

## The Emergence of the Binary Foot in Mandarin

Jason Brown & Shuxia Yang  
University of Auckland

While the binary foot is a common requirement across languages, formalized as a constraint, FT-BIN is violable, and predicts patterns of latent binarity in some languages. This talk outlines the prosodic behaviour of some compounds in Mandarin, which are demonstrated to yield output structures that must consist of binary tonal feet, and where otherwise additional obligatory syllables will undergo tonal deletion in order to satisfy this requirement. Finally, we tackle the problem that these feet pose: while they appear to be an emergent effect, whereby an optimal unmarked structure surfaces in specific contexts, the context here is a morphosyntactically derived form, contrary to predictions of recent approaches to constraint application.

### Verbal Compounds in Mandarin

In Mandarin, [VN] compounds, which involve the merging of a verbal root with a nominal root, exhibit a process of syllable deletion. (1a) illustrates a phrasal form with disyllabic V and N, and (1b) illustrates the compounded [VN] form:

- (1) a. ta zai shanli **xunzhao** **mogu**.  
he in mountain look.for mushroom  
'He looked for mushrooms in the mountain.'
- b. ta zai shanli **xun-mo**.  
he in mountain look.for-mushroom  
'He looked for mushrooms in the mountain.'

Regardless of the syllable count of the individual nominal and verbal roots, the resulting structure must be two syllables in length, even if this forces the deletion of a syllable (as illustrated above). We take this to be the emergence of a disyllabic foot in derived contexts. Given that there are no stray syllables allowed in this construction, the ranking required for the compounds must be FT-BIN » MAX. We will expand on the idea of the disyllabic foot by claiming that it is actually a *tonal* foot.

### Crowding in Tonal Feet

Previous works have argued for a tonal foot in Mandarin, with some claiming the foot is left-headed (Shih 1986, Yip 2004), and others that it is right-headed (Feng 1997). We remain agnostic as to whether feet are left- or right-headed in Mandarin, as there appear to be no constraints on the tonal structure of [VN] compounds; however, one phenomenon argues strongly for the resulting feet being tonal in nature, rather than syllable-based. This involves the appearance of classifiers in [VN] compounds, which surface between the verbal and nominal root, but with the citation tone changed to “neutral” tone:

- (2) a. wan (bowl CLASSIFIER) Tone: 3
- b. he-**wan**-tang 'drink a bowl of soup' (drink-bowl-soup) Tones: 1 0 1

Assuming that neutral-toned syllables lack a phonological tonal specification in Mandarin (Huang 2012), the existence of these structures indicates that the toneless syllable, while parsed to a tonal foot, is metrically inert in the sense that it does not count in the computation of binarity. The fact that these toneless syllables can intervene between syllables with specified tones indicates that they must belong to a single foot:

- |        |         |                                     |   |              |
|--------|---------|-------------------------------------|---|--------------|
| (3) a. | gan-zou | ‘drive somebody away’ (drive-leave) | Tones: 3 3                                    |              |
|        | b.      | gan- <b>bu</b> -zou                 | ‘can’t drive somebody away’ (drive-not-leave) | Tones: 3 0 3 |
|        | c.      | gan- <b>de</b> -zou                 | ‘can drive somebody away’ (drive-AUX-leave)   | Tones: 3 0 3 |

Thus, the while these forms are trisyllabic, an optimal binary *tonal* foot motivates the tone deletion: since there are three morphemes, syllable deletion is not an option (as this would delete an entire morpheme); however, deleting a tone for a toneless foot achieves the optimal prosodic structure, thus FT-BIN » MAX-TONE. It is only in these contexts where the conditions on tone over-ride the disyllabicity requirement.

### Implications Surrounding FT-BIN

In recent work on English and Navajo, Martin (2011) has claimed that phonological constraints can have a categorical effect within lexical items that is expressed as a gradient effect in larger, derived contexts such as compounds (cf. also Mohanan 1993 for the idea that constraints apply more stringently to smaller domains). The problem raised by the Mandarin compound pattern is that the binary foot effect holds in [VN] compounds, but FT-BIN is freely violable in lexical forms. For example, Zhou (2004) found that the *Xinhua New Word Dictionary* includes 2168 words, among which 1204 are disyllabic, 324 are trisyllabic, and 449 are quadrisyllabic, and that *The Contemporary Chinese Dictionary* has 58,481 words, among which 39,548 are disyllabic, 4,828 are trisyllabic, and 4,798 are quadrisyllabic. The implication is that within lexical items, FT-BIN is violable, but clearly emerges as a statistical preference, whereas in derived contexts, the constraint is categorically satisfied. We thus claim, based on the above patterns, that phonological constraints may in some cases apply more stringently to larger or derived domains than to lexical items (the *opposite* of Martin’s claims for English). We present further support for this view from other derived syntactic structures.

### References

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