Prenuclear L*+H leads to the activation of alternatives in German

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Nuclear accents have received a lot of attention in terms of the prosody-semantics interface, such as information structure/status [1-3], prominence [4, 5] and processing [6, 7]. Prenuclear accents have received less attention in the literature. Semantically, they are described as ornamental [8], serving mostly a rhythmic purpose [9] and listeners don't seem to process them as efficiently as nuclear accents [10, 11]. We tested whether this also holds for prenuclear L*+H in German, an accent which is used to signal contrastive topics CTs [12, 13], among others.

Regarding speech processing, certain nuclear accent types have the potential to make unmentioned, contrastively related alternatives salient to the listener [14, 15]. For instance, Braun, et al. [15] tested German listeners who heard declarative utterances (e.g., *The swimmer wanted to put on flappers*) and watched displays that depicted four printed words: one that was contrastively related to the subject noun (e.g., *diver*), one that was non-contrastively related (e.g., *pool*), the object (e.g., *flappers*), and an unrelated distractor. One experiment compared a nuclear L+H* accent on the subject (indicating a subject focus) to a prenuclear L+H* on the subject (indicating a broad focus). There were more fixations to the contrastive associate when the subject was produced with a nuclear L+H* accent compared to a prenuclear L+H*, suggesting that nuclear L+H* accents activate alternatives [cf. 1]. A nuclear H+L* did not lead to the activation of alternatives, supporting its status as an accent that marks givenness [3].

There is no study on whether prenuclear accents can activate contrastive alternatives. We conducted two visual-word eye-tracking experiments, similar to [15]. In Experiment 1, we compared prenuclear L*+H accents (idealized accent for CTs, with L in tonic and H in post-tonic syllable followed by a high plateau) to prenuclear L+H* accents (idealized accent for broad focus, with L in pre-tonic and H in tonic syllable followed by an f0-dip), following the same procedure for testing and analysis. In Experiment 2 we manipulated the f0-contours of the stimuli in both conditions to match the f0-minima, f0-maxima and f0-excursions of the prenuclear rises to test whether listeners are influenced more by pitch accent type (signaled by the alignment contrast: L*+H vs. L+H*) or by the emphasis signaled by the f0-excursion.

We tested 40 native speakers of German in both Experiments. The results showed that participants fixated the contrastive associate more in the prenuclear L*+H than in the prenuclear L+H* condition in both experiments. In Experiment 1, the difference was significant in the time window 500-600ms after the onset of the subject-NP ($p = 0.005$); the difference approached significance in the time window 600-700ms (see Table 1). Given the time it takes to launch a saccade (150-250ms), cf. Matin, et al. [17], the effect is driven by acoustic information of the subject noun (which starts 200ms and ends 600ms after the onset of the utterance). In Experiment 2, the effect was significant in a later time window, 700-800ms after utteance onset ($p = 0.03$), see Table 1 but the interaction between experiment and intonation condition was not significant in any of the analysis windows (all p-values > 0.2)

Our data show that prenuclear L*+H accents lead to a stronger temporary activation of contrastive alternatives than prenuclear L+H*. This difference persists even if L*+H and L+H* have the same f0-excursion, although the effects occur slightly later in this case. We therefore argue that it is the specific pitch accent type (prenuclear L*+H) that leads to the activation of alternatives and not its phonetic implementation (larger f0-excursion often associated with this contrast in accent types [13]). The results have important implications for theories of contrastive topics (whether they are formalized as an independent information-structural category or hierarchical (as focus nested within topic), cf. [18], [19], [20]) and the relation between phonetics, phonology and processing.

	100 - 200	200-300	300-400	400-500	500-600	600-700	700-800
Exp 1	p = 0.1	p = 0.1	p = 0.07	p = 0.1	**p < 0.005**	p < 0.07	p = 0.3
Exp 2	p = 0.05	p = 0.5	p = 0.7	p = 0.9	p = 0.2	p = 0.1	**p = 0.03**

Table 1. Summary of p-values for the effect of intonation contour on the fixation to contrastive alternatives in subsequent 100ms time windows. The onset and offset of the subject noun are at 200 and 600ms after utterance onset, respectively.

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