INTONATIONAL PREFERENCES FOR LEXICAL CONTRAST AND VERUM FOCUS

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ABSTRACT

This paper explores the intonational marking and functional relatedness of lexical contrast and verum focus in German. Lexical contrast, such as "She teaches" vs. "She learns" is commonly expressed by an L+H* accent, although L*+H is also attested. Verum focus highlights the truth of a proposition, such as "She does learn", by an accent, reportedly H*, on the finite verb. In a rating study, we investigated the appropriateness of H*, L+H* and L*+H on the two focus types. Listeners preferred L+H* on lexical contrast and L*+H on verum focus. Interestingly, in both conditions L+H* was preferred over H*. Hence, both lexical contrast and verum focus require prominent accents, i.e. rising accents with a large pitch excursion, but can also be realized by two distinct intonation patterns. These results contribute to the debate on the nature of verum focus suggesting a relatedness to contrastive focus.

Keywords: focus, contrast, verum, intonation, rises

1. INTRODUCTION

In West Germanic languages words in narrow and contrastive focus have been found to involve greater prosodic prominence than words in broad and non-contrastive focus, respectively (see [1] for an overview). This prominence results from both the realisation of different pitch accent types and continuous modulations of pitch and segmental durations. In this paper we aim to investigate the intonational marking of lexical contrast and "verum focus" in German with a view to contributing to the debate about their possible relatedness.

Contrastivity is often related to narrow focus (which refers to the size of the focus domain, i.e. a single syntactic constituent [2]), but requires the presence of focus alternatives in the common ground, either explicitly or implicitly (cf. [3, 4]). The typical use of contrastive focus is corrective [4], i.e. when the proposition in the context differs from the proposition in the target sentence. While lexical contrast focuses on a lexical category (noun, adjective, verb), verum focus is widely understood as, inter alia, focusing on a functional category – a semantic operator VERUM,

which is invisible on the phonetic surface [5]. According to Höhle [5], verum focus is expressed by a nuclear accent on the finite full verb or auxiliary (alternatively a complementizer or relative pronoun) in order to mark a proposition as true. The verb is supposed to be associated with the VERUM operator, which becomes prominent when the verb is accented. Crucially, verum focus is generally assumed to be non-contrastive (cf. [5]). However, Lohnstein [6, 7] re-analyzed verum focus and argues that it is a sub-type of contrastive focus which reduces the alternatives to sentence mood functions in the discourse situation. Höhle [5] and Lohnstein [6, 7], inter alia, clearly define the verum accent as focus, but there are also some approaches that treat it as phonological realisation of a conversational operator that is not linked to focus (see [8, 9] for discussion).

In German, the most common (GToBI [10]) accent type marking lexical contrast reported in the literature is a medial-late peak accent L+H* [11, 12, 13, 14, 15, 16, 17], although a late peak accent L*+H is also possible. For verum focus Turco et al. [18, 19] report a medial-peaked high-falling nuclear pitch accent (H* L-/H+L*) on the finite verb. However, their test stimuli involved the auxiliary *hat* "has", with a short vowel flanked by voiceless consonants, leading to possible truncation of the pitch contour (e.g. [20, 21]), making it difficult to determine the accent type. Observations from spontaneous speech (*Fokus-DB* [22]) reveal that different accent types can be used to express verum focus, and that there is some overlap with those used for contrastive focus. However, accent types with a late peak (L*+H) tend to be used more often to mark verum focus than lexical contrast.

To shed light on the intonational form and functional relatedness of lexical contrast and verum focus, we tested the perceptual appropriateness of three types of accentual rise, differing in the timing and the extent of the rise – namely H*, L+H* and L*+H – as markers of these focus types in German.

2. METHOD

2.1. Stimuli and Conditions

In a web-based perception task, we tested the appropriateness of five different target sentences,

each realized with three different nuclear accent types on the focus exponent, i.e. the *finite* verb, in relation to contexts eliciting lexical contrast or verum focus.

The target sentences (1) all consist of a sentence-initial pronominal subject and a finite verb in second position followed by a verbal complement. A *full* verb occupies the position of the finite verb in sentences (1a-d), while sentence (1e) has a *modal* verb in this position. In the latter case, the predicate is jointly composed of the modal verb and a full verb, which is placed at the end of the sentence in the infinitive. The finite verbs in second clause position serve as target words marked by different nuclear accent types. They are all disyllabic with primary stress on the first syllable, have a simple segmental structure and are predominantly voiced to provide a continuous f0 trajectory. The verbal complements consist of either two or three syllables to avoid truncation or compression of the f0 contour on the preceding nuclear accented target word.

(1)		pronoun	finite verb	verb. compl.	infinitive
	a.	*Ich*	*lebe*	*auf Rügen.*	
		"I	live	on Rügen."	
	b.	*Ich*	*lerne*	*Spanisch.*	
		"I	learn	Spanish."	
	c.	*Ich*	*nähe*	*mein Kostüm.*	
		"I	sew	my costume."	
	d.	*Ich*	*wohne*	*in Köln.*	
		"I	reside	in Cologne."	
	e.	*Ich*	*wollte*	*den Hund*	*füttern.*
		"I	wanted	the dog	to feed."

The target sentences were read by a trained 23-year-old male phonetician (native German speaker), recorded in a sound-attenuated booth. The speaker was instructed to produce each of the five target sentences naturally and in a neutral mode with three rising nuclear pitch accent types (according to GToBI [10]) on the finite verbs: A high accent with a medial peak and a small pitch excursion on the stressed syllable (H*), a high accent with a medial-late peak and a steep rise on the stressed syllable, i.e. with a higher scaling and larger pitch excursion (L+H*), and a low accent with a late, steeply rising f0 movement whose peak is reached after the stressed syllable (L*+H). The perceptual prominence of these accents has been attested to increase from H* over L*+H to L+H* [23]. In order to keep the prosodic variability of the test sentences to a minimum they all begin and end with a low intonation contour. Furthermore, we controlled both the perceptual and acoustic equivalence of the respective accent types on the target words. No adjustments of the recorded sentences were made, except for an equalization of the sound level. Figure 1 shows the individual f0 traces of all test sentences superimposed.
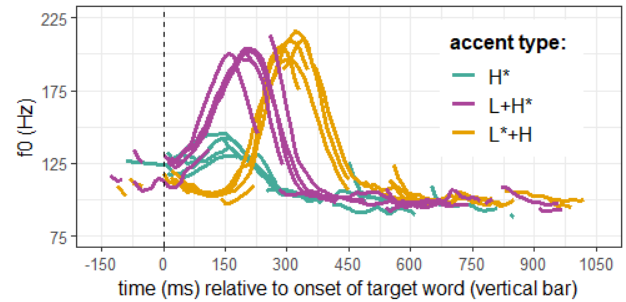

Figure 1: Individual f0 traces of all test stimuli temporally aligned at onset of target word (vertical bar).

In the perception study, each of the 15 test sentences (5 lexically different sentences * 3 accent types) was rated in relation to two different contexts (presented orthographically) eliciting either a contrastive focus (2) or a verum focus (3) reading on the test sentences (capitals reflect implicit prosodic highlighting).

(2) **Lexical contrast (context):**

    a. *Du MACHST doch URLAUB auf Rügen.*
       "You TAKE HOLIDAYS on Rügen."

    b. *Du UNTERRICHTEST doch Spanisch.*
       "You TEACH Spanish."

    c. *Du KAUFST doch dein Kostüm.*
       "You BUY your costume."

    d. *Du ARBEITEST doch in Köln.*
       "You WORK in Cologne."

    e. *Du MUSSTEST doch den Hund füttern.*
       "You HAD to feed the dog."

(3) **Verum focus (context):**

    a. *Du LEBST doch gar nicht auf Rügen.*
       "You don't LIVE on Rügen."

    b. *Du LERNST doch gar kein Spanisch.*
       "You don't LEARN Spanish."

    c. *Du NÄHST dein Kostüm doch gar nicht.*
       "You don't SEW your costume."

    d. *Du WOHNST doch gar nicht in Köln.*
       "You don't RESIDE in Cologne."

    e. *Du WOLLTEST den Hund doch gar nicht füttern.*
       "You didn't WANT to feed the dog."

The combination of context and target sentences results in short dialogues, e.g. (4), in which the target sentence (underlined) is the answer (B) to a preceding assertion (A). The assertions' finite verbs were written in capital letters indicating the intended position of a focal accent (implicit prosody) to facilitate the different intended focus readings on the target sentences.

(4) a. **Lexical contrast (experimental condition):**

    A: *Du KAUFST doch dein Kostüm.*
    B: *Nein. Ich nähe mein Kostüm.*

   b. **Verum focus (experimental condition):**

    A: *Du NÄHST dein Kostüm doch gar nicht.*
    B: *Doch! Ich nähe mein Kostüm.*

In the lexical contrast conditions, e.g. (4a), it is the finite verb that is being contrasted. Updating the

lexical value of the finite verb results in a contrastive focus structure (B) with an accent on this verb. The denial of the assertion is additionally expressed by the negation *Nein* preceding the target sentence.

In the verum focus conditions, e.g. (4b), the assertion (A) implies a strong presupposition concerning the negative truth value of the target sentence's proposition. This leads to a verum focus structure in the target sentence (B) with an accent on the finite verb updating the truth value of the whole proposition. The affirmative answer of the negated proposition is additionally enhanced by the particle *Doch* (meaning roughly "Yes, on the contrary!") preceding the target sentence.

2.2. Procedure

The study was web-based, implemented with the *SoSci Survey* software and made available to participants at www.soscisurvey.de [24].

The participants' task was to evaluate how well the melody of a test stimulus matched a corresponding context. They indicated their judgements by choosing one value on a five-point Likert scale with discrete verbal references. That is, each point of the "appropriateness" scale has a nominal label representing a possible response ranging from totally inappropriate to very appropriate (Fig. 2). The distance between each value is supposed to be approximately equal. The responses were measured as a numerical variable ranging from one to five (there is no absolute zero point). Hence, higher ratings reflect a higher degree of perceived appropriateness (see Fig. 2, bottom).

The evaluation was carried out for each test stimulus on a separate page. Both types of context containing the same target sentence were displayed simultaneously, each with its own scale for evaluation (see Fig. 2, top). While the context and target sentences were presented orthographically, only the target sentence was presented acoustically. Participants had control over when and how often to play a stimulus.

To avoid systematic order effects by the presentation of the contexts, two experimental lists were used with a different order of context presentation. Each participant saw only one of the two lists. Moreover, each stimulus was rated twice. Therefore, the set of stimuli was presented for a second time after all stimuli had been rated once. Stimuli were presented in random order within each set. Accordingly, for each participant 60 evaluations (5 target sentences * 3 accent types * 2 contexts * 2 repetitions) entered the analysis. At the beginning of the study, participants were familiarized with the experimental procedure by means of a short practice part including five stimuli.
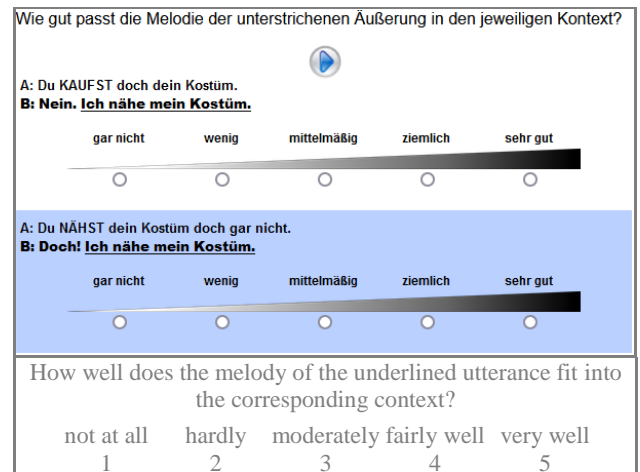

Figure 2: Example of the appropriateness rating task (top) with English translation of the task and labels (bottom).

2.3. Participants and Statistical Analysis

Seventy-seven native speakers of German (66% female, 32% male; 9% bilingual) participated in the study. They were first-year students at the IfL Phonetik at the University of Cologne aged between 19 and 36 years (mean = 22.2 years, SD = 3.2).

Since the elicited evaluations are ordinal ratings, we calculated mixed effects ordinal logistic regression models on the appropriateness ratings using the *clmm()* function from the "ordinal" package [25] in R [26]. In total, 4620 observations (77 participants * 60 evaluations) entered the analyses. The statistical models included FOCUS (lexical contrast, verum focus) and ACCENT (H*, L+H*, L*+H) as fixed factors and assumed random intercepts and slopes for FOCUS and ACCENT by participants and items (five target words).

3. RESULTS

The distributions of the ratings on the five-point Likert scale (Fig. 3) clearly show differences in the perceptual appropriateness of different accent types as markers of lexical contrast and verum focus.
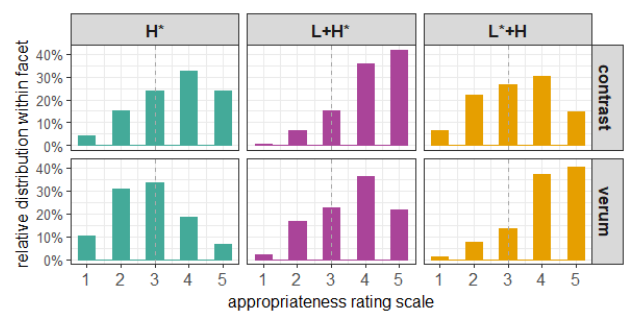

Figure 3: Relative distribution of appropriateness ratings on five-point Likert scale per condition.

Likelihood ratio tests on the appropriateness ratings reveal a significant effect of ACCENT ($\chi^2 = 13.044$, $p < 0.01$) as well as an interaction of ACCENT and FOCUS ($\chi^2 = 604.01$, $p < 0.001$). The mean rating scores (Fig. 4, left panel) display the main differences at a glance: H* and L+H* accents receive higher scores when marking lexical contrast, while L*+H accents receive higher scores when marking verum focus. Moreover, results reveal the following prosodic preferences for the two focus types (indicating a decrease in appropriateness from left to right).

Lexical contrast:

L+H*	>	H*	>	L*+H
(mean = 4.10, SD = 0.95)		(mean = 3.57, SD = 1.14)		(mean = 3.26, SD = 1.15)

Verum focus:

L*+H	>	L+H*	>	H*
(mean = 4.08, SD = 0.97)		(mean = 3.59, SD = 1.08)		(mean = 2.81, SD = 1.07)

Pairwise comparisons confirm that the ratings for the three accent types significantly differ from each other overall (with $p < 0.001$ each), but also within and across focus conditions (with $p < 0.05$ for contrast/H* vs. contrast/L*+H and for contrast/H* vs. verum/L*+H and with $p < 0.001$ for the other comparisons), except for the comparisons of contrast/H* vs. verum/L+H*, contrast/L+H* vs. verum/L*+H and contrast/L*+H vs. verum/L+H* that do not differ significantly.

Hence, L+H* accents prove to be appropriate prosodic markers of both focus types, being best suited to mark lexical contrast. However, in the verum focus condition L*+H accents are clearly preferred as prosodic markers, while they are least adequate to mark lexical contrast. The perceptual scores for H* accents take an intermediate position: They are rated as fairly appropriate when marking lexical contrast but are, by far, least adequate as markers of verum focus.
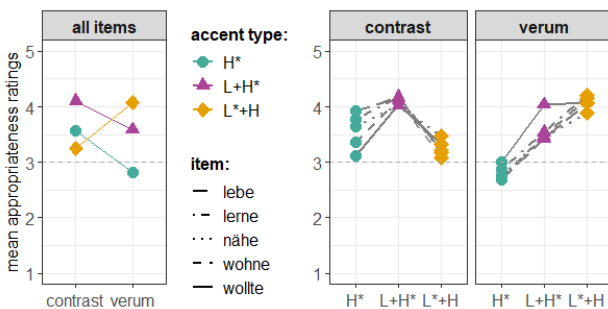

Figure 4: Mean appropriateness ratings for all stimuli (left panel) and per item/target word (right panels).

The right panels in Figure 4 show that the overall preferences in prosodic marking of the two focus types hold for all target sentences apart from a few exceptions. For instance, in target sentence (1e) containing the modal verb (*wollte*, solid line) L+H* and L*+H accents are rated equally appropriate as markers of verum focus. Interestingly, H* accents show a high variation in appropriateness for the different target sentences when marking lexical contrast but not when marking verum focus.

4. DISCUSSION AND CONCLUSIONS

In this study we investigate the perceptual appropriateness of intonational rises as prosodic markers of lexical contrast and verum focus. Results reveal a preference for L+H* over H* and L*+H accents for lexical contrast and a preference for L*+H over L+H* and H* accents for verum focus. Interestingly, in both conditions, L+H* was consistently preferred over H*, indicating that both lexical contrast and verum focus require prominent accents, but also that the mapping of function to accent type is not one-to-one.

Although both H* and L+H* involve a rising onglide (excursion up to the accented syllable), L+H* involves a larger onglide than H*. The rising onglide has been found to be a perceptual cue to contrast [16, 17, 27, 28], with a larger onglide being perceived as more prominent [23], in turn increasing the likelihood of a contrastive interpretation. The present study reveals that both lexical contrast and verum focus can be produced with this cue to contrast, indicating that the two focus types could indeed be related.

However, while the preference of L+H* over H* can be primarily attributed to a difference in f0 *scaling* (and prominence), the difference between L*+H and the other two accents applies additionally to the dimension of f0 *timing*, i.e. the rise of the accent in L*+H is later than in H* and L+H* (but, in our stimuli, the pitch excursion in L+H* and L*+H are comparable). The timing difference in L*+H appears to function as a marker of verum focus, more clearly than of lexical contrasts (see also [17, 29] for timing differences in focus marking). In fact, the use of L*+H (or a late peak accent) may express "a personal affective evaluation to a contrast" [30] made by the speaker, in the case of verum focus in the form of a protest or explicit objection to what has been claimed before.

To conclude, both types of focus investigated here show aspects of contrastive intonation, with differences in pitch scaling and timing mapped onto three distinct accent categories. Our perception data suggest that listeners use these prosodic dimensions to detect functional differences in the marking of lexical contrast and verum focus.

5. ACKNOWLEDGEMENTS

6. REFERENCES

[1] Bishop, J. 2012. Information Structural Expectations in the Perception of Prosodic Prominence. In: Elordieta, G., Prieto, P. (eds), *Prosody and Meaning* (Interface Explorations). Mouton de Gruyter, 239–270.

[2] Ladd, D. R. 1980. *The Structure of Intonational Meaning: Evidence from English*. Indiana University Press.

[3] Rooth, M. 1992. A Theory of Focus Interpretation. *Natural Language Semantics* 1, 75–116.

[4] Krifka, M. 2008. Basic Notions of Information Structure. *Acta Linguistica Hungarica* 55, 243–276.

[5] Höhle, T. 1992. Über Verum-Fokus im Deutschen. In: Jacobs, J. (ed), *Informationsstruktur und Grammatik* (Linguistische Berichte, Sonderheft 4). Westdeutscher Verlag, 112–141.

[6] Lohnstein, H. 2012. Verumfokus – Satzmodus – Wahrheit. In: Lohnstein, H., Blühdorn, H. (eds), *Wahrheit – Fokus – Negation* (Linguistische Berichte, Sonderheft 18). Buske, 31–67.

[7] Lohnstein, H. 2016. Verum focus. In: Féry, C., Ishihara, S. (eds), *The Oxford Handbook of Information Structure*. Oxford University Press, 290–313.

[8] Gutzmann, D. 2012. Verum – Fokus – Verum-Fokus? Fokus-basierte und lexikalische Ansätze. In: Lohnstein, H., Blühdorn, H. (eds), *Wahrheit – Fokus – Negation* (Linguistische Berichte, Sonderheft 18). Buske, 67–103.

[9] Gutzmann, D., Hartmann, K., Matthewson, L. 2020. Verum Focus is Verum, not Focus: Cross-linguistic Evidence. *Glossa: a journal of general linguistics* 5(1): 51, 1–48.

[10] Grice, M., Baumann, S., Benzmüller, R. 2005. German Intonation in Autosegmental-Metrical Phonology. In: Jun, S.-A. (ed), *Prosodic Typology: The Phonology of Intonation and Phrasing*. Oxford University Press, 55–83.

[11] Féry, C. 1993. *German Intonational Patterns.* Niemeyer.

[12] Alter, K., Mleinek, I., Rohe, T., Steube A., Umbach, C. 2001. Kontrastprosodie in Sprachproduktion und – perzeption. In: Steube, A., Umbach, C. (eds), *Kontrast – lexikalisch, semantisch, intonatorisch*. Linguistische Arbeitsberichte 77, 59–79.

[13] Steube, A. 2001. Correction by Contrastive Focus. *Theoretical Linguistics* 27, 215–249.

[14] Baumann, S., M. Grice & S. Steindamm (2006). Prosodic Marking of Focus Domains - Categorical or Gradient?. *Proceedings of the 3rd International Conference on Speech Prosody*, Dresden. 301–304.

[15] Hermes, A., Becker, J., Mücke, D., Baumann, S., Grice, M. 2008. Articulatory Gestures and Focus Marking in German. *Proc. 4th Speech Prosody* Campinas, Brasil, 457–460.

[16] Ritter, S., Grice, M. 2015. The Role of Tonal Onglides in German Nuclear Pitch Accents. *Language and Speech* 58(1), 114–128.

[17] Grice, M., Ritter, S., Niemann, H., Roettger, T. 2017. Integrating the Discreteness and Continuity of Intonational Categories. *Journal of Phonetics* 60, 90–107.

[18] Turco, G., Dimroth, C., Braun, B. 2012. Intonational Means to Mark Verum Focus in German and French. *Language and Speech* 56(4), 461–491.

[19] Turco, G., Braun, B., Dimroth, C. 2014. When Contrasting Polarity, the Dutch use Particles, Germans Intonation. *Journal of Pragmatics* 62, 94–106.

[20] Grabe, E. 1998. Pitch Accent Realization in English and German. *Journal of Phonetics* 26, 129-143.

[21] Rathcke, T. 2013. On the Neutralizing Status of Truncation in Intonation: A Perception Study of Boundary Tones in German and Russian. *Journal of Phonetics* 41(3-4), 172–185.

[22] Lohnstein, H., Stommel, H. 2023. Fokus-DB [language database]. http://www.fokus-db.de/

[23] Baumann, S., Röhr, C. T. 2015. The Perceptual Prominence of Pitch Accent Types in German. *Proc. 18th ICPhS* Glasgow, UK, vol. 298, 1–5.

[24] Leiner, D. J. 2019. SoSci Survey (Version 3.1.06) [Computer software]. https://www.soscisurvey.de

[25] Christensen, R. H. B. 2022. ordinal—Regression Models for Ordinal Data (R package version 2022.11-16). https://CRAN.R-project.org/package=ordinal

[26] R Development Core Team. 2011. *R: A Language and Environment for Statistical Computing.* R Foundation for Statistical Computing. https://www.R-project.org/

[27] Kügler F., Gollrad, A. 2011. Production and Perception of Contrast in German. *Proc. 17th ICPhS* Hong Kong, 1154–1157.

[28] Roessig S., Mücke, D., Grice, M. 2019. The Dynamics of Intonation: Categorical and Continuous Variation in an Attractor-based Model. *PLoS ONE* 14(5), e0216859.

[29] Kügler, F., Genzel, S. 2016. Effects of Information Structure, Syllable Structure, and Voicing on Nuclear Falling Pitch Accents in German. *Proc. 8th Speech Prosody*, Boston, USA, 678–682.

[30] Kohler, K. J. 2006. What is Emphasis and How is it Coded? *Proc. 3rd Speech Prosody* Dresden, Germany, 748–751.