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Introduction to the special issue on Japanese geminate obstruents

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Geminate obstruents (GOs) and so-called unaccented words are the two properties most characteristic of Japanese phonology and the two features that are most difficult to learn for foreign learners of Japanese, regardless of their native language. This special issue deals with the first of these features, discussing what makes GOs so difficult to master, what is so special about them, and what makes the research thereon so interesting.

GOs are one of the two types of geminate consonant in Japanese[1] which roughly corresponds to what is called 'sokuon' (促音). 'Sokon' is defined as a 'one-mora-long silence' (Sanseido *Daijirin* Dictionary), often symbolized as /Q/ in Japanese linguistics, and is transcribed with a small letter corresponding to /tu/ (っ or ッ) in Japanese orthography. Its presence or absence is distinctive in Japanese phonology as exemplified by many pairs of words, including the following (dots /. / indicate syllable boundaries).

(1)	sa.ki	'point'	vs.	sak.ki	'a short time ago'
	ka.ko	'past'	vs.	kak.ko	'paranthesis'
	ba.gu	'bug (in computer)'	vs.	bag.gu	'bag'
	ka.ta	'type'	vs.	kat.ta	'bought (past tense of 'buy')'
	to.sa	'Tosa (place name)'	vs.	tos.sa	'in an instant'

More importantly, 'sokuon' is an important characteristic of Japanese speech rhythm known as mora-timing. It is one of the four elements that can form a mora

[1] The other type of geminate consonant is geminate nasals, which phonologically consist of a coda nasal and the nasal onset of the following syllable, e.g., /am. ma/ [am:a] 'massage', /an. na/ [an:a] 'Anna'.

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but not a syllable in Japanese, the other three elements being the coda nasal and the second half of long vowels and diphthongs. Thus, the second word of each pair in (1) is three moras long as opposed to two moras and is one and a half times as long as the first word, according to the intuition of native speakers of the language. This distinction contributes to the distinction in syllable weight in Japanese phonology, distinguishing heavy (bimoraic) syllables from light (monomoraic) ones (Kubozono 1999).

Among the four moraic elements that cannot constitute a syllable on their own, 'sokuon' is the most unique and mysterious. It cannot stand word-finally and, more crucially, does not have an inherent quality of its own. It is usually realized as an inaudible pause corresponding to one-mora length when it appears before stops. Before fricatives, it is realized as a one-mora-long frication. Moreover, the notion of one-mora pause or frication cannot be defined in absolute values: thus, the closure duration of the single /k/ in /sa.ki/ in slow speech can be longer than that of the geminate /k/ in /sak.ki/ in fast speech (Hirata and Whiton 2005). In relation to this, vowels tend to be phonetically longer before GOs than before their single counterparts, contrary to the notion of closed syllable vowel shortening (Maddieson 1985) while vowels following GOs tend to be shorter than those following single consonants (Han 1994). These features make 'sokuon' quite difficult to master for foreign learners of Japanese (see, for example, Toda 2007 and Sonu et al. in this issue) and even for native speakers of the language (Ito and Tatsumi 1997). In phonetic studies, therefore, it is necessary to explore how GOs can be defined as opposed to their single counterparts. It is also interesting to ask why GOs are more likely to occur before obstruents than before nasals and approximants (e.g., /bit.to/ 'bit', /top.pu/ 'top' vs. /bi.ru/ 'building', /to.mu/ 'Tom'), before voiceless obstruents than before voiced ones (e.g., /kyap.pu/ 'cap' vs. /kya.bu/ 'cab'), and before stops than before fricatives (e.g., /bat.to/ 'bat' vs. /ba.su/ 'bus').

GOs in Japanese raise many interesting questions from phonological perspectives, too. GOs are abundant in loanwords and show some peculiar distributions (for more details, see the paper by Kubozono et al. in this issue). For example, voiceless obstruents in the coda of English words turn into GOs when they are adapted into Japanese, but this process is often blocked in non-final position. This is exemplified in (2):

(2)	/dok.ku/	'dock'	vs.	/do.ku.taa/	'doctor'
	/sek.ku.su/	'sex'	vs.	/se.ku.sya.ru/	'sexual'
	/fak.ku.su/	'fax'	vs.	/fa.ku.si.mi.ri/	'facsimile'
	/sak.ku.su/	'sax'	vs.	/sa.ki.so.fon/	'saxophone'

Likewise, voiceless fricatives exhibit some peculiar patterns of gemination in loanwords. Among voiceless fricatives, /s/ and /ʃ/ display contrastive behaviors with respect to consonant gemination, with the second fricative but not the first tending to be geminated, e.g., /ki.su/ 'kiss', /pa.su/ 'pass' vs. /puʃ.ʃu/ 'push', /su.maʃ.ʃu/ 'smash'. /f/ ([ɸ]) and /h/ ([h]) also show contrastive patterns in gemination, the latter fricative mostly coming from Dutch and German, e.g., /i.fu/ 'if', /pa.fu/ 'puff' vs.

/bah.ha/ ‘Bach’, /goh.ho/ ‘Gogh’, /mah.ha/ ‘Mach’. This picture is made more complicated by the fact that /s/ and /ɸ/ become prone to gemination in certain phonological contexts. For example, /s/ in non-final positions in English words is geminated in loanwords, e.g., /res.sun/ ‘lesson’, /ris.sun/ ‘listen’, /waf.fu.ru/ ‘waffle’ vs. /re.su/ ‘less’, /ri.su.to/ ‘list’, /pa.fu/ ‘puff’.

Moreover, fricatives and voiced stops in English codas suddenly become prone to gemination if they appear in syllables with a complex onset (Kawagoe and Takemura, in this issue). This is illustrated in (3):

(3)	/su.taf.fu/	‘staff, stuff’	vs.	/ta.fu/	‘tough’
	/su.nob.bu/	‘snob’	vs.	/no.bu/	‘knob’
	/fu.rag.gu/	‘flag’	vs.	/ra.gu/	‘lag’
	/fu.rog.gu/	‘frog’	vs.	/ro.gu/	‘log’

These facts as well as many other interesting facts remain mysteries in Japanese phonology. In addition to these phonetic and phonological questions, studies on GOs can shed new light on the major issues in other subfields of linguistic research. For example, how babies acquire GOs and the moraic status of GOs in their phonological development is a major issue in psycholinguistics. How the Japanese language acquired the moraic status of GOs and consequently mora-timed rhythm is an important question that remains unsolved in the historical linguistics of the language.

Having introduced the major issues pertaining to GOs in Japanese, let us look at the three papers included in this special issue. In the paper entitled ‘On the positional asymmetry of consonant gemination in Japanese loanwords’, Kubozono, Takeyasu, and Giriko examine phonetic and phonological reasons for the fact illustrated in (2) above, i.e., that voiceless obstruents in the coda of English words are generally geminated in the final position but not in non-final positions, e.g., /dok.ku/ ‘dock’ vs. /do.ku.taa/ ‘doctor’. They present experimental evidence in favor of phonetic factors, i.e., that it is not the phonological position per se but the phonetic (pitch and durational) differences between final and non-final syllables in the input English words that are responsible for the positional asymmetry observed in the adaptation patterns.

Kawagoe and Takemura’s paper, ‘Geminate perception of English-like words by Japanese native speakers’, addresses the question illustrated in (3), asking why the English coda consonant is geminated in words with a complex onset, e.g., /su.taf.fu/ ‘stuff’, but not in words with a simplex onset, e.g., /ta.fu/ ‘tough’. They conducted several phonetic experiments and concluded that the observed asymmetry cannot be attributed to the phonetic properties of the English words but to the phonological complexity of the onset structure.

Finally, in their paper entitled ‘Non-native perception and learning of phonemic length contrasts in spoken Japanese’, Sonu and her colleagues look at the difficulties involved in the acquisition of geminate/singleton distinctions by L2 learners of Japanese. Employing a perceptual experiment, they first report that native speakers of Korean identify consonant length contrast with a different strategy from native

speakers of Japanese, by relying on a fixed-length criterion instead of adapting to changes in speaking rate. They further indicate that perceptual training helps Korean learners learn a phonemic length contrast although it is still difficult for the learners to acquire native-like perceptual criteria.

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