Exploring the syntax-phonology interface: the effect of freestanding form

Huang, Yujing
Harvard University

One prevalent theory of syntax-phonology interface postulates a prosodic level that is distinct from syntax and phonology and that mediates between these two (Selkirk 1986, Selkirk 2011). For this postulation, two questions need to be answered: how do syntactic and prosodic structures correspond; is there enough evidence to postulate an additional level rather than claiming that there is a mismatch between syntax and phonology, presumably due to competing constraints/rules? Mandarin Tone 3 Sandhi (T3S), of which the domain is often analyzed as prosodic, provides some insight into these questions. This study, by investigating T3S, shows that (i) T3S domain corresponds to the syntactic constituency, inherited by the prosodic component of the grammar, if and only if the syntactic constituents are freestanding; otherwise (ii) the prosody can act as an independent structure which intervenes and reconfigures the domain.

T3S is the phenomenon where Tone 3 (T3) changes to Tone 2 (T2) when it precedes another T3 (T3 $\rightarrow$ T2/___ T3). The sandhi application is believed to be cyclic (Chen 2000, Duanmu 2007, a.o.). For example, if the syntactic structure is a right-branching one, e.g.{*xiao*{*yu san*}} ("small umbrella"), and if the prosodic structure aligns with the syntactic structure, i.e. *(xiao(yu san))*, the output should be *(xiao3(yu2 san3))* (where 2 means T2 and 3 means T3). The first T3S domain is the innermost constituent *(yu san)*; after the first cycle of sandhi application, the result is *(xiao3(yu2 san3))*. There is no environment for T3S to apply again. This prediction is consistent with native speakers' judgment. However, there are some systematic exceptions with certain syntactic configurations such as in the following example: for {*liang*{*ba san*}} ("two Classifier umbrella") the output is *liang2 ba2 san3*.

Those exceptions are traditionally explained by a cliticization rule (Poteet, 1985). In Poteet's (1985) original example, *mai ba san* ("to buy an umbrella"), the verb and the classifier form a prosodic word. It is not clear whether this account can be extended to all syntactic categories, such as numeral phrases e.g. *liang ba san* ("two umbrellas"). The rule also needs to explain why the clitic attaches to the left not the right constituent which is syntactically closer to it. A traditional alignment constraint (McCarthy and Prince, 1993) in an Optimality Theoretical account cannot explain the difference between *xiao yu san* and *liang ba san* either. Since *xiao yu san* and *liang ba san* have exactly the same syntactic structure, if the prosodic and syntactic boundaries are matched by alignment constraints, the prosodic structure for the two examples will be the same. However, as shown above, they have different sandhi patterns. There is one difference between the two phrases that is overlooked by alignment constraints: *ba san* is not a freestanding constituent, but *yu san* is. This study thus argues that in the case of T3S, syntactic constituents that are not freestanding are not visible to prosody; in other words, alignment constraints can only match prosodic boundaries with the syntactic boundaries of freestanding structures. Therefore, the syntactic structure of {*liang*{*ba san*}} is not relevant to the prosody component of the grammar, because of the non-freestanding status of *ba san*. This phrase is interpreted as {*liang ba san*} by the prosody.

The above hypothesis (stated earlier as hypothesis (i)) comes from the effect of isolation forms (Kenstowicz 1996; or Lexical Conservatism by Steriade 2000). Such an effect is derived from correspondence between bases and derivatives: if there are outputs for both the base and the derivative, there is an output-output correspondence between the two; if there is no freestanding base, meaning no output of base to be evaluated against the output of the derivative, the correspondence constraint

is mute. Hypothesis (i) follows a similar logic: the alignment constraint can only see a constituent when the constituent is a freestanding form. Otherwise, it is mute. What it says about the interface between syntax and phonology at Spell-out is that, when the constituent is a freestanding form, it can enter phonological evaluation, and its boundaries can be matched to prosodic boundary by alignment. If the constituent is not freestanding, it cannot have a phonological form and consequently cannot enter the phonological evaluation. In fact, it has to wait until a later cycle when the constituent becomes a freestanding form to be spelled out. This is the case with *liang ba san*.

This leads us to another question: since there is no syntactic component that determines the hierarchy of the prosodic structure, does this mean that the prosody is not hierarchical at all? To answer this question, the author of this study has conducted an acoustic analysis on three-syllable chains that have no visible internal syntactic structure. This experiment controls for syllable structure by using identical syllables. The results show that the boundary between the second and third syllables is significantly larger than the boundary between the first and second syllables ($t = 3.73$, $p<0.001$). Thus, three-syllable units have the prosodic structure $((\sigma\sigma)\sigma)$. This structure predicts its sandhi pattern to be ((22)3) which is consistent with native speakers' judgment. It is shown that, even without any syntactic information, prosodic structure must be organized in a hierarchy. So, *liang ba san* has *((liang ba)san)* as its prosodic structure, and *xiao yu san* has a prosodic structure of the form *(xiao(yu san))*. The fact that they have different prosodic structures explains why different sandhi results are expected, hence hypothesis (ii).

To sum up, this study shows a case where constituents with the same syntactic tree structure can have different prosodic correspondents. It is argued that (i) the freestanding status of some syntactic constituent is relevant to its visibility to the prosodic structure. T3S, as a case of cyclic application, shows the correspondence between syntax and prosody in each derivation cycle. It therefore sheds some light on the nature of Spell-out; that is, only freestanding constituents can be spelled out in T3S domain. In addition, it was shown that (ii) prosodic hierarchy can be created independently of syntactic structure. This supports the postulation of a prosodic level, and explains why constituents with the same syntactic structure can have different prosodic structures.

References

Chen, Matthew Y. 2000. *Tone sandhi: Patterns across chinese dialects*, volume 92. Cambridge University Press.

Duanmu, San. 2007. *The phonology of standard chinese*. Oxford University Press, USA.

Kenstowicz, Michael. 1996. Base-identity and uniform exponence: alternatives to cyclicity. *Current trends in phonology: Models and methods* 1:363–393.

McCarthy, John J, and Alan Prince. 1993. Generalized alignment. *Yearbook of morphology* 79–153.

Poteet, Stephen. 1985. Tone sandhi and the phonological structure of mandarin. *Ms, UCSD* .

Selkirk, Elisabeth. 2011. The syntax-phonology interface. *John Goldsmith, Jason Riggle and Alan CL Yu (eds.), The handbook of phonological theory* 435–484.

Selkirk, Elisabeth O. 1986. *Phonology and syntax: the relationship between sound and structure*. MIT press.

Steriade, Donca. 2000. Lexical conservatism and the notion base of affixation. *Ms., University of California, Los Angeles* .