A data-based sketch of Phonological Grammar for L2 prosody-syntax

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https://doi.org/10.36505/ExLing-2024/15/0030/000655

Abstract

This study investigates L2 learners' prosody to outline Phonological Grammar for pedagogical purposes. The prosody data from Japanese learners of English was collected by the following procedures. Fifty-nine learners participated in the production tasks consisted of arranging cards into sentences and reading them aloud appropriately for a given context. Seventeen students in the surveyed learners' group continued three-month lessons and took an interview test for the follow-up fluency assessment. The results indicated a significant correlation of prosodic naturalness with grammatical knowledge, showing that phrasal prosody could improve through the additional learning exposure while discourse/sentence prosody could not. These results lead to Phonological Grammar, a grammar that focuses on prosody tied to phrase structures.

Keywords: prosodic/syntactic phrasing, intonation, information structure, L2 English

Introduction

This study deals with L2 learners' knowledge for prosody-syntax mapping, in other words, how grammar and pronunciation are linked. It is known that structurally ambiguous utterances (e.g., "feel the frog with the feather") are resolved by means of prosodic cues such as pauses and vowel lengthening (Snedeker et al 2008). Similar use of prosody seems to be partly available by L2 learners for ambiguity resolution, but the underlying L2 phonology has not been extensively pursued.

Although prosody-syntax mapping is expected to be harder to acquire than individual sound/grammar knowledge (Sorace 2011), a recent theoretical study suggests that natural pitch patterns can be acquired implicitly by non-native speakers (Archibald and Croteau 2021). This research direction leads to a theoretical hybrid of L2 phonology and grammar (Phonological Grammar in my term), which promotes the learning of natural rhythm and intonation.

Based on the above background, this study addresses two research questions: 1) Can L2 learners make use of prosodic cues to disambiguate structurally complex utterances? 2) How can Phonological Grammar for L2 learners be outlined/visualized? To answer the questions, learners in different proficiency levels are examined because more proficient learners are expected to acquire prosody-syntax mapping better.

Prosodic disambiguation

Methods: A speech production task was conducted with 28 Japanese learners of English with CEFR B2, 31 learners with CEFR A2 as well as 8 native speakers. After a tutorial, they were asked to read a given context on a PC display. Here is an example of a context: "John likes to play with a ball. It's in a basket in his room. Now he tries to throw the ball far. He finds a little gap above the curtain."

Then they arranged word cards (*curtain*, *behind*, *throw*…) into a correct utterance (a method following Yang et al (2022)). The correct order was shown, and the participants were asked to read it aloud using appropriate prosody. The card arrangement and speech were video/audio-recorded to compare the participants' prosody-syntax mapping with native speakers' data.

Results: The result of the production task indicates a significant correlation between proficiency and prosody-syntax mapping. For example, ambiguous "throw the ball in the basket behind the curtain" could be prosodically disambiguated by more than half of the B2 learners, while most of the A2 learners could hardly prosodically disambiguate them.

Figure 1 shows how the above ambiguous utterance was prosodically disambiguated to mean taking out a ball in the basket and then throw it over the curtain. Overall, the native speakers used pauses, vowel lengthening, and pitch changes to effectively signal prosodic boundaries. The B2 learners tended to depend on pauses. The A2 learners' pauses were placed too randomly to signal the boundaries. In addition, the range of pitch by A2 and B2 learners was by far narrower than the native speakers' pitch.

These facts indicate that although using pauses seems relatively easy to acquire, prosodic cues uncommon in the learners' first language (Japanese, in this study) such as pitch changes are difficult to learn and use for disambiguation.

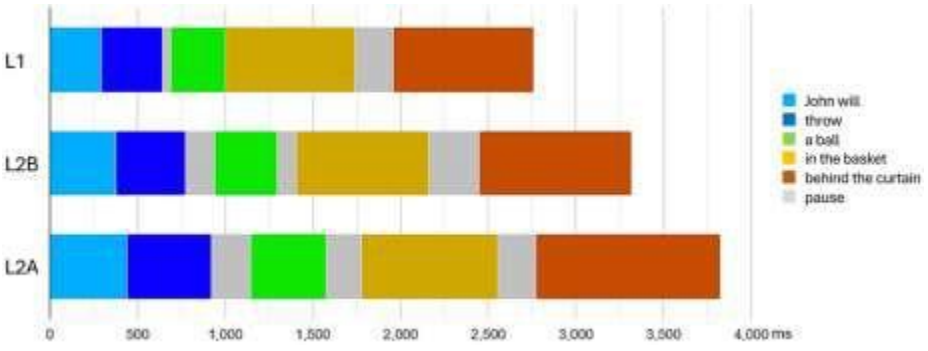

Figure 1. Time course for the target utterance

Pitch control in focus structures

Methods: Out of the 31 A2 learners in Part 2, 17 students joined a weekly English course for three months and then took writing and speaking tests. The speaking test was an interview-style exam based on one of the units in the coursebook. The students were asked to read aloud a passage, which begins with a focus-sensitive sentence, and orally answer the questions about the topic discussed in the passage.

The interview was audio-recorded, and the recorded sound files in MP3 format were analyzed for prosodic features using *Praat* (version 6.1.50). The students' pronunciation was rated on a scale from 1 to 5 according to clarity and fluency, and for a comparison purpose, the data were divided into better speech samples (Group A, n=9) and others (Group B, n=8), respectively.

Results: Figure 2 illustrates the waveform and pitch of the sentence pronounced by a female speaker of American English. The pitch curve shows a sharp rise and fall on a focused word *plants*. More importantly, there is a clear V-shaped rise-fall-rise on *isn't just*. The pitch ranges from 142.8 to 497.5 Hz, which is remarkably wider than the pitch by other two learner's groups.

Figure 3 shows the speech data of a female learner in Group A. There is a tendency in this group that a contrast of *plants* is slightly emphasized within the limited pitch range from 87.5 to 216.6 Hz. The whole sentence was read as fast as the native speaker's sample, which means that the learners in Group A could acquire sufficient fluency to read out in a smooth flow without unnecessary pauses.

To summarize, the comparison of pitch data (B Group omitted) shows that the pitch range of upper A2 learners of English is narrower than a native speaker's and the ability of pitch use varies among them. The learners with relatively high prosodic skills are able to control pitch to express focused information, while the ones with low prosodic skills are unable to control pitch nor read aloud smoothly.

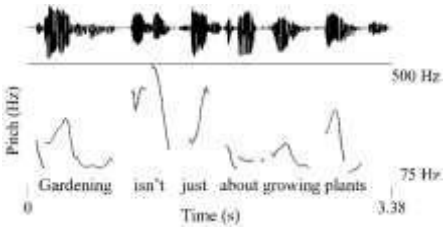

Figure 2. The speech data of a female speaker of American English.

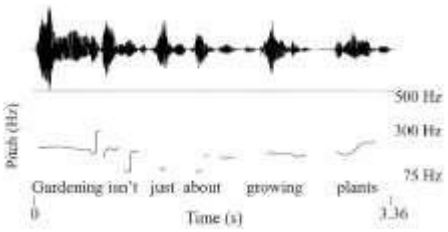

Figure 3. The speech data of a female participant in the A-samples

Discussion and implications

The production task in Part 1 shows that L2 learners can make limited use of prosodic cues such as pauses. The follow-up lessons and interview assessment in Part 2 suggests that pitch is learnable to mark focus structures even though its range is not as wide as native speakers' pitch. If the pitch change in a focused construction "not just A (but) B" is visualized for a publication purpose, I will illustrate it in a simple, easy-to-read fashion as follows:

is just plapeo
Gardening n't about growing nts, it's about growing ple

This study has two implications for learning and linguistic theory. A pedagogical implication is that since prosody-syntax mapping is more challenging to acquire than syntax itself, one of keys towards more proficient second language users is to learn how to put phonological chunks to their analyzable structures. Another implication from a theoretical perspective is that the findings in Part 1 supports Grillo and Turco's (2016) proposal by providing empirical evidence of prosodic disambiguation of prepositional phrases at different structural height.

Acknowledgements

This research was supported by JSPS KAKENHI Grant No. 23K00687 "Structuring second language prosody from the syntax-phonology interface perspectives". I am grateful to my students for data collection and to my colleagues for their help as native speaker informants.

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