Experimental evidence for perceptual hypercorrection in American r-dissimilation

Nancy Hall, Bianca Godinez & Irene Orellana

California State University Long Beach

The cause of phonological dissimilation is much debated; it is often described as an "unnatural" process, as opposed to the articulatorily natural (and pervasive) tendency towards assimilation. Ohala 1993 proposes that dissimilation originates from perceptual hypercorrection for phonetic assimilation. Certain features, such as rhoticity and nasality, can spread across several syllables. This drawn-out realization can cause perceptual masking of similar nearby sounds. For example, in a word like American *surprise* /sə˞pɹaɪz/, listeners may misinterpret the rhoticity of the first vowel as anticipatory assimilation to the [ɹ], and posit a representation of /səpɹaɪz/. This has in fact become a common alternate pronunciation.

Although widely cited, Ohala's proposal has rarely been empirically tested. As Garrett & Johnson 2011:21 note, "while there are a number of laboratory demonstrations of correction [for coarticulation], there are almost no controlled observations suggesting that listeners hypercorrect in speech perception...this may be a gap in the literature, but it is an important one." Attempts to produce perceptual dissimilation in laboratory settings have generally been unsuccessful.

Abrego-Collier 2013, for example, tested English listeners' categorization of a synthetic [r-l] continuum in the context ['a_aYa], where Y is either [r], [l], or [d]. The goal was to produce perceptual hypercorrection for rhoticity/laterality mimicking the r/l dissimilation frequently attested in Romance, e.g. Latin *aratru* > Aragonese *aladro* 'plows'. She found that a later [r] had no effect on the categorization of the ambiguous liquid, while later [l] actually tended to produce perceptual assimilation (not dissimilation).

Similarly, Harrington et al. 2016 found that Italian listeners did not perceptually hypercorrect for rounding. Historically, words containing two rounded consonants lost rounding on the first, as in *kwinkwe > kinkwe > [tSinkwe] 'five'. In an attempt to produce such dissimilation perceptually, a synthesized /kw/.../k/ continuum, in the words *canto ... quanto*, was inserted into carrier phrases where the following words either contained /w/ (*quattro*) or did not contain /w/ (*sette*). The prediction was that the ambiguous word should be heard more often as *canto* when it preceded *quattro* than when it preceded *sette*. No such dissimilatory effect was found.

However, one issue with both experiments was that each attempted to produce a type of dissimilation *that does not currently exist in the language studied*. American r-dissimilation does not occur in the kinds of words Abrego-Collier tested: it never affects intervocalic /r/, and does not change rhotics to laterals. The Italian rounding dissimilation pattern is apparently not synchronically active, and it historically occurred within words, not across word boundaries as in Harrington et al's experiment. If perceptual dissimilation results from acoustic ambiguity in the specific phonetic realization of particular sounds, we expect that its occurrence in any given language should depend on whether that language has patterns of phonetic realization that would create the relevant kind of ambiguity.

In this study, we tested perception of nonce words that closely mimic the typical environments for /r/-dissimilation in American English. We created 33 pairs of stimuli. In each pair, a naturally produced syllable containing unstressed /r/ was spliced to two different continuations: one that contained /r/ and

one that did not. The prediction was that listeners would be more likely to miss the presence of the first /r/ when it was spliced to a continuation containing another /r/.

target		trigger		
ˈkɪnsɚ	*+*	*twaɹ*	→	*ˈkɪnsɚˌtwaɹ*
	+	*twan*	→	*ˈkɪnsɚˌtwan*

The nonce words were presented to listeners in various natural sentences, such as "We need to get a *ˈkɪnsɚˌtwaɹ / ˈkɪnsɚˌtwan*", accompanied by a picture. This method of presentation was designed to mimic as much as possible the actual experience of acquiring a new word from conversation. Listeners were instructed to type the unfamiliar word, spelling it however seemed natural to them. 20 listeners were divided into two groups, where each group heard half of the stimuli with two /r/s and half with one /r/. Thus, each stimulus version was heard 10 times.

As predicted, the target /r/ was omitted from the written response significantly more often when the continuation also contained /r/: 34/330 times in words with 2 /r/s, versus 4/330 times in words with 1 /r/ ($\chi 2 = 25.1$, $p = .000001$). Moreover, the patterns of perceptual error largely followed the tendencies of actual American spoken /r/-dissimilation. For example, /r/ was deleted rather than changed to /l/. In all but one case, the /r/ that dropped was unstressed. Instances of /r/-omission were not evenly distributed across items; stimuli generally had either multiple /r/-omissions or none at all. There was a distance effect: target and trigger /r/s were sometimes separated by intervening vowels, as in [ˌmaɹˈnɪkjəlɚ] (typed <moniculer, monicular>), but the highest rates of /r/-omission occurred in words where the /r/s were in adjacent syllables, such as ['tænzɚtɚ] (typed 5/10 times without the first /r/).

As far as we are aware, this is the first time that /r/-dissimilation has been produced on novel words in a laboratory setting. We interpret this as evidence that Ohala's perceptual hypercorrection theory is viable, although we acknowledge and discuss other possible explanations of the results as well (e.g., the possibility that listeners are applying an abstract grammatical process of dissimilation).

In a second experiment currently underway, we attempt to distinguish between grammatical and perceptual explanations by testing whether the presence or absence of rhotic coarticulation on intervening syllables affects the rate of dissimilation. In a word like [ˌmaɹˈnɪkjəlɚ], we predict that if the string [nɪkjəl] is spliced from a token that has no rhotics (hence lacking rhotic coarticulation), listeners should be less likely to interpret the first [ɹ] as anticipatory coarticulation with the [ɚ]. Results from this experiment will be presented and implications addressed.

References

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