Tone sandhi, prosodic phrasing, and focus marking in Wenzhou Chinese

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Chapter 8

Conclusion

This thesis set out to experimentally investigate the relation between tonal realization, prosodic phrasing, and focus realization with data from the Wenzhou dialect of Chinese. Specifically, the following research questions were addressed, as listed in section 1.2.2 of this thesis:

Tone sandhi and prosody (Chapter 3):

- Which factors determine the application of tone sandhi in disyllabic targets which are ambiguous between two prosodic structures?

Tone sandhi and focus (Chapters 3 and 4):

- Can the presence of contrastive focus in (only one of the syllables of) a disyllabic lexical compound block lexical tone sandhi?
- If not, how are the acoustic reflexes of focus distributed within the disyllabic lexical compound if only one of the syllables is focused, compared to focus on the entire disyllabic lexical word?

Tonal realization and prosodic structure (Chapter 5):

- Is the implementation of tonal contours affected by prosodic structure? If yes, which component of prosodic structure (prosodic boundaries/prosodic heads) is more important for the way tonal contours are implemented?

Tonal realization, prosodic structure, and focus (Chapter 5):

- Is the effect of prosodic structure on tonal implementation identical to the effect of focus?

Tone sandhi contour implementation and prosodic structure (Chapter 6):

- How are tonal contours implemented/scaled in sentences with different numbers of words per constituent? Is the scaling of the contours based on sentence or on constituent length?
- How does syntactic embedding affect the scaling of tonal contours? Which level of syntactic complexity is reflected in the tonal scaling?

Tonal realization and focus/givenness (Chapter 7):

- Do the speakers of Wenzhou use lexical means to mark referents in different discourse situations?
- Is there a difference in tonal realization between constituents that are given, broadly focused, and narrowly focused?

A summary of the experimental findings that were presented in the individual chapters will be given in section 8.1. In section 8.2, these findings will be set into relation with the broader research questions outlined in the introduction. Section 8.3 presents suggestions for further research.

8.1 Summary of experimental results

Chapter 3 was concerned with the application conditions for tone sandhi in disyllabic structures that are ambiguous with respect to lexical wordhood. Two theoretical claims were tested, namely whether tone sandhi application in disyllabic verb-object constructions correlates with their degree of lexicalization, and that the presence of contrastive focus influences the application likelihood of tone sandhi. Additionally, it was tested whether contextual factors, such as the presence of a carrier sentence or the co-elicitation of disyllabic lexical compounds, would influence the application of tone sandhi in the verb-object constructions.

As was shown with experimentally obtained data, only the first claim could be confirmed for the speech of the young Wenzhou speakers. The degree of lexicalization of verb-object constructions, as measured according to semantic, syntactic, and morphological criteria, positively correlated with the relative magnitude of tone sandhi application in the realizations by the speakers. On the other hand, recording the disyllabic verb-object constructions in sentence-medial position and in contrastive focus context did not significantly influence the number of instances of tone sandhi application.

However, the experiment reported in Chapter 3 found that the most important predictor for whether the disyllabic verb-object constructions are realized as tone sandhi contours or with phrasal prosody was actually the prosodic context. More specifically, the experimental results showed that speakers were much more likely to realize verb-object constructions as phrases when they were presented in the context of other verb-object constructions. On the other hand, when the verb-object constructions were presented in the context of disyllabic compounds, the speakers most often applied tone sandhi to both the

disyllabic compounds and the disyllabic verb-object constructions. This speaks for a high variability in the tone sandhi application behavior of the young speakers, while it could be shown that the contextual factors that influence the application of tone sandhi are different from what has been assumed in previous literature.

In Chapter 4, the research question concerned the phonetic effects of contrastive focus on the tonal contours that result from lexical tone sandhi. Particularly, the experimental setup varied the position and extent of the focus domain with respect to the disyllabic tone sandhi domain, such that the focus domain would either precede, follow, undercut, or encompass the tone sandhi domain. In that way, it was tested whether (i) the presence of focus on a sub-part of the tone sandhi domain can interrupt the application of the tone sandhi process itself, and (ii) if not, whether the phonetic implementation of the tone sandhi contour would be different under focus on the entire tone sandhi domain, compared to focus only on one of its syllables.

Concerning (i), it was found, in agreement with the findings in Chapter 3, that the presence of focus did not affect the application of tone sandhi on the lexical compounds. Extending the findings of Chapter 3, it was shown that tone sandhi, which presumably serves as a marker for lexicalization, even applies in contexts where the speakers want to stress the importance of one of the syllables of the compound over that of the other syllable. Therefore, focus on a constituent below the word level cannot affect the application of phonological processes in Wenzhou (unlike e.g. pitch accent assignment on the stressed syllable in Dutch and English, which can be overridden by focus requirements).

Additionally, it was shown that even on the phonetic level, focusing only one of the syllables of the compound did not consistently lead to an F_0 or duration difference when compared to focus on the entire word. This means that, even on the phonetic level, the tone sandhi contour is only affected by focus as one whole, and its components are not individually accessible to focus marking. Instead, the focus effect (lengthening and F_0 range expansion) is distributed over the entire tone sandhi domain as a whole, and neither cue is sufficient to differentiate e.g. focus on the first syllable from focus on the second syllable, or from focus on the whole word. These findings underline the importance of the tone sandhi domain as phonological domain, and its special status compared to disyllabic domains in other dialects which do not have tone sandhi.

In Chapter 5, the influence of prosodic structure and focus on tonal realization was tested. Based on hypotheses from findings on the segmental level, which predict a strengthening of articulation in prosodically strong and focused

positions, it was investigated whether a similar strengthening effect could be observed for the implementation of tonal contours. Specifically, it was tested to what extent tonal contours are susceptible to the influence of neighboring tonal targets in the context of the two influence factors (prosodic structure and focus).

Moreover, in order to tease apart the influence of prosodic boundaries from the influence of prosodic headedness, two syntactic structures were compared which differ in both of these prosodic characteristics. In verb-object structures, both components form a prosodic phrase with each other, but due to the principle of nonhead prominence, only the object bears prosodic prominence. In adverb-verb structures on the other hand, both components constitute their own prosodic phrase and thereby both acquire prosodic headedness. Therefore, the two structures differ both with respect to the prosodic boundary between the components (V-O: Prosodic word boundary, ADV-V: Prosodic phrase boundary), and with respect to the prosodic prominence distribution (V-O: Prosodic head = Object, ADV-V: Prosodic head = Both).

Comparing the amount of coarticulatory influence between the two structures, it was found that the tonal trajectories of rising and falling tones were significantly steeper for the verbs in verb-object structures than for the adverbs in adverb-verb structures. On the other hand, no significant difference in the steepness of the contours was found between the objects in verb-object structures and the verbs in adverb-verb structures. These findings were interpreted to indicate that the relevant component of prosodic structure, which influences tonal coarticulation in Wenzhou Chinese, is prosodic headedness. Specifically, tones are articulated more autonomously and with steeper contours when they are in prosodically strong positions, but they are more susceptible to the influence of adjacent tonal targets when they are in prosodically weak positions.

By comparing this effect of prosodic prominence on tonal implementation to the effect of focus, it was observed that the two effects are not identical. Rather, while tonal contours in prosodically weak positions showed less influence of adjacent tonal targets under focus, tonal contours in prosodically strong positions showed further strengthening under focus. These findings are incompatible with theories in which focus is implemented directly as prosodic prominence, and in which the only requirement of focus for the grammar is to have a prosodically strong position on the location of the focused constituent. If focus were implemented as prosodic prominence, it would be unclear how the observed further strengthening of prosodically strong positions would be conceptualized.

Instead, the findings lend further support to theories which account for the effect of focus as a strengthening of tonal implementation that is independent of prosodic structure. In such a theory, prosodically strong positions and focus both cause a difference in the implementation of tonal contours, but do so independently of each other. This would predict that the two effects may be (partially) cumulative, which is in line with the experimental findings for Wenzhou Chinese as presented in Chapter 5.

Chapter 6 looked at the properties of tonal realization on the sentence level. In order to investigate whether and how prosodic structure influences the implementation of tonal contours in a more global manner, sentences consisting of rise-fall tone sandhi contours were investigated. By keeping the tonal properties of the individual words constant, it was attempted to make the Wenzhou test sentences comparable to earlier investigations in African tone languages and intonational languages, where F_0 scaling was investigated on the basis of the peak scaling of pitch accent or tonal peaks.

In contrast to these languages investigated earlier, where sentential F_0 scaling was found either to be pre-planned globally based on sentence length, or implemented locally from one constituent to the other, it was found for Wenzhou that F_0 scaling was prosodically mediated. Specifically, it was found that a manipulation of the length of the subject or object constituent affected the scaling of the initial peak within that constituent, but not within the respective other constituent. This indicates that F_0 pre-planning in Wenzhou is performed on a semi-global level, namely that of the syntactic/prosodic phrase. At the same time, the location of the F_0 reset was found to have a fixed location in the structure, which indicated that the speakers do not re-adjust the prosodic structure of a sentence to balance the length of the individual constituents, as has been found for some Romance languages.

Testing the F_0 scaling of embedded clauses, a second finding in Chapter 6 was that the scaling is sensitive to the syntactic complexity of the embedded structure. While it is true for all test sentences that the embedded clause was also prosodically embedded (i.e. scaled lower than the matrix clause), the F_0 difference between matrix verb and embedded clause was larger for an embedded CP than for an embedded VP. This difference was found regardless of whether the embedded subject was overtly spelled out or not. In that sense, it can be concluded that F_0 scaling in Wenzhou Chinese is used as a marker for important syntactic differences to distinguish structurally different sentences with similar linear word order.

Finally, Chapter 7 investigated the marking of wh-focus and givenness, both in the lexical and in the phonetic/phonological respect. For the test of lexical complexity, the answers from the speakers were elicited with the help of a picture description task, which allowed the speakers considerable freedom in their realization of the focused and given referents. It was found that, similar to other languages, speakers use shorter lexical, and more definite, forms to talk about given referents in a discourse, and longer lexical and indefinite forms to talk about focused, not previously introduced referents.

In a second experiment, which investigated the phonetic marking of focus and givenness in a more experimentally controlled way, it was shown that speakers systematically mark given referents differently from focused referents, both in terms of F_0 and in terms of duration. In addition, the experiment also found a difference in F_0 and duration marking between referents in broad focus and those in narrow focus context. These findings corroborate accounts of information structure which stress that the complexity of referent marking cannot just be accounted for in terms of presence/absence of focus. Rather, the givenness of a referent can act as an additional factor, and induce a tripartite division in the realization of the respective tonal contours on the referents.

8.2 General conclusions

From the experimental results presented in the previous section, several important conclusions can be drawn.

First of all, the tone sandhi application observed the young speakers proved to be more variable than assumed in the previous literature in some respects, and at the same time more stable in other respects. A disyllabic collocation of two monosyllabic lexical words can be treated as one word, and consequently be realized with the lexical tone sandhi contour, or be treated as two separate words, and be realized in a way that is consistent with phrasal prosodic requirements. The exact realization of such an ambiguous structure that is chosen by a speaker in a certain moment can be predicted to some extent based on the lexical properties of the collocation. However, the largest influence factor seems to be whether the disyllabic collocation is uttered in the context of other (clearly lexicalized) compounds, or together with other phrasal structures.

In that sense, tone sandhi serves as a lexicalization marker, but can also assume other functions in ambiguous structures, and be implemented analogously to surrounding tonal contours. This finding is difficult to reconcile with theories in which the tone sandhi application domain is crouched in the

framework of prosodic levels, which are derived from syntactic structure (e.g. Chen 2000). Clearly, for the young Wenzhou speakers, its syntactic composition is not the sole criterion for the application tone sandhi on a disyllabic structure. Rather, some structures can be ambiguous, and in these ambiguous structures, several factors which are not related to prosody play a role in determining the precise application rate of tone sandhi.

Once the tone sandhi contours are derived on the word level, however, their implementation on the phrase and sentence level can be influenced both by prosody and by focus. For the former, the scaling of the tonal contour, i.e. its relative height within the speaker's pitch range, is dependent on the size of the phrasal prosodic constituent in which the particular word appears, and on its position within that constituent. Similarly, the height of an F_0 peak, compared to the preceding F_0 peak, is related to properties of the underlying syntactic structure, and gives cues to the listener about e.g. the complexity of structure in an embedded clause.

As for focus, the realization of the tone sandhi contour is magnified, similarly to the F_0 expansion effect of focus on tones on lexical monosyllables. However, the focus effect is distributed more or less evenly over the entire disyllabic contour, even when only one of the syllables within the disyllabic tone sandhi domain is the precise location of focus. It appears that under focus, the requirement to mark the exact focus location is in conflict with the requirement to treat the entire disyllabic lexical domain as one whole for the sake of tonal realization. The speakers resolve that conflict by giving precedence to the preservation of the disyllabic coherence of the tonal contour, at the expense of precisely marking the exact location of focus.

Therefore, the tone sandhi contour cannot be broken apart by focus, neither in the phonological target selection (i.e. by blocking tone sandhi), nor in the phonetic implementation of the selected target (i.e. by locating the focus effect on the focused syllable alone). The effect of focus, which acoustically manifests itself in lengthening and F_0 range expansion, applies on the tone sandhi domain in the same way that it would apply on lexical tones, and it treats the disyllabic tone sandhi contour as a single tonal contour.

On monosyllabic words, it can be seen that F_0 range expansion is not the only acoustic reflex of focus. On contour tones, focus also affects the strength of the tonal realization, so that the tones are less influenced by adjacent tonal targets. This effect is similar in kind, but independent of the prosodic strengthening effect, which affects monosyllabic tonal targets in prosodic head positions. This thesis has shown that the two strengthening effects of focus and

of prosody are cumulative, and that therefore one cannot be explained away with the help of the other.

Another piece of evidence, which speaks for an independence of the focus effect from prosodic phrasing, is its gradience. Speakers seem to be able to adjust the magnitude of focal strengthening, for example to distinguish broadly focused from narrowly focused constituents, and at the same time differentiate both types from given constituents. Outside of lexical means of referent denotation, the phonetic implementation of tonal targets therefore represents another powerful tool for the speakers to convey detailed communicative distinctions to listeners.

8.3 Directions for future research

On the basis of the findings laid out in this thesis, several other aspects of tone realization, prosodic phrasing, and focus can be investigated.

As for prosodic phrasing, it could be tested whether the observed strengthening effect of prosodic headedness also holds for tone sandhi tones. It could be argued that the flattening of lexical tonal contours in prosodically weak positions, as observed in this thesis, could stand in potential conflict with the characteristics of the tone sandhi contours. For example, it has been suggested for Taiwanese that tonal coarticulation is minimized in order to maintain the distinguishability of the tone sandhi tonal contours (Lin 1988). For Wenzhou, it would be interesting to test how speakers would realize tone sandhi contours, for which contour recognizability is crucial, in prosodically weak positions, in which the distinct realization of contours might be compromised.

As for F_0 scaling, several further aspects could be explored. For example, in addition to the subordinated clauses tested in this thesis, it could be investigated whether and how the syntactic structure of coordinated clauses is reflected similarly in the intonational implication. Additionally, it could be tested how the observed F_0 scaling properties in the Wenzhou sentences are affected by the presence of focus. Particularly, it would be interesting to observe whether focus on a certain constituent would induce an effect on the F_0 scaling that is different from the prosodic effect of a boundary. If this were the case, the argumentation that prosodic structure and focus effects are in principle independent would be further corroborated.

As for focus, it is an open research question whether wh-induced focus and contrastive focus have the same phonetic reflexes. In light of the acoustic complexity of the focus effects that were found for Wenzhou in this thesis (e.g.

the acoustic distinction between givenness, broad focus, and narrow focus of constituents as presented in Chapter 7), it could be expected that Wenzhou might represent a good test case to corroborate findings for languages like English (Katz & Selkirk 2011). One research area that has been completely neglected in this thesis is the information-structural notion of *topic*, and any focus effects, whether brought about by wh-focus or contrastive focus, could also be compared to the effects of topic, as in Chen 2009; Wang & Xu 2006, 2011.

Finally, while much research has already been devoted to the analysis of tonal realization in other dialects of Chinese, it can sometimes be difficult to directly compare the observed effects across different dialects, because each study uses its own methodology and stimulus composition. Investigations which directly compare different dialects (as in e.g. Chen et al. 2009; Xu et al. 2012), especially if they are expected to have very dissimilar tonal properties, can provide important insights in the abstract mechanisms that underlie the effects in question.