Implicational Universals in the Typology of Consonant Harmony

This study focuses on one of the unique properties of consonant harmony, namely its asymmetrical patterns concerning triggers and targets. It is observed in consonant harmony that only certain types of consonants are preferred as targets (Hansson 2001, 2010). For example, in Sarcee, alveolar sibilants are always targeted by harmony to undergo place assimilation to palatal sibilants, whereas palatal sibilants only trigger harmony but do not undergo it. Although this kind of target asymmetry has attracted attention in the literature, no typological research has been carried out that focuses on whether such an asymmetry exists merely as a tendency that can be reversed in some languages, or as a universal pattern that is cross-linguistically respected. Moreover, no satisfactory explanation has been provided for such an asymmetry, which is undesirable since it leaves considerable amount of consonant harmony data left unexplained. This study aims to address the question of whether and why such asymmetry occurs in consonant harmony. Based on the typological survey investigating the data in Hansson (2001, 2010) and Arsenault (2012), I claim that asymmetries should be stated as implicational universals. Moreover, I provide a phonetically-based analysis within the framework of Optimality Theory, which explains all and only the attested patterns in consonant harmony.

Based on the typological survey of more than 120 languages, I found target asymmetries in the following three types of consonant harmony: sibilant, retroflex, and nasal consonant harmony. In sibilant consonant harmony whereby place assimilation occurs between alveolar sibilants ([s, z, ts, tz]) and palatal sibilants ([ʃ, ʒ, tʃ, dʒ]), if palatal sibilants are targets of harmony in a language, so are alveolar sibilants, but not vice versa. For example, in Sarcee, the word /si-tʃfogó/ ‘my flank’ becomes [ʃitʃfogó], with the alveolar /s/ becoming palatal [ʃ]. As Sarcee exhibits regressive (i.e. right-to-left) harmony, the rightmost sibilant (i.e. /ʃ/) in the word triggers harmony in the preceding sibilant (i.e. /s/). However, when the rightmost sibilant is alveolar, it does not trigger harmony. Instead, the rightmost palatal sibilant triggers harmony and targets all preceding sibilants within a word. This is shown in the word /si-tʃfiz-àʔ/ ‘my duck’ that surfaces as [ʃitʃfizəʔ], not *[sizfizəʔ]. The rightmost sibilant /z/ does not trigger harmony but instead the second rightmost sibilant /ʃ/ triggers harmony. Of the 25 relevant languages in my survey, 15 languages reveal such a target asymmetry in which only alveolar sibilants are targets to the exclusion of palatal sibilants; On the other hand, the other 10 languages show symmetric harmony in which both alveolar and palatal sibilants are equally targeted (e.g. Navajo, /si-dʒéʔ/ → [ʃidʒéʔ] ‘they lie’, and /ʃ-iʃ-ʃaʃ/ → [jismas] ‘I’m rolling along’ (Hansson 2001)). Significantly, however, the reverse asymmetric situation whereby only palatal sibilants are targeted is not attested in any language in the survey. Similar kinds of target asymmetry are also observed in retroflex and nasal consonant harmony. In retroflex consonant harmony, non-retroflex consonants such as dental or alveolar stops and nasals (/d, t, n/ and /d̪, t̪, n̪/) are targets if their retroflex counterparts (/d̠, t̠, n̪/) are targets, but not vice versa. In nasal consonant harmony, non-nasal consonants such as plain stops (/b, d, g, p, t, k/) and liquid consonants (/l, r/) are targets if nasal consonants (/m, n, ɾ/) are targets, but not vice versa. Based on these survey results, I conclude that the observed asymmetries should be expressed as the following implicational statements: i) If palatal sibilants are targets of consonant harmony, so are alveolar sibilants. ii) If retroflex consonants are targets of consonant harmony, so are non-retroflex consonants. iii) If nasal consonants are targets of consonant harmony, so are non-nasal consonants.

Inspired by phonetically-based Optimality Theory (Hayes, Kirchner and Steriade 2004), I investigate perceptibility variation in contexts where consonant harmony typically occurs. Based on this investigation, I argue that the observed asymmetries are perceptually motivated
and can be well understood under the P-map hypothesis (Steriade 2001, 2009). The upshot of P-map is that perceptually prominent phonological change is avoided. In Optimality-Theoretic terms, faithfulness constraints preventing more prominent perceptual change invariably outrank those prohibiting less perceptual change. In line with P-map, I claim that consonant harmony is a process preferring less perceptual modification. In particular, various phonetic studies (Ladefoged 2003, a.o.) show that the phonological features relevant to palatal, retroflex, and nasal consonants have prolonged phonetic cues that may span over multi-segmental domains. I hypothesize that the consonants with prolonged phonetic cues (i.e. more likely triggers of consonant harmony) may weaken perceptibility of the relevant features in nearby consonants and make them less perceptible. This means that the phonetic cue of relevant phonological features is weaker before the consonants with a long cue (i.e. palatal sibilants, retroflex consonants, and nasal consonants) than before the consonants without a long cue.

Reflecting this contextual perceptibility variation, constraints for the corresponding contexts are projected and universally ranked by P-map. The faithfulness constraints prohibiting phonological change before alveolar sibilants, non-retroflex consonants, and non-nasal consonants universally outrank those prohibiting change before palatal sibilants, retroflex consonants, and nasal consonants, respectively. To take an example of sibilant consonant harmony, ID-IO (anterior/_s) is universally ranked above ID-IO (anterior/_ʃ), explaining the cross-linguistic universal that faithfulness for anteriority is weaker before palatal sibilants than before alveolar sibilants. Moreover, language-specific consonant harmony patterns are also explained by interaction of these two constraints with another constraint, IDENT-CC, which induces consonant harmony. When IDENT-CC dominates the two ID-IO faithfulness constraints, consonant harmony occurs all the time, regardless of the type of triggers and targets. When it is ranked between the two ID-IO faithfulness constraints, only the alveolar sibilants are targeted, revealing target asymmetry patterns. Finally, when IDENT-CC is dominated by the two ID-IO faithfulness constraints, consonant harmony does not occur at all. The target asymmetries in retroflex and nasal consonant harmony are similarly analyzed: ID-IO (anterior/_d) ≫ ID-IO (anterior/_ɟ), and their interaction with IDENT-CC in retroflex consonant harmony, and ID-IO (nasal/_d) ≫ ID-IO (nasal/_n), and their interaction with IDENT-CC in nasal consonant harmony. It is significant that this analysis precisely predicts the absence of the pattern in which palatal sibilants, retroflex consonants, and nasal consonants are exclusively targeted in consonant harmony.

The research serves as an empirical contribution in that it finds target asymmetries in consonant harmony typology. In addition, it is predictive, allowing for all and only the observed patterns in consonant harmony typology including asymmetrical patterns that were not discussed in depth in previous research. Finally, the analysis combines theories of consonant harmony, such as correspondence theory, with perception-based theory, creating a novel hybrid analytical framework, which can be applied to other future areas of phonological research.