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ENGLISH SUMMARY

As an important means of our daily communication, spoken language is notoriously rich in its variability due to various factors. Previous studies have paid much attention to how people produce and perceive different types of segmental variation typically in non-tonal languages. The majority of the world’s languages, however, are tonal languages, in which pitch patterns over syllables distinguish lexical meanings. Much less, however, has been investigated and understood on how suprasegmental features such as lexical tones vary in their acoustic realizations in different contexts in speech production and how the variabilities further affect listeners’ perception of the lexical tones and the recognition of speech. This dissertation provides a comprehensive study of both local and global tonal variability in Tianjin Mandarin with a series of well-controlled experiments. Tianjin Mandarin is well-known for its intriguing tonal variation patterns, and therefore presents as a good test case for a better understanding of the tonal variability phenomenon.

The dissertation consists of seven chapters. Chapter 1 briefly introduces the main research issues to be discussed in this dissertation, followed by a description of the phonological system of Tianjin Mandarin in Chapter 2. Chapter 3 sets out to investigate the f0 variability induced by two tonal variation processes, i.e., tone sandhi and tonal coarticulation, which are known to greatly vary the f0 realization of lexical tones in a local domain. Previous impressionistic studies have proposed complex patterns of tonal sandhi patterns over disyllabic constituents, as well as the conflicting directionality of sandhi alternations and possible iterative application of disyllabic sandhi rules over trisyllabic constituents. Via examining f0 variation of lexical tones as a function of different following tones, this chapter observed an interesting anticipatory raising effect of the lexical low-falling tone (T1) which has never been mentioned in the literature. Furthermore, this chapter confirmed three tonal sequences with tone sandhi changes: 1) two low-falling tones (T1T1), 2) a high-falling tone followed by a low-falling tone (T4T1), and 3) two low-dipping tones (T3T3). These disyllabic tone sandhi patterns, however, were not consistently observed within trisyllabic sequences, as claimed in the literature. Specifically, while T3T3 showed sandhi application regardless of its position within a trisyllabic sequence, T1T1 and T4T1 sequences showed sandhi changes only when they were right aligned. Last but not least, no tonal neutralization was observed over any of the sandhi processes. Rather, this chapter argues that T3T3 is a near-merger sandhi case, while T1T1 and T4T1 can be classified as no-merger sandhi sequences.

Chapters 4 and 5 investigate the perceptual consequences of the local tonal variability that has been discussed in Chapter 3. Chapter 4, via the visual world paradigm, examines the effect of contextual tonal variation on speech recognition in Tianjin Mandarin, where three types of contextual tonal variation have been observed: Near-Merger Sandhi, No-Merger Sandhi, and No-Sandhi tonal coarticulation. Listeners were asked to identify the target speech amongst an array of four possibilities upon hearing a disyllabic collocation, while their eye movements were tracked. Results suggest that native listeners are sensitive to fine-grained phonetic details in contextual variation of lexical tones. No-Sandhi
Coarticulation was the easiest to recognize as participants fixated on the targets the earliest among the three conditions. Between the two sandhi variation types, Near-Merger Sandhi was more difficult to process than No-Merger Sandhi, reflected in the overall less proportion of looks to target. To follow up, Chapter 5 further examines the nature of tone sandhi perception. Previous perception studies with traditional meta-linguistic tonal judgement tasks claimed great perceptual ambiguity between sandhi-derived tones and another lexical tone in the tonal system, suggesting a complete lexical tonal neutralization due to tone sandhi. This chapter, via the same Visual World Paradigm as in Chapter 4, shows that the sandhi-derived tones are in fact perceived more similarly to their non-sandhi variants of the same toneme rather than another lexical tone that is claimed to be the output tone of sandhi change according to rules reported in previous impressionistic studies. This chapter, therefore, from a perceptual perspective, confirmed that tone sandhi does not involve the categorical change of one lexical tone to another. Rather, sandhi derived tones are better viewed as just a variant of the lexical tone that undergoes tone sandhi change.

Based upon findings for the local source of tonal variability as discussed in Chapters 3-5, Chapter 6 sets out to further understand how global factors might influence the tonal f0 realization. This chapter examined the effect of prosodic boundaries on the neutral tone realization in Tianjin Mandarin. Neutral tone refers to the prosodically weak element which shows much reduced acoustic properties and great variability in the f0 realization. The neutral tone in Tianjin Mandarin exhibits interesting context-dependent f0 realization, where the neutral tone exhibits consistent rising f0 realization preceding a low-falling lexical tone. The results showed that the rising neutral tone f0 contour before T1 does not need to be treated as a special tonal target as claimed in the literature, but rather should be due to the raising effect brought about by the following T1 as first proposed in Chapter 3. It is shown that the neutral tone in Tianjin Mandarin has a mid-low neutral tone target similar to that in Standard Chinese. In addition, by manipulating the prosodic boundary between the neutral tone and the following T1, an interesting effect of prosodic boundary on the neutral tone f0 realization was observed. Specifically, the raising effect due to the following T1 can be blocked by a high-level prosodic boundary (i.e., a Subject-Predicate boundary) compared to a low-level boundary (i.e., a below-NP boundary). Last but not least, this chapter shows an interaction of prosodic boundary and focus, which further argues for the independent implementation of the two mechanisms.

Chapter 7 revisits the research questions and concludes the main findings in this dissertation. This chapter also discusses the limitations and provides suggestions for future research.