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Editorial: The production of speech sounds across languages

What is the phonological unit used in speech production?

Speaking comes so effortlessly to us that we sometimes even forget how complicated it is. We need to go from a thought to planning and producing our speech. In doing so, we must use correct grammar, appropriate speech sounds (phonology), and finally use our muscles to adjust the airflow through our speech production system to produce clear utterances. This is especially remarkable if one considers that this all happens in a couple of hundred milliseconds. Although the construction of speech sounds (phonology) as a topic by itself has received ample consideration in the past, little attention has been paid so far to whether this process occurs similarly for each language.

In one of the most cited models of language production (Levelt, Roelofs, & Meyer, 1999), it was typically assumed that speech sounds are constructed by incrementally clustering phonemes into syllables. In other words, to build the sound for the word "dog," one places the letters /d/, /o/ and /g/ one-by-one in a syllable. Evidence for this assumption comes from research which made use of the so-called implicit priming paradigm (Meyer, 1990, 1991; Roelofs, 1998). These authors showed that for words that share their initial sounds onset priming (i.e., facilitation) is observed (e.g., loner, level, list), but this was not true when they shared their rime (e.g., murder, ponder, boulder).

In contrast, using the same paradigm, Chen, Chen, and Dell (2002) and O'Seaghdha, Chen, and Chen (2010) showed that overlap smaller than a syllable (e.g., /ma/ and /mo/) did not have an effect on speech processing in Mandarin Chinese. Similarly, in Japanese using implicit and masked priming paradigms (Kureta, Fushimi, & Tatsumi, 2006; Verdonschot et al., 2011), it was shown that only when minimally a mora (e.g., /ka/ but not just /k/) overlapped could significant priming effects be observed. These results seem to indicate that the way we construct speech sounds (phonology), or the unit which is involved in this process, may differ per language. As such, it has become clear that existing models of language production should take into account differences between languages. In addition, there are still many outstanding questions, such as whether bi- or multilingual speakers would have different units for each of their languages or whether, for instance, the smallest unit would always prevail. This special issue of *Japanese Psychological Research* showcases several high-quality empirical studies and two comprehensive reviews in order to encourage the debate on how phonology is built across the world's languages.

Highlights of the articles

This special issue starts out with a comprehensive review and interpretation of the existing literature by Padraigh O'Séaghdha (2015), including recent developments such as the "sustained attention view" (O'Séaghdha & Frazer, 2014). He also concisely summarizes and interprets the significance of several of the articles found in this special issue. This article provides an excellent start for those who are unfamiliar with the topic, as well as in-depth information for those who are familiar with it. Subsequently,

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five empirical research papers, which include exciting new data, are presented.

Wong and Chen (2015), using a picture-word interference task, showed subsyllabic priming for Cantonese Chinese when the picture name and the distracter shared more than one identical phonemic segment (regardless of the place of overlap). Additionally, they found that the effect was larger when the tone also overlapped between the picture and the distracter's name. Similarly, using a masked priming paradigm, Verdonschot, Lai, Chen, Tamaoka, and Schiller (2015) also obtained subsyllabic priming for Mandarin Chinese (i.e., when onset + vowel were shared between prime and target). However, for both studies (i.e., Cantonese and Mandarin) pure onset overlap did not yield reliable facilitation.

On another note, Chen and Chen (2015) sought to investigate whether the "domain" of planning was different between Indo-European languages (e.g., English) and Mandarin Chinese. Recently, it has been (tentatively) found that the "domain" concerning phonological planning for English compound words would pertain to the whole word and not to its constituents (Jacobs & Dell, 2012). In this special issue, Chen and Chen similarly investigated whether multimorphemic Mandarin Chinese compound words are processed as a whole or whether preparation benefits could occur for compound words' constituents. Using an implicit priming paradigm in which participants were cued to say the second part of a disyllabic word, such as "jie" in: /lian2jie1/, /qiang3jie2/, /chai1jie3/, /zu1jie4/, Chen and Chen (2015) found preparation benefits indicating that each morpheme of a multimorphemic word may constitute a new starting point for phonological planning in Mandarin Chinese.

Concerning Japanese, Kureta, Fushimi, Sakuma, and Tatsumi (2015) investigated whether the particular type of script used in experimental setups may play an important role. In three experiments using the word-form preparation paradigm, they found that onset preparation is obtained neither when stimuli are presented in typical (nonsegmental) Japanese scripts (e.g., kanji and kana) nor when they are auditorily presented. However, when stimuli were transcribed into romanized Japanese (romaji) in the prompt-response learning phase a significant phoneme preparation effect was obtained, indicating that script does play an important role in the specific linkage between orthography and phonology.

Next, as it has previously been found that high-proficient Mandarin Chinese-English bilinguals show onset priming in their L2 and under specific conditions also in their L1 (Verdonschot, Nakayama, Zhang, Tamaoka, & Schiller, 2013), Ida, Nakayama, and Lupker (2015) investigated whether these results would also hold for high-proficient Japanese-English bilinguals. In two masked priming experiments Ida et al. found onset priming effects for participants' L2 (English), but no hint of onset priming for stimuli presented in participants' L1 (Japanese) except for a small effect in the error rates, which suggests that within typical Japanese word processing the native "mora" unit is used, even though these bilinguals were highly proficient in an alphabetic language such as English.

Lastly, Ardi Roelofs (2015) takes us on a grand tour through the route that phonological encoding in spoken word production takes according to the well-known Levelt et al. (1999) model of language production. He also points out how empirical data obtained from a variety of languages (ranging from Germanic languages to Chinese and Japanese) can be explained by the model, and additionally shows how novel computer simulations by WEAVER++ (for an introductory explanation concerning WEAVER++ in Japanese see Tamaoka, 2013) can account for the model's ability to encompass a large variety of different languages.

Conclusion

We believe that this special issue greatly influences and extends the ongoing debate on how phonology is constructed across the world's languages and we thank all authors for their generous and excellent contributions to this special issue.

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References

Chen, J.-Y., Chen, T.-M., & Dell, G. S. (2002). Word-form encoding in Mandarin Chinese as assessed by the implicit priming task. *Journal of Memory and Language*, *46*, 751–781.

Chen, T. M., & Chen, J. Y. (2015). The phonological planning in Mandarin spoken production of mono- and bimorphemic words. *Japanese Psychological Research*, *57*, 81–89.

Ida, K., Nakayama, M., & Lupker, S. (2015). The functional phonological unit of Japanese-English bilinguals is language dependent: Evidence from masked onset and mora priming effects. *Japanese Psychological Research*, *57*, 38–49.

Jacobs, C. L., & Dell, G. S. (2012). *The production of hotdog is not the production of hot and then dog*. Poster Session Presented at the Annual Meeting of the Psychonomic Society, Minneapolis, MN.

Kureta, Y., Fushimi, T., Sakuma, N., & Tatsumi, I. F. (2015). Orthographic influences on the word-onset phoneme preparation effect in native Japanese speakers: Evidence from the word-form preparation paradigm. *Japanese Psychological Research*, *57*, 50–60.

Kureta, Y., Fushimi, T., & Tatsumi, I. F. (2006). The functional unit of phonological encoding: Evidence for moraic representation in native Japanese speakers. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *32*, 1102–1119.

Levelt, W. J. M., Roelofs, A., & Meyer, A. S. (1999). A theory of lexical access in speech production. *Behavioral and Brain Sciences*, *22*, 1–75.

Meyer, A. S. (1990). The time course of phonological encoding in language production: The encoding of successive syllables of a word. *Journal of Memory and Language*, *29*, 524–545.

Meyer, A. S. (1991). The time course of phonological encoding in language production: Phonological encoding inside a syllable. *Journal of Memory and Language*, *30*, 69–89.

O'Séaghdha, P. G. (2015). Across the great divide: Proximate units at the lexical-phonological interface. *Japanese Psychological Research*, *57*, 4–21.

O'Séaghdha, P. G., Chen, J.-Y., & Chen, T.-M. (2010). Proximate units in word production: Phonological encoding begins with syllables in Mandarin Chinese but with segments in English. *Cognition*, *115*, 282–302.

O'Séaghdha, P. G., & Frazer, A. K. (2014). The exception does not rule: Attention constrains form preparation in word production. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *40*, 797–810.

Roelofs, A. (1998). Rightward incrementality in encoding simple phrasal forms in speech production: Verb-particle combinations. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *24*, 904–921.

Roelofs, A. (2015). Modelling of phonological encoding in spoken word production: From Germanic languages to Mandarin Chinese and Japanese. *Japanese Psychological Research*, *57*, 22–37.

Tamaoka, K. (2013). Mental lexicon and word processing: The model of WEAVER++. *Lexicon Forum*, *6*, 327–345. (In Japanese.)

Verdonschot, R. G., Kiyama, S., Tamaoka, K., Kinoshita, S., La Heij, W., & Schiller, N. O. (2011). The functional unit of Japanese word naming: Evidence from masked priming. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *37*, 1458–1473.

Verdonschot, R. G., Lai, J., Chen, F., Tamaoka, K., & Schiller, N. O. (2015). Constructing initial phonology in Mandarin Chinese: Syllabic or subsyllabic? A masked priming investigation. *Japanese Psychological Research*, *57*, 61–68.

Verdonschot, R. G., Nakayama, M., Zhang, Q.-F., Tamaoka, K., & Schiller, N. O. (2013). The proximate phonological unit of Chinese-English bilinguals: Proficiency matters. *PLoS ONE*, *8*, e61454.

Wong, A. W.-K., & Chen, H.-C. (2015). Processing segmental and prosodic information in spoken word planning: Further evidence from Cantonese Chinese. *Japanese Psychological Research*, *57*, 69–80.

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