

Individual Differences in the Use of Phonetic and Lexical Context Across Tasks

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Speech perception requires listeners to take into account acoustic cues as well as lexical context and phonetic (coarticulatory) context. Individuals have been shown to vary in how they integrate these factors. Lai et al. [4], investigated how individuals differ when both lexical and coarticulatory contexts were simultaneously presented. In a phoneme identification task, a /s-/ʃ/ continuum was placed in lexically biasing contexts (e.g. a(s)ume, a(ʃ)ure) followed by different coarticulatory contexts (rounded or unrounded vowels) that biased towards one sibilant over the other. A negative correlation was found between the degree of coarticulatory compensation and lexical effects when both cues are present. The results suggested a potential trade-off relationship between attending to acoustic detail and lexical recruitment at the individual-level, perhaps reflecting individual strategies or processing styles.

Experiment 1: To better understand whether this trade-off is task-dependent and present only when both cues are simultaneously present, we conducted three different phoneme categorization tasks on speech continua. Task 1 (lexical + coartic) was identical to Lai et al. [4] where both cues are present. Task 2 (lexical) had only lexical context cues for /ɛ/-/ɪ/ vowel continua (e.g. v(ɛ)st, k(ɪ)t). In task 3 (coartic) a /da/-/ga/ stop continuum in nonsense syllables followed different coarticulatory contexts (/ar/ or /al/). We ran two versions of the experiment that differed in task order (version 1: task 1, 2, 3; version 2: task 2, 1, 3) with 82 native Canadian English participants in version 1 and 55 native Canadian English participants in version 2. Our findings are consistent across both versions: those who used lexical context more used coarticulatory context less in task 1 ($r(67) = -.31, p = .001$), as in prior research (Figure 1, [4]). However, no evidence was found for this correlation when examined across tasks 2 and 3. Similarly, we did not find a correlation between individual use of lexical and coarticulatory context across tasks, suggesting task or stimulus dependency. While some previous work has found consistent individual differences across tasks in lexical recruitment [3] and compensation for coarticulation [5], other results have found weak links across tasks [1].

Experiment 2: Further studies are planned to test stimulus dependency of lexical recruitment, and whether acoustic contrasts with differing categorical effects can influence the degree of lexical reliance. We will construct acoustic continua of vowels /ɛ/ - /æ/ that vary mostly in F1 - F2, liquids /r/ - /l/ that vary in F3, fricatives /s/ - /ʃ/ that vary in the spectral properties of the frication, and stops /d/ - /t/ that vary in voice onset time. If lexical recruitment is indeed an individual trait, we expect that when using the same Ganong task, individuals with higher lexical recruitment would do so, no matter the contrast. Additionally, at the contrast level, some contrasts such as stops have more categorical effects compared to others like vowels [2]. We will test whether more categorical contrasts increase or decrease lexical recruitment. This will allow us to assess the dynamic relationship between task type, contrast type, and individual variability in lexical recruitment.

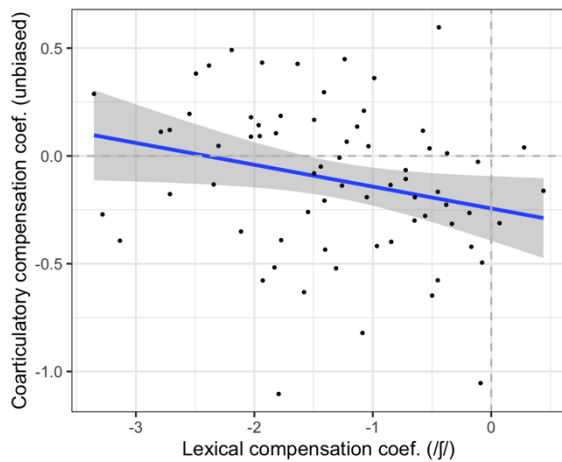


Fig. 1. By-participant model estimates of lexical and coarticulatory contexts in task 1. Each dot represents a unique participant.

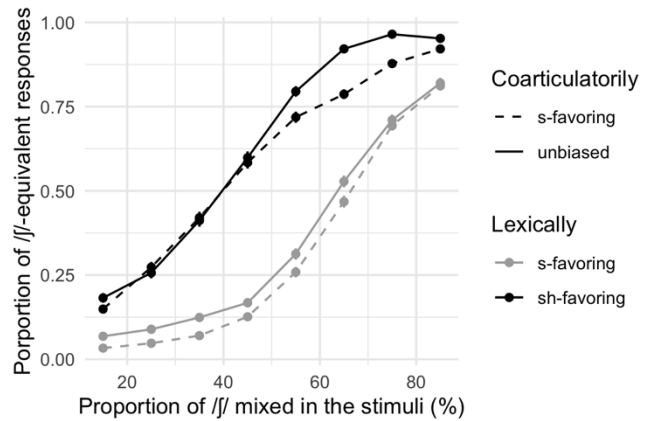


Fig. 2. Group-level means and standard errors of /f/ response in task 1, version 1.

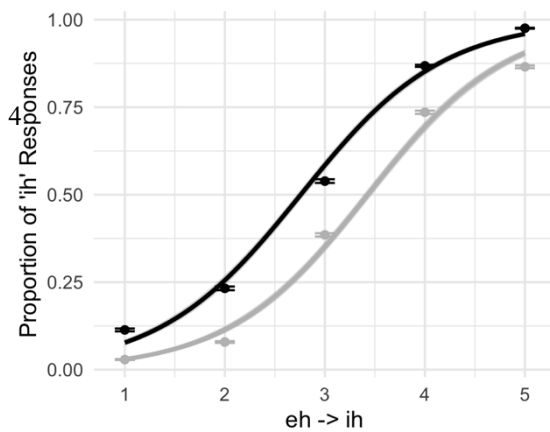


Fig. 3. Group-level means and standard errors of “ih” response in task 2, version 1.

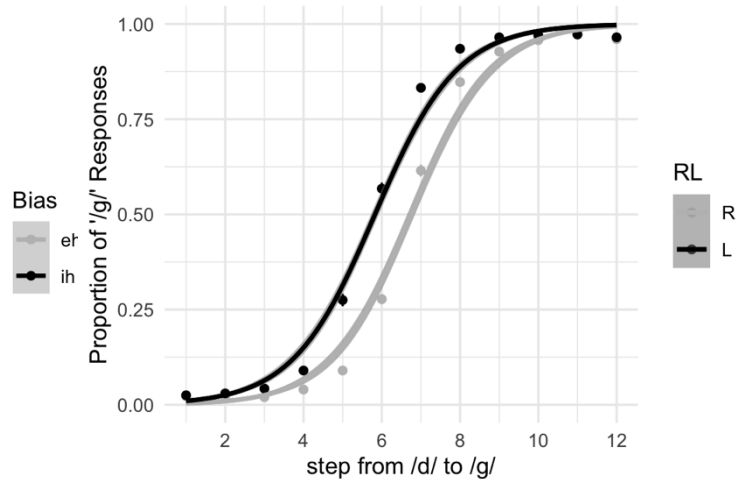


Fig. 4. Group-level means and standard errors of /g/ response in task 3, version 1

References

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