Abstractions or exemplars? How contextual information filters the acoustic signal and guides sound change.

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Early models of exemplar theory (Johnson 1997) proposed that the speech signal remains unmodified before word recognition, such that listeners store all details of acoustic information in memory in memory traces known as exemplars. This model suggests that abstract representations need not be activated in word recognition. Later models (Pierrehumbert 2006 , Goldinger 2007) argue for the existence of both abstract representations *and* exemplars, and as Goldinger (2007) states, "[E]ach stored exemplar is actually a product of perceptual input combined with prior knowledge…" suggesting both are activated in some way in perceiving speech. Meanwhile, research in psycholinguistics has established the effect of context on speech perception, in studies of understanding words in fluent speech (Pollack & Pickett 1963), the phonemic restoration effect (Warren 1970, Samuel 1981, 1987), fluent restoration (Marslen-Wilsen & Welsh 1978), and error detection (Cole, Jakimik & Cooper 1978), in which speakers use context for aiding word recognition, to the extent that phonetic details of words may pass unnoticed. The current study investigates how the predictability of words in context modulates attention to phonetic detail. The results of a first experiment suggest stronger activation of abstracted forms when listening to predictable speech, and a greater attention to and processing of phonetic details when listening to unpredictable speech. A second experiment, using the phonetic accommodation paradigm, showed that perception of these details affects production, suggesting relevance in the shaping of one's exemplars and the spread of sound changes.

The first experiment in this study isolated the role of the listener and the effect of predictability on speech perception. Subjects were asked to listen to both predictable and unpredictable words in a sentence context, followed by hearing them repeated in isolation. Subjects then judged whether the repetition of the word was exactly identical to its first presentation in sentence context. The repeated word may have been identical or was manipulated to have longer VOT in their onset /k/ and higher pitch in the first syllable. Overall, a mixed-effects logistic regression model showed that subjects made significantly more errors ($p = 0.012$) when hearing and comparing predictable words in context and in isolation, as opposed to when hearing unpredictable words. This suggests the subjects retained more phonetic details in exemplars of unpredictable words, while they may have been more influenced by their own abstract representations of predictable words.

The second experiment used the phonetic accommodation paradigm (Goldinger 1998) to study the role of the listener turned speaker (thus the effect of perception on production). Subjects were asked to repeat sentences containing the same target predictable and unpredictable words of the first experiment, which were presented with lengthened VOT of initial /k/ and higher first syllable pitch. Despite being given no instruction to imitate, subjects showed closer imitation of the model when repeating unpredictable words, aligning with the results from the first experiment. In a second version of the experiment subjects were explicitly told to imitate the model, in which case differences in imitation of predictable and unpredictable words were not significant, although subjects did become significantly more like the model over the course of the experiment for unpredictable words only.

The results of the experiments suggest that listeners may more heavily activate their own abstract representations of words when listening to predictable speech, but store more phonetic details in exemplars of unpredictable speech. The second experiment showed that this perceptual duality affected production, and is thus relevant in shaping one's exemplar cloud and potentially in the spread of sound change. This may be particularly relevant in explaining the profoundly different sound changes that affect globally more predictable word and morpheme classes, such as function words, as opposed to more unpredictable content words.

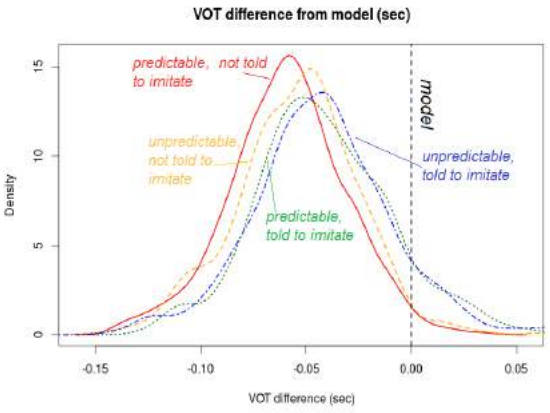

Figure 1: Difference from model's VOT by condition: In the imitation experiment, subjects' VOT was closer to that of the model when repeating unpredictable words, in both instructional conditions

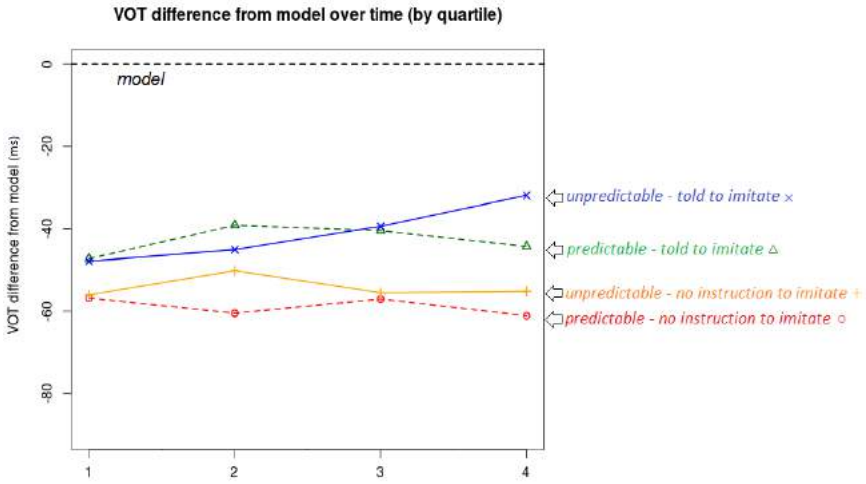

Figure 2: Difference from the model's VOT over time: When told to imitate, subjects' VOT became closer to the model (increased) but only for unpredictable words.

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