prosodic entity (either assuming that they are

spelled out on the basis of the basic configuration, Kratzer and Selkirk, 2007, or that

they have undergone movement for case reasons, Kahnemuyipour, 2009). The

assumption that the highest phonologically eligible element in the spellout domain

receives the nuclear accent (Kahnemuyipour, 2009:68) predicts that the DP argument

will be accented. The unergative structure is spelled out in two phases, the higher

phase containing the specifier of the vP (after case-checking operations have taken

place), and the lower phase its complement, i.e., the verb. Each prosodic entity carries

its own pitch accent.

(4)   a.   Unaccusative/passive verbs

             ((x $)_\varphi$ $)_\iota$

             [$_{VP}$ DP   Verb   ]

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1   b.   Unergative verbs

2     $((\quad x \quad)_\varphi \quad (\quad x \quad)_\varphi)_\iota$

3   [$_{vP}$ DP   [$_{vP}$ Verb]]

4   The prosodic structures in (4) are expected to occur in wide focus contexts.

5 Information structure creates new prosodic possibilities for both verb classes. If the

6 nominative DP is a topic, then it is expected to be phrased separately from its

7 complement. This holds independently of verb class, i.e., it creates a new prosodic

8 option for unaccusative and passive verbs, which is contextually restricted (to

9 contexts in which the nominative argument is a topic).[1] The situation with foci is

10 different: a focused nominative argument receives the nuclear accent, which is

11 accounted for by assuming a focus-to-accent correspondence rule (Jackendoff

12 1972:237). These prosodic options equally hold for nominative arguments of

13 unaccusative, passive, and unergative verbs.

14 **2.3   Semantic and pragmatic approaches**

15 The assumptions outlined in Section 2.2 account for the prosodic differences observed

16 in simple intransitive sentences as mapping syntactic differences that are

17 independently established. A number of observations in the research on accent

18 assignment with intransitive verbs suggest a functional view on the same facts. Some

19 authors note that a subset of the observed differences can be accounted for without

20 reference to syntactic categories; others assume a correlation between verb class

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[1] On this background, the much discussed example pair with the unaccusative verb *die*, namely (i)
TRUman's DIED vs. (ii) *JOHNson's died* (see Schmerling, 1976:90) receives a natural explanation: (i) is
felicitous in a context where Truman (including his critical health situation) is contextually given while
(ii) is uttered in an all-new context where Johnson's death is completely unexpected.

(unaccusative/passive vs. unergative) and information structure. The aim of the present section is to outline these facts and approaches and discuss their relevance for the analysis of the verb class contrast.

Empirical research on the prosody of simple intransitive sentences challenges the view that the phenomena at issue can be explained in syntactic terms. Allerton and Cruttenden (1979) discuss an array of different lexical and semantic properties of the verb that have an impact on the choice of the prosodic realization in (1) such as the verbal notion of appearance and disappearance and verbs expressing a misfortune. According to these authors, these cases have in common that the attention is drawn to the subject which is more newsworthy than the verb (see similar observations in Bolinger, 1972; Faber, 1987 on English and Contreras, 1976; Hatcher, 1956 on Spanish). These preferences directly result from the lexical content of the verb, i.e., they do not depend on different contexts.

Hirsch and Wagner (2011) show by means of a series of experiments on speech production in English that the prosodic structure does not correlate with the syntactic difference between unaccusative and unergative verbs and argue that the prosodic differences can be traced back to preferences for the interpretation of agent constituents as sentential topics, which applies to unergative and not to unaccusative verbs. In particular, they provide experimental evidence that verbs of disappearance are more frequently accented than verbs of appearance and relate this result to the fact that verbs of disappearance are more likely to be associated with referents that are available in the common ground and may serve as topics (see example (5a)) while subjects of verbs of appearance are more likely to introduce new referents, as illustrated in (5b).

(5)   a.   The rash FADED.

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1   b.   A RASH formed.

2   Furthermore, Hirsch and Wagner (2011) present evidence for the impact of

3 animacy of the single argument of an intransitive verb to the effect that there is a

4 significantly higher proportion of accent on predicates with human subjects than with

5 non-human subjects. These facts are challenging because they demonstrate that the

6 accentual realization of identical syntactic structures is sensitive to semantic factors.

7   Another important factor which is orthogonal to the introduced syntactic

8 assumptions, is the role of the informational content and the related notion of

9 predictability of the lexical items in an utterance (see Allerton and Cruttenden 1979;

10 Bolinger, 1972; Féry, 1993:32; Gussenhoven, 1984:40; Krifka, 1984). The idea is that

11 the difference between the prosodic realizations in (1) is grounded in an asymmetry in

12 the contribution of the two verbs to the asserted content. The majority of occurrences

13 of a configuration such as 'Mary is coming' in discourse is used in order to introduce

14 a new referent, which implies that the contribution of the lexical content of the verb

15 'to come' to the asserted content is minimal. The rationale of this claim is that an

16 event of 'coming' is less informative than an event of 'singing' in the sense that the

17 former is more likely than the latter to appear in a discourse about a referent of the

18 type 'Maria'. The informativity of the parts of an utterance is inversely related to their

19 predictability. E.g., a verb that is highly predictable in the context of a given referent

20 contributes less information than a verb that is highly unpredictable.

21   The studies mentioned so far point out that particular factors that depend on lexical

22 semantics have an influence on the prosodic realization. These data show that for a

23 subset of the verbs under discussion, prosodic preferences can be explained without

24 reference to syntax. The crucial question however is whether the observations about

25 the role of the unaccusative/unergative distinction in the prosodic structure can be

1 exhaustively explained by the influence of lexical or semantic differences. If this

2 turned out to be the case, the alleged impact of syntax would be an epiphenomenon of

3 correlations between particular types of propositional content with certain information

4 structures.

5   A further issue in the research on neutral prosodic realization of intransitives is the

6 claim that the influence of syntax on prosody is mediated by information structural

7 features. This view is mirrored in the distinction between 'thetic' and 'categorical'

8 utterances (Sasse, 1987) as referring to two different information structural

9 configurations, i.e., topicless utterances and topic-comment articulations that can both

10 occur in all-new contexts. Similarly, Jäger (2001) argues that the difference between

11 stative and eventive predicates correlates with information structural properties.

12 Crucially, only eventive predicates come with a reading that does not require a subject

13 topic. Building upon this claim, Kratzer and Selkirk (2007) assume that the prosodic

14 realization of stative predicates results from mapping a syntactic configuration that

15 involves the intransitive argument as topic (see also previous accounts based on the

16 difference between stage-level and individual-level predicates in Gussenhoven, 1984,

17 1992; Selkirk, 1995). Similarly, Féry (2011) assumes in an optimality-theoretical

18 account that the input of unergative verbs for the candidate generation involves a

19 topical argument (see also discussion in Irwin, 2012:240). The crucial point is that the

20 topic phrase is expected to appear in all-new contexts in these accounts, which is

21 possible with an understanding of topic as a constituent related to the comment via an

22 aboutness relation. This analysis implies that for a subset of verbs the configuration

23 that appears under all-new contexts differs in that it has to display a topic-comment

24 structure. The influence of syntax on prosody depends on this very property, i.e., it is

25 mediated by an information-structural difference. Zubizarreta and Vergnaud

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1 (2005:533) are explicit in this issue: both accentual patterns can occur in wide focus

2 contexts but this does not imply that the implicit common ground is identical

3 (speakers may select the subject-accentual pattern in "a surprise context or in order to

4 highlight a certain aspect of the information being conveyed"). Although these

5 accounts are based on structural properties (subjects of unaccusatives/unergatives

6 originate in different syntactic positions in Kratzer and Selkirk, 2007; the majority of

7 constraints refer to structural properties in the approach of Féry, 2011) and do not

8 claim that the root of the prosodic difference lies in information structure, the crucial

9 difference that determines the derivation of the accentual patterns is an information

10 structural feature (cf. also Riester and Piontek, this issue, for factors of accent

11 placement in DPs/NPs).

12 **3. Argument structure and predictability**

13 **3.1 Research question**

14 The aim of the present investigation is to shed light on the root of the different

15 accentual patterns observed with simple intransitive sentences. In order to achieve this

16 goal we will observe the impact of the intransitivity split and the impact of further

17 factors with information structural correlates on the prosodic realization of simple

18 intransitive clauses. Our endeavor is motivated by the information-structural accounts

19 as outlined in Section 2.3. We want to observe how such factors interact with the

20 intransitive verb-class distinction and draw conclusions about the extent to which

21 these factors can account for the phenomena at issue. Our research question is as

22 summarized in (6).

23 (6)   Can the differences in the prosodic realization of intransitive structures be

24   accounted for through semantic/pragmatic properties?

13

1   In order to answer the question in (6), we examine the notion of 'predictability',

2   which has been claimed to interfere with the prosodic patterns observed with

3   intransitive verbs (see discussion in Section 2.3). Predictability has an advantage for

4   the empirical operationalization of the research question in (6). In contrast to

5   particular semantic properties of certain verbs that have been claimed to be relevant in

6   our discussion, such as 'appearance' and 'disappearance', predictability is a gradient

7   property of any lexical item, i.e., it can be applied to the entire verb inventory.

8   **3.2   The notion of predictability**

9   New information may vary as to its contribution to the common ground. In a

10   particular environment, information may be highly expected and thus predictable or

11   not. For instance, the verb *cry* is more likely in the context of a baby and less so in the

12   context of an employee (see the German examples in (7)).

13   (7)   Context: Warum waren alle so beunruhigt?

14   'Why was everybody so worried?'

15   a.   Weil ein Baby geweint hat.

16   'Because a baby cried.'

17   b.   Weil eine Angestellte geweint hat.

18   'Because an employee cried.'

19   Both utterances may present new information in a particular context, e.g., in an

20   answer to the context question given in (7). However they involve an asymmetry in

21   terms of meeting the expectations of the hearer or not. Both sentences (7a) and (7b)

22   express propositions that are not part of the common ground. The difference between

23   them lies in the relation between the noun and the verb. The type 'baby' is more likely

24   to be involved in events of the type 'cry' than the type 'employee'.

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1   The impact of predictability on the realization of an utterance has been discussed

2   both with respect to prosodic reflexes and syntactic reflexes, as for instance reflexes

3   on word order. It has been argued that predictability relates to nuclear accent

4   assignment in a probabilistic way: high predictability has a measurable influence on

5   phonetic parameters such as duration, articulation and pitch range, all of which are

6   reduced when the information is highly predictable (Aylett and Turk, 2004; Bell et al.,

7   2009; Calhoun 2010), and the presence of these phonetic cues indicates the presence

8   of an accent. Highly unpredictable words are likely to receive a nuclear accent in

9   contrast to highly predictable words which are not probable to get a nuclear accent

10   (e.g., Bolinger, 1972:644). Syntactic reflexes of high predictability are observed in the

11   English locative inversion construction, which frequently occurs with verbs such as

12   *come*, etc. that are "semantically empty", i.e., do not have a substantial contribution to

13   the conveyed propositional content (see Birner, 1994, 1995; Birner and Ward, 1998).

14   Finally, non-predictability is considered to be a core property of focus in some

15   accounts (Lambrecht, 1994:218; Zimmermann, 2008).

16   **3.3   Operationalization of the notion of predictability**

17   The factor PREDICTABILITY is gradient in nature. In order to inspect its impact, we

18   consider the contrast between two levels of predictability of the verb, i.e., maximally

19   and minimally predictable verbs, in particular sentential configurations as illustrated

20   in (8). The implementation of the notion of predictability is based on the expectedness

21   of a particular verb in the context of a particular subject referent.

22   (8)   a.   Maximally predictable verb

23   Ein Chor hat gesungen.   'A choir sang.'

24   b.   Minimally predictable verb

25   Ein Arbeiter hat gesungen.   'A worker sang.'

We estimate predictability of a verb by the association score of the verb with a particular subject. For this information, we relied on the calculation of "salience" in DWDS (*Digitales Wörterbuch der Deutschen Sprache*).[2] This measure is based on the formula in (9), whereby *r* is a particular syntactic relation (in the case at issue 'subject of'), *w* and *w´* are the involved words, and ‖w,r,w´‖ is the attested frequency of the words *w* and *w´* in the relation *r* in the DWDS corpus. Furthermore, ‖w,r,*‖ and ‖*,r,w´‖ represent the frequencies of the words *w* and *w'* in the relation *r* with any word in the corpus, respectively, and ‖*,r,*‖ is the overall frequency of the relation *r*. The formula computes whether the word combinations in the relation *r* occur more frequently than expected, a high score indicating that the word pair is strongly collocated (see discussion and examples in Geyken, 2011:122f.).

(9)   *association score* (*w, r, w´*) $= \dfrac{\| w,r,w´ \| \times \| *,r,* \|}{\| w,r,* \| \times \| *,r,w´ \|}$ (Geyken, 2011:123)

On the basis of the account of predictability given in Section 3.2 and its inverse relation to the possibility of being accented our expectations regarding the prosodic structure of simple intransitive sentences are straightforward: the verb is less likely to be accented if it is maximally predictable.

3.4   Experimental implementation and predictions

In order to answer the research question outlined in Section 3.1, we designed two experiments on the acceptability of simple intransitive sentences with early vs. late

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[2] DWDS is a digital lexical system developed and continuously extended by the *Berlin-Brandenburgische Akademie der Wissenschaften*, available at http://www.dwds.de/. It contains over 410.000 lemmata from diverse digitalized dictionaries of present-day German and 1,8 billion tokens from 15 corpora. Furthermore, for each lemma a word profile with statistical information about its syntagmatic behavior is available.

16

1 nuclear accent. The acceptability of both accent patterns was judged in the context of

2 a wide focus question which felicitously triggers an all-new answer, i.e., the structure

3 that is associated with the default prosodic structures for simple intransitive sentences

4 according to the unaccusativity hypothesis (see Sections 2.1 and 2.2). The

5 experimental sentences were constructed as verb-final dependent clauses (with

6 temporal and causal subordinators), see (7). The subject constituent invariably was an

7 indefinite marked animate DP, to induce the reading of a newly introduced

8 participant. (See Sections 4.1.4 and 4.2.4 for a detailed description of the experimental

9 procedure).

10 Experiment 1 tested passive verbs, experiment 2 tested unergative verbs. In order

11 to achieve a clear contrast for the factor PREDICTABILITY in the experimental

12 manipulation, we used passive verbs for the realization of the unaccusative/passive

13 structure in experiment 1. The decision to use passive verbs was motivated by the fact

14 that these verbs are more appropriate for testing the effects of predictability.

15 Following the information in the association score provided in the DWDS corpus (see

16 Section 3.3) typical unaccusative verbs such as *kommen* 'come', *ankommen* 'arrive',

17 *fallen* 'fall', *erscheinen* 'appear', etc. either collocated preferably with inanimate

18 subject nouns (compare *fallen: Entscheidung* 'decision', *Kurs* 'price', *Wort* 'word'.

19 *etc.; erscheinen: Katalog* 'catalogue', *Roman* 'novel', etc.) or with highly generic

20 person nouns such as *Menschen* 'humans', *Mann* 'man' (*come, fall, appear, arrive*).

21 Furthermore, the association scores of these verbs with suitable subject nouns were

22 generally much lower than the corresponding association scores for unergative and

23 passive verbs (e.g., the pair *erscheinen* 'appear' – *Gäste* 'guests' had an association

24 score of 5.09; the pair *ankommen* 'arrive' – *Soldat* 'soldier' had an association score

1 of 3.7). Hence, the manipulation that we intend in this study could not be

2 implemented with verbs of this type.

3 In general, the choice of the individual verbal items in both verb groups was

4 determined by the availability of both typical and non-typical subject-noun relations,

5 which was tested on the basis of the information available in the DWDS. The

6 experimental material is listed in Appendix A. For each item the association score for

7 the verb – subject relation indicated in the DWDS is given.

8 According to the unaccusativity hypothesis, the effect of PREDICTABILITY will be

9 different depending on verb class. As outlined in Section 2.2, in syntax-based

10 approaches unaccusative/passive verbs are associated with an early nuclear accent on

11 the subject constituent whereas unergative verbs are associated with a late nuclear

12 accent on the verb. PREDICTABILITY should thus have an effect on the acceptability of

13 both accent patterns with unergative verbs since the effect of high predictability (i.e.,

14 subject accent) diverges from the default nuclear accent of these verbs (i.e., verb

15 accent). In contrast, PREDICTABILITY is not expected to interact with the default accent

16 pattern of unaccusative/passive verbs. With these latter verbs, early nuclear accent on

17 the subject is already predicted by their constituent structure, i.e., the expected

18 prosodic effect of high predictability (i.e., nuclear accent on the subject) converges

19 with the accent on the subject in neutral contexts assumed for unaccusative/passive

20 verbs.

4. Acceptability judgements

4.1 Experiment 1: Passive structures

4.1.1 Experimental factors

To test the above outlined predictions for the passive structures, the experimental setup contains a 2 × 2 design of PREDICTABILITY and ACCENT PLACEMENT, each factor containing two levels. Full permutation of the levels of both factors resulted in four experimental conditions. Consider the examples in (10), which show a non-predictable verb in (10a/b), a predictable verb in (10c/d), early nuclear accent placement in (10 a/c), and late nuclear accent placement in (10 b/d).

(10)   a. Passive, non-predictable verb, early nuclear accent

                H*L   L%

      Weil eine SEKRETÄRIN gesucht wurde.

      'Because a SECRETARY was looked for.'

    b. Passive, non-predictable verb, late nuclear accent

                H*   H*L   L%

      Weil eine Sekretärin GESUCHT wurde.

      'Because a secretary was LOOKED FOR.'

    c. Passive, predictable verb, early nuclear accent

              H*L   L%

      Weil ein SPONSOR gesucht wurde.

      'Because a SPONSOR was looked for.'

    d. Passive, predictable verb, late nuclear accent

              H*   H*L   L%

1   Weil ein Sponsor GESUCHT wurde.

2   'Because a sponsor was LOOKED FOR.'

3   The factor PREDICTABILITY was calculated as indicated in section 3.3 above.

4   (10a/b) gives an example for a non-predictable subject – verb pair of the verb *suchen*

5   'to look for' with an association score of 0.0, (10c/d) shows an example for a

6   predictable subject – verb pair with an association score of 9.9 (see Appendix A,

7   Table A for the association scores of the subject – verb pairs used in experiment 1).

8   The second factor, ACCENT PLACEMENT was manipulated through the realization of

9   the recorded utterances. The level 'early accent' involves a nuclear accent on the

10   subject constituent, while the level 'late accent' involves nuclear accent on the verb.

11   4.1.2   Stimuli

12   Using 16 verbs in two PREDICTABILITY conditions and systematically modifying

13   ACCENT PLACEMENT of the resulting sentences yields a total of 64 target sentences (16

14   verbs × 2 PREDICTABILITY × 2 ACCENT PLACEMENT). A trained male native speaker of

15   German (second author) produced these stimuli keeping the prosodic structure of the

16   stimuli constant according to the conditions. All 64 target sentences, listed in

17   Appendix A, Table A, were digitally recorded in a sound proof booth with a

18   Sennheiser ME 64 condenser microphone applying a sampling frequency of 44.1 kHz

19   and a 16 bit resolution.

20   The speaker systematically used a nuclear falling H*L accent either on the subject

21   or the verb according to the levels of the condition ACCENT PLACEMENT; in cases

22   where the verb carries the nuclear accent, the speaker additionally produced a

23   prenuclear accent on the subject (cf. Féry, 1993; Féry and Kügler, 2008). Figure 1

24   illustrates the pitch contours of the non-predictable and predictable passive stimuli

25   given in (10). Figure 1a and 1c show that the subject carries the nuclear falling pitch

20

1 accent while Figure 1b and 1d show the sequence of a prenuclear pitch accent on the

2 subject and the nuclear falling accent on the verb.
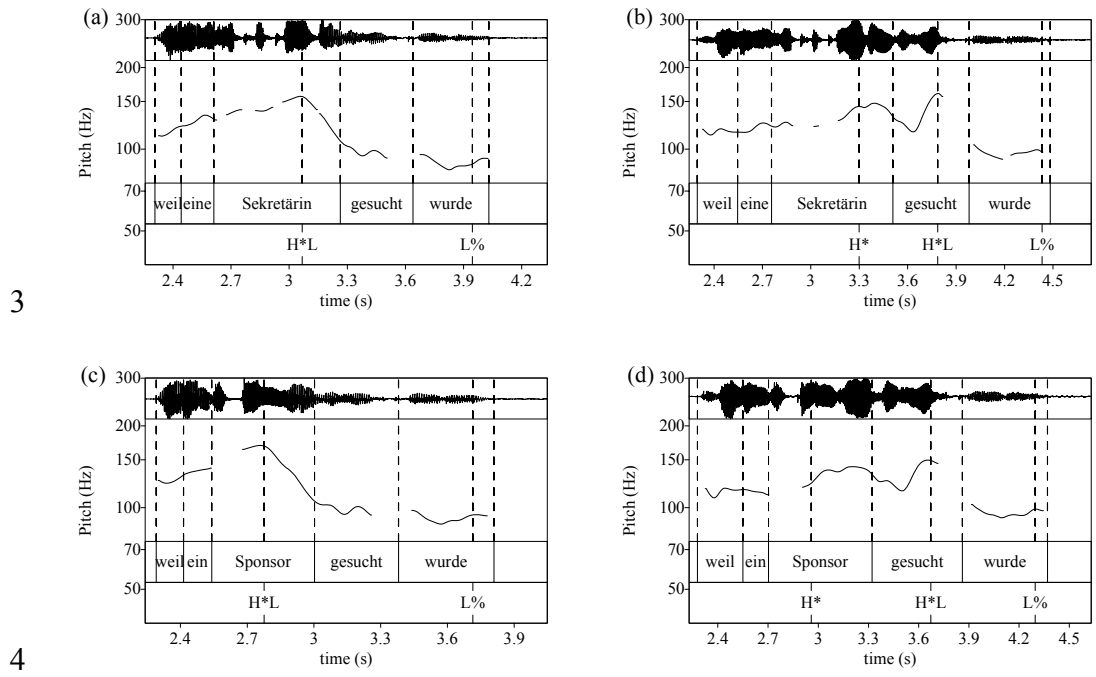
6 Figure 1. Pitch tracks of examples (10) with nuclear accent on the subject in

7 unpredictable (a) and predictable condition (c), and nuclear accent on the verb in

8 unpredictable (b) and predictable condition (d).

10   To ensure that the prosodic composition of the experimental stimuli was constant

11 across corresponding conditions, the relevant constituents were closely inspected with

12 respect to F0-maximum and duration in the four conditions. The F0-maximum is

13 considered to be the phonetic cue of an H tone: for the H* pitch accent the F0-

14 maximum shows up on the stressed syllable of each corresponding word, in particular

15 towards the end of the syllable rime (Grabe, 1998). Table 1 presents the F0-maximum

16 of each constituent, subject and verb, in each of the four conditions averaged over

17 items. The subject had a significantly higher F0 when it carried the nuclear accent

18 than when it was prenuclearly accented (168 Hz vs. 154 Hz, t = 7.1182, df = 31, p <

1   0.001). The verb also had a significantly higher F0 when it carried the nuclear accent

2   than when it was post-nuclearly compressed (162 Hz vs. 108 Hz, t = 21.0633, df = 31,

3   p < 0.001).

4

5   Table 1. Mean F0-maximum aggregated over items for passive structures (n = 16 per

6   cell) on Subject (S) and Verb (V) split by PREDICTABILITY and ACCENT PLACEMENT

7   condition.

	NUCLEAR ACCENT PLACEMENT			
	Subject		Verb	
PREDICTABILITY	S	V	S	V
non-predictable	167	108	154	161
predictable	168	107	154	162
means	168	108	154	162

8

9   Table 2 shows the duration in milliseconds of each constituent, subject and verb, in

10 each of the four conditions averaged over items. Duration here refers to word

11 duration. Since the mean number of syllables differs between the subject and the verb

12 (subject: 2.7 syllables vs. verb: 4.6 syllables), verb duration is longest compared to the

13 corresponding subject duration.

14   Comparing verb duration across sentences, the presence of a pitch accent leads to a

15 significant increase in duration (mean duration V_{NoAcc} = 243 ms vs. V_{Acc} = 311 ms, t

16 = 10.117, df = 31, p < 0.001) (cf. e.g., Beckman, 1986; Kügler, 2008). Comparing

17 subject duration across sentences, the subject is significantly longer when carrying a

18 prenuclear accent than when nuclearly accented (mean duration S_{PreAcc} = 277 ms vs.

22

1 S_{NucAcc} = 225 ms, t = -5.8119, df = 31, p < 0.001).[3] The main conclusion of the

2 average F0 and duration data in Table 1 and 2 is that prosodic structure is identical

3 across corresponding conditions; the presence of a pitch accent is reflected in longer

4 durations and higher F0 peaks.

5

6 Table 2. Mean duration in ms aggregated over items for passive structures (n = 16 per

7 cell) of Subject (S) and Verb (V) split by PREDICTABILITY and ACCENT PLACEMENT

8 condition.

	NUCLEAR ACCENT PLACEMENT			
	Subject		Verb	
PREDICTABILITY	S	V	S	V
non-predictable	197	238	231	299
predictable	253	249	323	324
means	225	243	277	311

9

10 4.1.3 Participants

11 32 native German speakers (22 female) participated in this experiment with an

12 average age of 26.6 years. None of them reported any speech or hearing impairment.

13 They were paid a small fee for participating.

---

[3] The fact that prenuclearly accented subjects are longer than nuclearly accented ones is due to a cumulative effect of accent and phrase boundary. The prenuclear subject seems to be phrased separately (cf. Gollrad, 2013 for phonological phrase boundary lengthening in German).

1 4.1.4 Experimental procedure

2 The experiment was scripted and performed in PRAAT using the MFC function

3 (Boersma and Weenink, 2011). Each trial consisted of a prerecorded context question

4 which instantiates a wide focus context and a following answer (cf. (11)). The task

5 was to evaluate the semantic congruency between the question and the corresponding

6 answer (cf. Kügler and Gollrad, 2011), which is why the participants were asked to

7 judge whether the performance of the answer fits with the context of the preceding

8 question. They were instructed to express their judgments on a scale from 1 (= not

9 appropriate in this context) to 7 (= appropriate in this context).

10 (11) Wide focus domain

11 A: Warum freuen sich die Leute auf dem Platz?

12 'Why are people on the market so happy?'

13 B: Weil ein Arbeiter gesungen hat.

14 'Because a workman sang.'

15 Applying a latin square design, the stimuli were distributed over four lists with

16 each one containing 16 stimuli of the four experimental conditions, but only one

17 version of each sentence. The experimental items were embedded in a list of 48 fillers

18 of similar structures. The filler sentences were question-answer pairs eliciting subject

19 or object focus. Prosodically congruent filler sentences carried the nuclear accent on

20 the focused constituent. Prosodically incongruent filler sentences carried a nuclear

21 accent on the verb so that the focused constituent (subject or object) did not receive

22 the maximal prominence of the sentence. The filler sentences functioned as a

23 reference frame for the acceptability ratings.

24

1   Prior to the experiment, participants performed a practice session with eight trials

2   not belonging to the 64 experimental trials. The trials were randomly displayed on the

3   screen and presented via headphones. Before each trial there was a 500ms pause.

4

5   4.1.5   Results

6   According to our predictions, predictability of the verb should not affect the

7   acceptability of the data, since the effect of high predictability (= accent on the

8   subject) converges with the assumed default accentuation pattern of passive verbs, in

9   which case the subject carries the nuclear accent. The results shown in Figure 2

10   confirm our predictions. Passive structures with early nuclear accent, i.e., accent on

11   the subject (mean rating = 6.10), are rated significantly more congruent than those

12   with late nuclear accent, i.e., accent on the verb (mean rating = 3.84). Predictability of

13   the verb does not play a role in the acceptability of early vs. late nuclear accent with

14   passive verbs, see Figure 2 and results in Appendix B, Table A. Mean rating of

15   congruent and incongruent filler sentences was 6.57 and 1.83, respectively.

16   Fitting a linear mixed effects model[4] with PREDICTABILITY and ACCENT PLACEMENT

17   as fixed factors and 'listener' and 'item' as random factors reveals a significant effect

18   of ACCENT PLACEMENT (SE = 0.24500, t = 9.23), but not for PREDICTABILITY (SE =

19   0.15984, t = 0.17), showing that an accent on the subject independent of the

20   predictability of the verb resulted in significantly more congruent ratings. This

21   confirms exactly the predictions: speakers have a clear preference for nuclear accent

---

[4] For statistical calculations we used R (R Core Team, 2013) and the lme4 package for fitting linear

mixed effects models (Bates et al., 2013). In all models, we used the more conservative measure of

random slopes (Baayen et al., 2008; Barr et al., 2013) for speakers and items.

1 on the subject with passive verbs, which is not influenced by predictability

2 asymmetries.
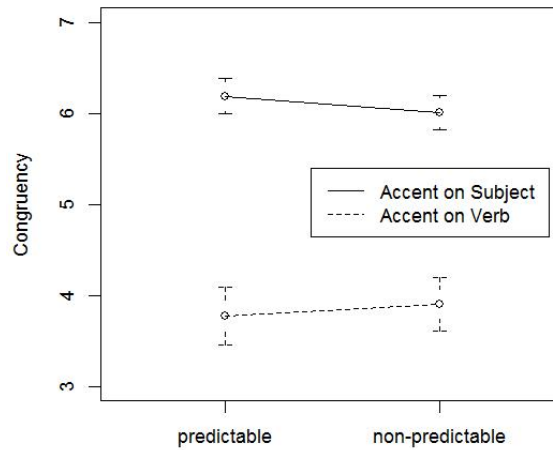
3

4 Figure 2. Congruency ratings for sentences with passive verbs split by predictable and

5 non-predictable condition; the solid line represents ratings for sentences with nuclear

6 accent on the subject, the dotted line with nuclear accent on the verb (Y-bars:

7 confidence intervals .95).

8

9 **4.2 Experiment 2: Unergative structures**

10 4.2.1 Experimental factors

11 As in the previous experiment, a 2 x 2 design of the factors PREDICTABILITY and

12 ACCENT PLACEMENT was set up with unergative structures, each factor containing two

13 levels, as indicated in (12). Full permutation of the levels of both factors resulted in

14 four experimental conditions.

15

16 (12)   a. Unergative, non-predictable verb, early nuclear accent placement

17   H*L   L%

26

Weil eine ANGESTELLTE geweint hat.

'Because an EMPLOYEE cried.'

b. Unergative, non-predictable verb, late nuclear accent placement

            H*   H*L   L%

Weil eine Angestellte GEWEINT hat.

'Because an employee CRIED.

c. Unergative, predictable argument, early nuclear accent placement

            H*L   L%

Weil ein BABY geweint hat.

'Because a BABY cried.'

d. Unergative, predictable argument, late nuclear accent placement

            H*   H*L   L%

Weil ein Baby GEWEINT hat.

'Because a baby CRIED.'

Again, the factor PREDICTABILITY was calculated as indicated in section 3.3 above. (12a/b) gives a non-predictable argument of the verb *weinen* 'to cry' with an association score of 0.0, (12c/d) a predictable correspondent with an association score of 8.17 (see Appendix A, Table B for the association scores of the subject – verb pairs used in experiment 2). As in experiment 1, the factor ACCENT PLACEMENT was manipulated through the realization of the recorded utterances. The level 'early accent' involves a nuclear accent on the subject constituent (12a/c), while the level 'late accent' involves nuclear accent on the verb (12b/d).

4.2.2   Stimuli

Using 16 verbs in two PREDICTABILITY conditions and systematically modifying ACCENT PLACEMENT of the resulting sentences yields a total of 64 target sentences (16

1 verbs × 2 PREDICTABILITY × 2 ACCENT PLACEMENT). The same speaker as in

2 experiment 1 produced these stimuli keeping the prosodic structure identical across

3 conditions. All 64 target sentences, listed in Appendix A, Table B, were digitally

4 recorded during the same recording session as the stimuli for experiment 1. Stimuli

5 have a sampling frequency of 44.1 kHz and a 16 bit resolution.

6 As before, the speaker systematically used a nuclear falling H*L accent either on

7 the subject or the verb according to the conditions; in cases where the verb carries the

8 nuclear accent the speaker additionally produced a prenuclear pitch accent on the

9 subject (cf. Féry, 1993; Féry and Kügler, 2008).

10 Figure 3 illustrates the pitch contours of the non-predictable and predictable

11 unergative stimuli. Figure 3a and 3c show that the subject carries the nuclear falling

12 pitch accent while Figure 3b and 3d show the sequence of a prenuclear pitch accent on

13 the subject and the nuclear falling on the verb.[5]

---

[5] Comparing the phonetic realization of the nuclear pitch accent between Figure 1 and Figure 3 a difference in slope towards the accentual H* tone can be observed. This variation exists not only between the two experiments as the examples in the figures might suggest, but the different stimuli within each experiment show this variation. Hence, in experiment 1 there were stimuli with a steeper slope as illustrated in Figure 3, and in experiment 2 there were stimuli with a shallower slope as illustrated in Figure 1.

28

(a)

(b)

(c)

(d)
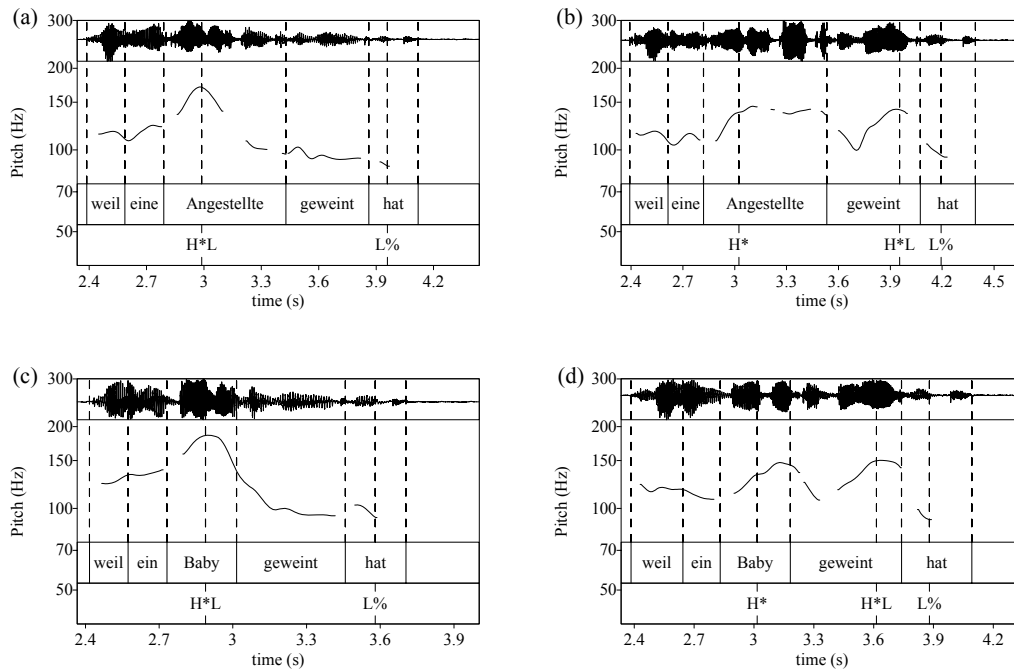
Figure 3. Pitch tracks of unergative stimuli (12) with accent on the subject in unpredictable (a) and predictable condition (c), and accent on the verb in unpredictable (b) and predictable condition (d).

As in experiment 1, a close inspection of the stimuli with respect to F0-maximum and duration in the four conditions ensured that the prosodic composition of the experimental stimuli was identical across conditions. Table 3 presents the F0-maximum of each constituent, subject and verb, in each of the four conditions averaged over items. Measurements confirm that the constituent carrying the nuclear accent has the highest F0 peaks. Specifically, the subject had a significantly higher F0 when it carried the nuclear accent than when it was prenuclearly accented (175 Hz vs. 150 Hz, $t = 11.9592$, $df = 31$, $p < 0.001$). The verb also had a significantly higher F0 when it carried the nuclear accent than when it was post-nuclearly compressed (155 Hz vs. 115 Hz, $t = 4.5387$, $df = 31$, $p < 0.001$).

Table 3. Mean F0-maximum aggregated over items for unergative structures (n = 16 per cell) on Subject (S) and Verb (V) split by PREDICTABILITY and ACCENT PLACEMENT condition.

	NUCLEAR ACCENT PLACEMENT			
	Subject		Verb	
PREDICTABILITY	S	V	S	V
non-predictable	175	123	149	155
predictable	174	108	151	156
means	175	115	150	155

As in experiment 1, the presence of an accent increases word duration (cf. Table 4). A paired samples t-test reveals that verb duration is significantly longer when carrying a nuclear accent compared to no accent (mean duration V_{ACC} = 394 ms vs. V_{NOACC} = 310 ms, t = 7.6445, df = 31, p <0.001). Duration of the subject is significantly longer when carrying a prenuclear accent than when nuclearly accented (mean duration S_{PREACC} = 275 ms vs. S_{NUCACC} = 240 ms, t = -4.3289, df = 31, p < 0.001). Hence, the conclusion of the quantitative phonetic data inspection in Table 3 and Table 4 is that the prosodic structure of the experimental sentences is identical across conditions; longer durations and higher F0 peaks indicate the presence of an accent.

Table 4. Mean duration in ms aggregated over items for unergative structures (n = 16 per cell) of Subject (S) and Verb (V) split by PREDICTABILITY and ACCENT PLACEMENT condition.

	NUCLEAR ACCENT PLACEMENT	
	Subject	Verb

PREDICTABILITY	S	V	S	V
non-predictable	250	313	278	407
predictable	230	307	271	382
means	240	310	275	394

1

2 4.2.3 Participants

3 32 native German speakers (22 female), who did not take part in the previous

4 experiment, participated in this experiment. They were 27.2 years on average. None

5 of them reported any speech or hearing impairment. They were paid a small fee for

6 participation.

7 4.2.4 Experimental procedure

8 The experimental procedure was identical to experiment 1 (cf. section 4.1.4 above),

9 using Praat, presenting individual trials (cf. (13)) distributed across four lists, and

10 having participants rate the congruency between a target sentence and a context

11 question on a seven-point scale. As in experiment 1, filler items were prosodically

12 congruent and incongruent with respect to focus context and nuclear accent

13 placement.

14 (13)　　Wide focus domain

15 　　　A:　Warum waren alle so beunruhigt?

16 　　　　　'Why was everybody so worried?'

17 　　　B:　Weil eine Angestellte geweint hat.

18 　　　　　'Because an employee cried.'

1   4.2.5   Results

2   According to our predictions, predictability of the verb should affect the congruency

3   ratings of the data. In unergative structures, nuclear accent on the subject or the verb

4   is assumed to be equally acceptable. If, however, the verb is highly predictable in

5   relation with the subject, nuclear accent on the verb should reduce acceptability (e.g.,

6   (12d) vs. (12c)). The results shown in Figure 4 confirm our predictions. With

7   unergative verbs in the non-predictability condition, early nuclear accent (i.e., accent

8   on the subject, cf. Figure 3a, mean rating 5.64) is rated as congruent as late nuclear

9   accent (i.e., accent on the verb, cf. Figure 3b, mean rating 5.73). However,

10   PREDICTABILITY interacts with ACCENT PLACEMENT in the predicted way: With a

11   highly expected verb, constructions with early nuclear accent (accent on the subject,

12   cf. Figure 3c, mean rating = 6.27) are significantly more congruent than constructions

13   with late nuclear accent (accent on the verb, cf. Figure 3d, mean rating 5.40). See

14   Figure 4 and results in Appendix B, Table B. Mean rating of prosodically congruent

15   filler sentences was 6.42, and 1.91 for prosodically incongruent filler sentences on

16   average.
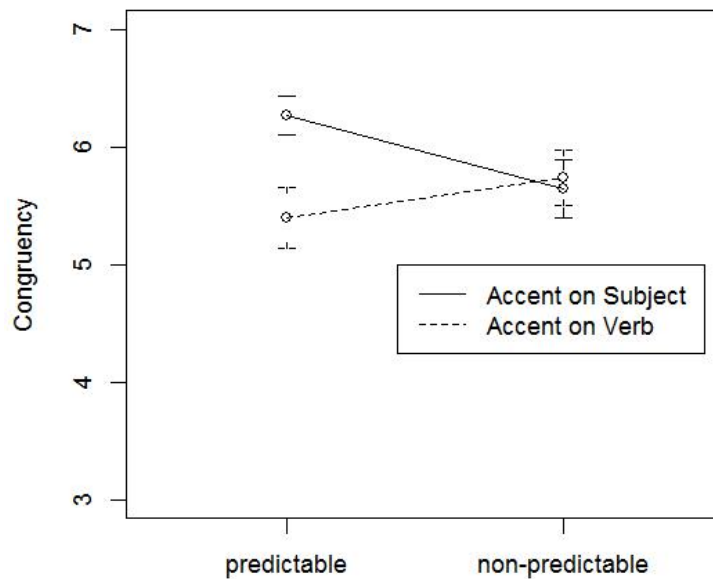
Figure 4. Congruency ratings for sentences with unergative verbs split by predictable and non-predictable condition; the solid line represents ratings for sentences with nuclear accent on the subject, the dotted line with nuclear accent on the verb (Y-bars: confidence intervals .95).

We fitted a linear mixed effects model with PREDICTABILITY and ACCENT PLACEMENT as fixed factors and random slopes and intercepts for 'listener' and 'item'. The model reveals neither a significant effect for ACCENT PLACEMENT (SE = 0.20257, t = 1.91) nor for PREDICTABILITY (SE = 0.16577, t = 0.87). Yet, a significant interaction of both factors (SE = 0.09533, t = 5.04) reflects the disordinal interaction pattern that we see in Figure 4. This interaction indicates that the effect of ACCENT PLACEMENT depends on PREDICTABILITY. As shown in Figure 4, an accent on the verb results in a loss of acceptability with predictable verbs while both possibilities of ACCENT PLACEMENT are equally acceptable otherwise.

1 **5. Discussion**

2 The aim of the present empirical study was to examine the interaction of the

3 intransitive verb class distinction with semantic/pragmatic properties. In particular, we

4 investigated the effects of verb class on the accentual pattern and its interaction with

5 predictability. The main reason for examining predictability was the following: as a

6 factor, predictability can be measured for any verb-subject combination and as such

7 can lead to generalizable conclusions for the entire inventory of intransitive verbs

8 (which is not the case for anecdotal observations on particular verb groups, e.g.,

9 'verbs of (dis)appearance', see Section 2.3). We used a contextual congruency

10 perception paradigm to achieve acceptability judgements on sentences with different

11 nuclear ACCENT PLACEMENT under manipulation of the verb class and the

12 PREDICTABILITY of the subject/verb configuration.

13 In a first experiment on intransitive structures with an internal argument (passive

14 verbs), we found a global preference for nuclear accent on the subject that does not

15 significantly interact with predictability; see Figure 2. This finding leads to two

16 conclusions: (a) it confirms the initial intuition obtained by introspective data that the

17 internal argument of passive verbs bears the nuclear accent; (b) it shows that this

18 intuition is independent of factors such as predictability. In a second experiment on

19 intransitive structures with an external argument (unergative verbs), we found that the

20 accentual pattern depends on predictability (empirically justified by a significant

21 interaction effect): if the verb is non-predictable, there is no evidence for a preference

22 for one or the other accent option; when the verb is predictable, the preferred option is

23 a nuclear accent on the subject; see Figure 4.

24 Due to the difficulties of implementing the factor predictability with unaccusative

25 verbs (see Section 3.4) we tested passive verbs as representatives of the classes of

34

intransitive verbs with an internal argument in experiment 1. As a matter of course, it remains unclear whether the passive results carry over to unaccusative verbs, especially in regard to a baseline association with nuclear accent on the subject. As summarized in Sections 2.2 and 2.3, previous experimental studies on English unaccusatives are inconsistent in their evidence of showing nuclear accent on the subject. For German unaccusatives, experimental evidence for a baseline nuclear accent on the subject is still pending.

The influence of predictability is only observed with unergative verbs, but not with passive verbs, i.e., it is present with those verbs that allow for early OR late nuclear accent in the baseline configuration, but not with verbs that are associated with early nuclear accent on the subject. This finding has implications for the impact of predictability on the accentual pattern. Recall that our measure of predictability is based on the association score of subjects and verbs obtained from a DWDS corpus query; see Section 3.3. The association score is a mutual measure which implies that in the 'maximally predictable' combinations (see Appendix A), the subject can be predicted with great confidence with the verb and vice versa, the verb can be predicted with great confidence with the subject. However, the effects of predictability on the accentual pattern are asymmetric: the 'maximally predictable' combinations are preferably realized with a deaccented verb and not either with a deaccented verb or a deaccented subject. Our experimental results show that predictability has only an impact with unergatives, i.e., it has an influence on accenting the verb. There is no impact when the baseline involves an accent on the subject (i.e., with passives), which indicates that subjects that can be predicted by the verbs are not deaccented. Thus, we conclude that the critical issue is that certain verbs are highly predictable in the context of particular subjects, but not vice versa.

1 Our findings corroborate the view that several factors have an influence on

2 accentual patterns of simple intransitive sentences (as discussed in several studies

3 since Bolinger, 1972; see recent experimental findings in Hirsch and Wagner, 2011).

4 However, comparing the effect of predictability with unergatives and passives shows

5 that there is an independent influence of verb class that cannot be reduced to the

6 impact of the factor investigated in this study. The effect of predictability has been

7 shown to depend on verb class. The potential effects of context and animacy were

8 controlled in our experiments: all utterances were presented in wide focus contexts;

9 all subjects were animate. Thus, we conclude that there is an impact of verb class that

10 is independent of predictability, animacy, and context.

11 The observed difference between passives and unergatives generally confirms

12 previous intuitions about the impact of verb class (see Féry, 1993, 2011; Kratzer and

13 Selkirk, 2007; Uhmann, 1991 for German). The challenging issue in our results is the

14 asymmetry between passives and unergatives: setting aside the interaction with

15 predictability, the accent preferences with unergatives do not show the mirror image

16 of the subject-accent preference with passives. While passives have a preference for

17 an accentual pattern, the accentual realization of unergatives seems to be

18 underspecified. This asymmetry is not in line with assuming a bi-unique relation

19 between accent and verb class, such that unaccusative/passive structures are mapped

20 with a subject accent and unergative structures with a verb accent (Kahnemuyipour,

21 2009). A part of the previous research assumes that unergatives occur with both

22 patterns (e.g., Féry, 2011; Zubizarreta and Vergnaud, 2005:533), and Irwin (2011)

23 observes an increase of variability with unergatives in an empirical study on English

24 speech production (which is, however, not statistically justified). Hoskins' (1996)

25 results from speech production in English are compatible with different

36

interpretations. This study reports averages of F_0 maxima with subject-verb structures containing unaccusative, passive and unergative verbs. The results show a larger difference between subject and verb with unaccusatives and passives, which implies that the subject is more frequently accented in the corresponding sentences, however, it is not clear from Hoskins' (1996) data whether unergatives always involve an accent on the verb or display two possibilities.

The empirical justification of the alternative accentual patterns has crucial implications for modelling the distinction between unaccusatives/passives and unergatives. Approaches exclusively based on the difference in the syntactic derivation of these types of clauses face a crucial problem with the optional accent realization for unergative verbs. If the difference in accentual pattern only relies on the different phases of derivation (as developed by Kahnemuyipour, 2009 or Irwin, 2012), then the optional accent of unergatives needs additional assumptions. It is possible to assume an optional syntactic operation that applies to unergative structures, such that unergative verbs can either be realized within the VP or in higher head position (Voice°) that is outside the spellout domain of the lower VP-phase (Irwin, 2012, based on Schäfer, 2008). The theoretical problem of such accounts is the stipulation of an additional derivational step and the lack of explanation for the optional operation applying to a subset of intransitive verbs.

Models that involve a role of an information structural operation such as topicalization have the advantage that they can accommodate optional phenomena in a more plausible way. We have seen in Section 2.3 that several models assume the possibility of different readings under wide focus. Kratzer and Selkirk (2007) and Féry (2011) assume that unergative verbs come with a topic argument in all-new contexts; Zubizarreta and Vergnaud (2005) illustrate that by means of notions such as

'surprise about the information conveyed', it is possible to have different information structures in the same context. Such a model can account for the observed optionality by assuming that unergative verbs come with different information structures in all-new contexts. This is, the presented findings are accounted for if we assume that a topic-comment articulation is possible with unergative verbs, also in the absence of a contextual trigger of subject topicalization.

6. Conclusion

This study investigated the accentual patterns of simple intransitive sentences in German that contain unergative and passive verbs. We started with the observation in previous research that these verb classes are realized with different accentual patterns in all-new contexts. The pattern of passives/unaccusatives involves nuclear accent on the subject, while the corresponding pattern of unergatives involves nuclear accent on the verb. This difference gave rise to several accounts on syntax/prosody mapping; see Section 2. The syntactic properties of the single argument differ depending on the intransitive verb type: it is an internal argument with passives/unaccusatives (bearing the theta role of a patient) and an external argument with unergatives (bearing the theta role of an agent). Approaches based exclusively on syntax argue that the higher argument of unergatives is in a syntactic projection that is phrased separately from the VP, which is not the case for the argument of passives/unaccusatives; see details in Section 2.2. Other approaches assume that the relation between prosody and syntax is mediated by information structure, i.e., by the preference for unergatives to be realized in a topic-comment configuration – even out of the blue; see Section 2.3.

We carried out an empirical study with acceptability judgments, which has shown that the felicity of accentual patterns can be affected by the predictability of the verb

38

vis-à-vis the subject. However, there is an effect of verb class that is independent of predictability and is compatible with previous analyses about an impact of syntactic factors on accent placement. The crucial empirical finding is that unergatives are not the mirror image of passives: while in all-new contexts, passives involve a preference for accenting the subject, both examined accentual patterns are equally accepted with unergative verbs.

The critical finding of our study can be accounted for if we assume that unergative verbs come with two different information structural configurations in all-new contexts: a configuration containing a topic which involves an accent on the verb and a topicless configuration that is prosodically realized like passives/unaccusative verbs.

Appendix A. Target items

(The column 'as' displays the association score for the combination of the subject constituent and the verb of the target item, see definition in Section 3.3; http://www.dwds.de, values extracted in August 2012)

1 Table A. Associations scores of items with passive verbs, experiment 1.

item	maximally predictable		minimally predictable	
	target sentence	as	target sentence	as
01	*Als ein Nachfolger benannt wurde.*	5.2	*Als ein Prüfer benannt wurde.*	0
02	*Weil ein Gutachter bestellt wurde.*	10.1	*Weil ein Kamerateam bestellt wurde.*	0
03	*Weil ein Präsident gewählt wurde.*	17.8	*Weil eine Lehrerin gewählt wurde.*	0
04	*Weil ein Sponsor gesucht wurde.*	9.9	*Weil eine Sekretärin gesucht wurde.*	0
05	*Weil ein Minister ernannt wurde.*	13.2	*Weil ein Ortsvorsteher ernannt wurde.*	0
06	*Weil ein Schwerbehinderter eingestellt wurde.*	15.3	*Weil eine Reinigungskraft eingestellt wurde.*	0
07	*Als ein Toter geborgen wurde.*	10.5	*Als ein Kind geborgen wurde.*	1.7
08	*Weil ein Zwangsarbeiter eingesetzt wurde.*	6.6	*Weil ein Spitzel eingesetzt wurde.*	1.3
09	*Als ein Arzt geholt wurde.*	7.5	*Als ein Vater geholt wurde.*	0
10	*Als ein Professor berufen wurde.*	13.4	*Als ein Manager berufen wurde.*	0
11	*Als ein Polizist gerufen wurde.*	9.1	*Als ein Anwohner gerufen wurde.*	0
12	*Weil ein Zeuge geladen wurde.*	9.1	*Weil ein Beamter geladen wurde.*	0
13	*Weil eine Verletzte gebracht wurde.*	7.8	*Weil ein Mitarbeiter gebracht wurde.*	0.1
14	*Als ein Patient eingeliefert wurde.*	8.6	*Als ein Kind eingeliefert wurde.*	2.3
15	*Als eine Leiche gefunden wurde.*	15.1	*Als ein Junge gefunden wurde.*	0.7
16	*Weil ein Sohn geboren wurde.*	16.1	*Weil ein Mädchen geboren wurde.*	3.1
mean		10.9		0.6
SE		0.9		0.2

2

3 Table B. Associations scores of items with unergative verbs, experiment 2.

item	maximally predictable		minimally predictable	
	target sentence	as	target sentence	as
01	*Als ein Priester gepredigt hat.*	7.9	*Als ein Teilnehmer gepredigt hat.*	0
02	*Weil ein Arbeiter gestreikt hat.*	16.4	*Weil ein Journalist gestreikt hat.*	1.7
03	*Weil ein Sportler trainiert hat.*	7.2	*Weil ein Schüler trainiert hat.*	0
04	*Als eine Ballerina getanzt hat.*	8.8	*Als eine Sängerin getanzt hat.*	1.5
05	*Weil ein Bariton gesungen hat.*	11.2	*Weil ein Gast gesungen hat.*	0.1
06	*Als ein Zuhörer applaudiert hat.*	11.1	*Als eine Abgeordnete applaudiert hat.*	2.8
07	*Weil ein Baby geweint hat.*	8.2	*Weil eine Angestellte geweint hat.*	0
08	*Als ein Gläubiger gebetet hat.*	10.1	*Als ein Mitglied gebetet hat.*	0
09	*Weil ein Käuzchen geschrien hat.*	15.2	*Weil ein Wanderer geschrien hat.*	0.7
10	*Als ein Löwe gebrüllt hat.*	9.2	*Als ein Demonstrant gebrüllt hat.*	0
11	*Weil ein Spatz gepfiffen hat.*	27.3	*Weil ein Schaulustiger gepfiffen hat.*	0
12	*Weil eine Biene gesummt hat.*	15.1	*Weil ein Student gesummt hat.*	0
13	*Weil ein Wolf geheult hat.*	12.3	*Weil eine Schülerin geheult hat.*	0
14	*Als ein Rabe gekrächzt hat.*	18.3	*Als ein Schauspielerin gekrächzt hat.*	0
15	*Als eine Möwe gekreischt hat.*	8.7	*Als eine Zuschauerin gekreischt hat.*	0
16	*Als ein Hund geknurrt hat.*	9.9	*Als ein Clown geknurrt hat.*	0
mean		12.3		0.4
SE		1.3		0.2

4

5 **Appendix B. Results**

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1   Table A. Experiment 1: passive verbs

verb	accent	*n*	mean	SE
predictable	subject	32	6.19	0.1
	verb	32	3.77	0.2
non-predictable	subject	32	6.01	0.1
	verb	32	3.90	0.2

2

3   Table B. Experiment 2 : unergative verbs

verb	accent	*n*	mean	SE
predictable	subject	32	6.27	0.1
	verb	32	5.40	0.2
non-predictable	subject	32	5.64	0.2
	verb	32	5.73	0.2

4

5

6

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