HOW HIGH PITCH AFFECTS LEXICAL PROCESSING IN GERMAN ADULTS – EVIDENCE FROM EYE-TRACKING

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To resolve lexical competition, listeners use both segmental (e.g., Allopenna et al., 1998) and suprasegmental information (e.g., Reinisch et al., 2010; Sulpizio & McQueen, 2012) as soon as it becomes available. Even though in intonation languages pitch is not lexically contrastive, listeners rely on the pitch contour to decide between lexical candidates (D’Imperio et al., 2007; Ladd & Schepman, 2003) and do not readily accept words with mismatching f0-contours (Friedrich et al., 2001). More importantly, recent data suggest that German infants’ speech segmentation is guided more by the position of the pitch peak than by metrical prominence (Braun et al., 2014). Using the visual world eye-tracking paradigm (Tanenhaus et al., 1995), we tested whether this association between high pitch and stress is still present in adulthood, such that high-pitched but unstressed syllables lead to temporary lexical activation of cohort competitors with initial stress.

We selected 48 frequency-matched trisyllabic cohort pairs (24 for experimental and 24 for filler trials) that were segmentally identical up to at least the first consonant of the second syllable, but differed in stress position (e.g., KaVERne-KAviar, capitals indicate stress). The cohort pairs and two distractors were presented on screen. In experimental trials, auditory stimuli referred to the cohort member with penultimate stress (e.g., "Bitte klicke KaVERne an"). The target word was produced with a medial-peak (L+H*) or an early-peak pitch accent (H+L*, see Figure 1). For each cohort pair, each participant heard the target in only one of the two intonation conditions. 60 participants (44 female, 25.5 years on average) were tested.

Fixations were extracted in 4ms steps and coded as pertaining to the auditory target (e.g., KaVERne) or the stress competitor (e.g., KAviar). Empirical logits were analyzed using linear-mixed effects regression models with intonation condition as fixed factor and participants and items as crossed random factors (Baayen et al., 2008; Barr et al., 2013). As expected, participants fixated the initial-stress competitor more in the early-peak condition (average elogs -0.66) than in the medial-peak condition (average elogs -1.20, β = -0.54 [0.02;1.08]1, SE = 0.27, t = 2.04, p < 0.05) (see Figure 2 for fixation proportions to the competitor in both intonation conditions), prior to segmental disambiguation. This suggests that initial high-pitched but unstressed syllables activate words with initial stress. Hence, high pitch appears to be an important stress cue for German adults.

1 Square brackets denote the 95% confidence interval for the estimate β.
Figure 1: Intonational realization of auditory targets (e.g., KaVERne)

Medial-peak condition

![Graph showing intonational realization of auditory targets](image)

<table>
<thead>
<tr>
<th>Bitte</th>
<th>klicke</th>
<th>Kaverne</th>
<th>an</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ka</td>
<td>VER</td>
<td>ne</td>
<td></td>
</tr>
<tr>
<td>L+H*</td>
<td>L-%</td>
<td></td>
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</tbody>
</table>

Time (s) 0 1.361

Early-peak condition

![Graph showing intonational realization of auditory targets](image)

<table>
<thead>
<tr>
<th>Bitte</th>
<th>klicke</th>
<th>Kaverne</th>
<th>an</th>
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<tbody>
<tr>
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<td>ne</td>
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</tr>
<tr>
<td>H+L*</td>
<td>L-%</td>
<td></td>
<td></td>
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</tbody>
</table>

Time (s) 0 1.361

Figure 2: Fixation proportions to competitor with initial stress (e.g., KAviar)

![Graph showing fixation proportions](image)

Fixation proportion

- early-peak (H+L*)
- medial-peak (L+H*)

Time from target onset, e.g., KaVERne (ms)

0 0.1 0.2 0.3 0.4 0.5 0.6
References


