

The perceptual basis of length co-occurrence restrictions

Introduction: Recent literature has argued that dissimilation processes are motivated by avoidance of similarity or a ban on successive identity (MacEachern, 1999; Mackenzie, 2009; Nevins, 2004). In particular, studies have found empirical support for successive identity creating perceptual difficulties even in absence of identifiable coarticulation effects. Gallagher (2010, 2014) found that Quechua speakers had greater difficulty identifying a pharyngeal contrast in a nonce form when it appeared in isolation (*kap'i* vs. *kapi* 1v0), versus when the distinction followed a pharyngeally marked consonant (*k'ap'i* vs. *kap'i*, 2v1). The present paper extends this line of research from feature dissimilation to length co-occurrence restrictions, processes where geminates reduce to singletons in the environment of other geminates (Suzuki 1998, Bye, 2011). An example of a geminate co-occurrence restriction is Inuktitut Consonant Cluster Simplification (CCS) (Smith, 1977), a morphophonological rule that causes a syllable-initial geminate consonant to reduce to a singleton, resulting in surface alternating geminates and singletons (**Example 1a and 1b**). Although CCS has been analyzed to result from syllable structure (Dresher & Johns, 1996), historical metrical structure (Rose, Pigott, and Wharram, 2012) which has since disappeared from the language, I follow Massanet (1981) in treating CCS as a process rooted in the phonology of Inuktitut geminate consonants. The present perception study tested the ability of listeners to perceive length contrasts in isolation or succession. If length contrasts are more perceptually difficult to make in succession, it is predicted that listeners will be less accurate in distinguishing a pair of forms which contrast in having two geminates vs. having one geminate (2v1) than a pair of forms which contrast in having one geminate vs. having none (1v0).

Methods: Participants (English speakers, n=17) completed an AX discrimination task in which they heard pairs of VCVCV nonce words (e.g. *atata*) where C2 could contrast in length and the final vowel was always [a]. Stimuli were recorded by a native Japanese speaker and manipulated to differ in length only in the target contrast (singleton consonant = 128 ms, geminate consonant = 249 ms, short V1 = 123 ms, long V1 = 246 ms, short V2 = 139 ms, long V2 = 278 ms), based on the speaker's mean production values. The key test stimuli were the 1v0 condition (*atat:a* vs. *atata*) and the 2v1 condition (*at:at:a* vs. *atat:a*). Participants heard three blocks of nonce words in which the target contrast was either a geminate or a vowel length contrast: same C1 C2 (*atata* vs. *atat:a*), different C1 C2 (*akat:a* vs. *akata*) and vowel length (*iti:ta* vs. *itita*). It was hypothesized that the same C1 C2 block would make the contrast more difficult to perceive than in the different C1 C2 block due to identity between consonants and the resulting lack of secondary phonetic cues. In addition, it was hypothesized that the vowel block would fare better than the consonant blocks due to vowels having more accompanying cues than consonants. Results were analyzed using a mixed-effects logistic regression model on participants' d' scores.

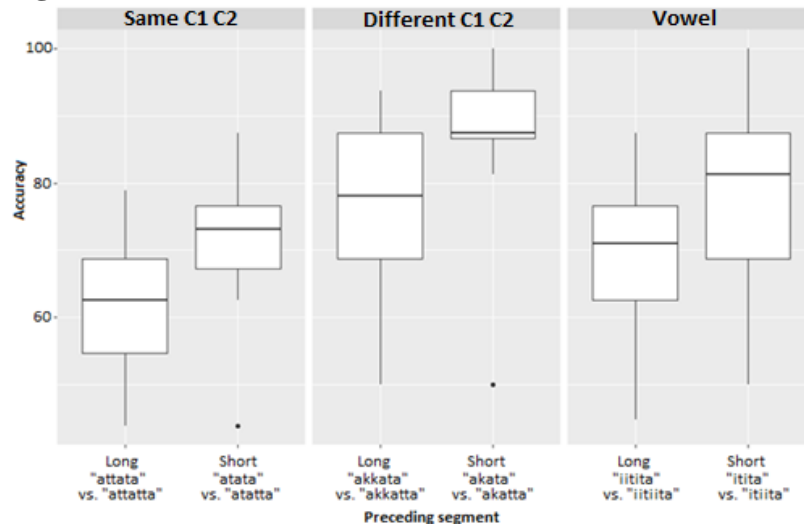
Results and discussion: Participants performed better than chance at perceiving length contrasts, and were significantly better at the 1v0 contrast than the 2v1 contrast across all blocks (p=0.02) (**Figure 1**). There were no interactions across blocks: the difference between participants' performance on the 1v0 and 2v1 contrast were not significantly larger or smaller between the same C1 C2 block and the different C1 C2 block, and participants were not significantly better at the 2v1 contrast in the vowel block than in the consonant blocks. These results are consistent with the theory that length co-occurrence restrictions are influenced by the relative perceptual difficulty of making a length contrast in succession.

Example 1

- (a) na.nuk + ng:u.ak + q:a: + l:u.ni => na.nu-ng:u.a-**q**aa-l:u.ni
bear toy do.first by 'By first killing a toy bear'
- (b) tu.t:u + ng:u.ak + q:a: + l:u.ni => tu.t:u-**ng**u.a-q:aa-**l**u.ni
caribou toy do.first by 'By first killing a toy caribou'

Labrador Inuttut (Smith, 1977)

Figure 1



References

- Bye, P. (2011). Dissimilation. In Van Oostendorp, M., Ewen, C., Hume, E. (Eds.) *The Blackwell Companion to Phonology Volume III: Segmental Processes*, pp. 1408-1433. Oxford: Wiley-Blackwell.
- Dresher, B.E., and Johns, A. (1995). The law of double consonants in Inuktitut. *Linguistica Atlantica* 17, 79-95.
- Gallagher, G. (2010). Perceptual distinctness and long-distance laryngeal restrictions. *Phonology* 27(3), 435-480.
- Gallagher, G. (2014). An identity bias in phonotactics: evidence from Cochabamba Quechua. *Laboratory Phonology* 5(3), 337-378.
- MacEachern, M.R. (1999). *Laryngeal Co-occurrence Restrictions*. New York: Garland.
- Mackenzie, S. (2009). *Contrast and Similarity in Consonant Harmony Processes*. Doctoral dissertation, University of Toronto.
- Massanet, J-M. (1986). *Etudes phonologiques d'un dialecte inuit canadien*. Quebec: Association Inuksiutiit Katimajit Inc.
- Nevins, A. (2004). *Conditions on (Dis)harmony*. Doctoral dissertation, MIT.
- Rose, S., Pigott, W., and Wharram, D. (2012). Schneider's Law revisited: The syllable-level remnant of an older metrical rule. *McGill Working Papers in Linguistics* 22(1), McGill University.
- Smith, L. (1977). *Some Grammatical Aspects of Labrador Inuttut (Eskimo): A Survey of the Inflectional Paradigms of Nouns and Verbs*. National Museum of Man Mercury Series, Canadian Ethnology Service Paper no. 37. Ottawa: National Museums of Canada.
- Suzuki, K. (1998). *A Typological Investigation of Dissimilation*. Doctoral dissertation, University of Arizona.