An OT Approach to Phonology-Syntax Mappings in Chinese Tone Sandhi

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The formal properties of Tone Sandhi (TS) in Chinese are widely studied in the literature of generative phonology. It has been argued that TS in several dialects of Chinese is shaped by syntactic structures, while some also argue that this syntax-phonology mapping is not that transparent (see Chen 2000: Ch.7 and Ch.10 for extensive surveys). In this paper, syntax-phonology mappings of TS in several Chinese dialects are studied in a constraint-based OT approach (Prince and Smolensky 1993). I argue for a direct phonology-syntax mapping condition between dominance of syntactic objects and phonological constraints.

I propose a set of phonology-syntax mapping constraints that can make reference to dominance relations in syntax, and the dominance relations are directly translated into the (sub)rankings of a mapping constraint. The proposed direct phonology-syntax mapping condition has the following mechanisms: in the structure [$_{XP}$ *ab* [$_{YP}$ *cd* [$_{ZP}$ ef]]] (*abcdef* are phonological representations), where the (phonological) string contained by XP is (*abcdef*), the one by YP is (*cdef*), and the one by ZP (*ef*), we predict that the ranking among *Con*(XP), *Con*(YP), and Con (ZP) is *Con*(XP) >> *Con*(YP) >> Con (ZP) (*Con*(Σ) for some constraint targeting a syntactic domain Σ). On the other hand, a ranking which does not follow the dominance relation is immediately ruled out in this system (i.e. * Con (ZP) >> Con(XP) >> Con (YP)). Optimality theoretically, the constraint violations caused by the string (*ab*), if any, are considered more unacceptable than those by the string (*cd*), which, in turn, are more unacceptable than those by the string (*ef*). In addition, since dominance relations are accessible to OT constraints, we predict that there are constraints which may refer to the most/least dominant syntactic objects, represented as *Con*(Σ^{MAX}) or *Con*(Σ^{MIN}). *Con*(Σ^{MAX}) targets the strings contained by the most dominant syntactic objects, while *Con*(Σ^{MIN}) the smallest strings by the least dominant syntactic objects.

Evidence for the direct mapping condition can be found in Mandarin TS: the more dominant a syntactic domain is, the more likely its right edge to remain faithful. With the help of the direct mapping mechanisms, the generalization can now be captured by phonology-syntax mapping constraints, such as in the construction [$_{XP}$ X [$_{YP}$ Y]], Anchoring (XP, Right) ranks over Anchoring (YP, Right). Hence any shift of tone in the right edge of XP will be considered worse than that in the right edge of YP. Furthermore, from overapplications of TS in rightward compounds, I propose that an anti-faithfulness constraint, Greed, is needed, which also relies on syntactic imports. In Mandarin, Greed targets the least dominant strings S^{MIN} and forces the exhaustive TS in those domains. Combining the results, the final ranking in Mandarin will be a set of hierarchically mapping Anchoring constraints dominating Greed(S^{MIN}), and they in turn dominate a faithfulness Ident constraint. A similar ranking is found in Taiwanese TS, in which Anchoring and Greed both target the maximal strings.