Japanese has syllables: A reply to Labrune (2012)

Abstract

Labrune (2012b) proposes a syllable-less theory of Japanese, by reviving the traditional view that Japanese has no syllables and instead has only moras below feet. Labrune (2012b) argues that there is no phonetic or psycholinguistic evidence for the existence of syllables in Japanese. This reply summarizes previous experimental findings that demonstrate that Japanese does show evidence for syllables both phonetically and psycholinguistically. After the summary of previous studies, this reply also takes up a few phonological and theoretical issues that merit explicit response from the syllable proponent perspective, and concludes that Japanese does have syllables.

1 Introduction

In a provocative article, Labrune (2012b) argues that there is little phonetic or psycholinguistic evidence for syllables in Tokyo Japanese (henceforth Japanese), and that phonological phenomena which have been hitherto analyzed in terms of syllables can be reanalyzed by deploying a distinction between a "regular/full mora" and a "deficient/special mora". She concludes that Tokyo Japanese does not have syllables, and as a further theoretical consequence of this view, she argues that not all prosodic levels are universal, extending on the suggestions by Hyman (1985, 2008). Although this proposal is very thought-provoking and its theoretical consequence is an important one, it does miss some of the previous experimental findings about the existence of syllables in the prosodic organization of Japanese. Therefore, this reply article summarizes evidence that Japanese does show evidence for syllables both phonetically and psycholinguistically.[1] After the summary, this reply also addresses some of the phonological and theoretical issues which merit further discussion in Labrune (2012b) from the perspective of the syllable proponents.

The proposal by Labrune (2012b) is heavily influenced by the traditional Japanese grammar (known as *kokugogaku*), which "rehabilitat[es] the Japanese native linguistic tradition" (p. 114).

[1] Vance (2013), in his book review of Labrune (2012a), which advances the same syllable-less view of Japanese as Labrune (2012b), says "I look forward to seeing how syllable proponents will respond (p.171)." Here is a concrete attempt by one of the syllable proponents. See also Ito & Mester (in press), Kawahara (2012b) and Tanaka (2013) for other critical responses to the syllable-less theory of Japanese.

Similarly, this reply heavily relies on previous experimental research on Japanese phonetics and phonology. What this reply attempts to do is to amalgamate evidence from the previous literature that syllables do exist in the phonetic and phonological organization of Japanese, although some additional remarks will be made at the end of the reply regarding some phonological and theoretical issues.

2 Background

Since Japanese syllable structures are very simple, most of the time syllables and moras coincide (e.g. [ta] is both monomoraic and monosyllabic). Moras and syllables diverge in the case of heavy syllables, which contain two moras (e.g. [taa] with a long [aa] is monosyllabic, but bimoraic). Japanese has limited types of heavy syllables, as summarized in Table 1.[2]

Table 1: The four types of heavy syllables in Japanese.

Second part of the syllable	phonemic rep.	phonetic rep.	gloss
First half of geminate : /Q/	/ha**Q+p**uN/	[ha**pp**uɴ]	'excitement'
	/ha**Q+t**atu/	[ha**tt**atsu]	'development'
	/ha**Q+k**eN/	[ha**kk**eɴ]	'discovery'
	/ha**Q+s**aN/	[ha**ss**aɴ]	'diffuse'
Moraic nasal: /N/	/he**N**/	[he**ɴ]**	'strange'
	/he**N+p**aJ/	[he**mp**ai]	'to pour back'
	/he**N+d**a/	[he**nd**a]	'is strange'
	/he**N+k**a/	[he**ŋk**a]	'change'
Second part of long vowel: /R/	/oka**R**san/	[ok**aa**san]	'mother'
Second part of a diphthong: /J/	**/oJ/**	[**oi**]	'nephew'

The first type of heavy syllables is a syllable containing the first half of geminates, or long consonants (Kawagoe, to appear; Kawahara, to appear). The traditional label for the first half of geminate is /Q/ (called *sokuon* in the traditional Japanese grammar), a convention that Labrune (2012b) also deploys. This /Q/ archiphoneme completely assimilates to the following consonant, surfacing as a geminate consonant. For example, /ha**Q+t**atu/ is realized as [ha**tt**atsu].[3] In this example, /haQ/—or [hat]—is monosyllabic but bimoraic.

The second type of heavy syllables are those that contain a so-called moraic nasal, which is traditionally represented with /N/ (called *hatsuon* in the traditional grammar). Word-finally before

[2]This reply sets aside syllables preceding a devoiced vowel, as in [kasu̥] 'scam', because whether or not the syllable with a devoiced vowel loses its syllabicity resulting in resyllabification is a controversial matter (see e.g. Kondo 1997; Starr & Shih 2014; Tsuchida 1997; Vance 1987, 2008).

[3][t] is affricated in front of [u] in Japanese.

a pause, this consonant is arguably realized as a uvular nasal, [ɴ], without much oral constriction, although its exact phonetic realization is much debated (Okada 1999, Vance 1987, pp.37-39, Vance 2008, pp. 95-105). This moraic nasal assimilates to the following stop in terms of place of articulation, as shown in Table 1.[4] Again, a sequence like /haN/ is monosyllabic but bimoraic.

The third type of a heavy syllable contains a long vowel, where the second portion is phonemically labeled as /R/ (or /H/); /haR/ is realized as [haa]. The final type is a diphthong, a tautosyllabic sequence of two vowels—it is debatable which vowel sequences constitute a diphthong and which sequences constitute a hiatus in Japanese, but there is a general consensus that [ai] sequences are parsed into one syllable, thus forming a diphthong; see Kubozono (to appear) for recent discussion.

As Labrune (2012b) notes, most generative work assume the characterizations of heavy syllables reviewed in this section; i.e. those syllables in Table 1 that contain /Q/, /N/, /R/, and /J/ constitute one prosodic unit—one heavy syllable (e.g. Haraguchi 1996, 1999; Ito 1986, 1990; Ito & Mester 1992/2003, 1993, in press; Kubozono 1989, 1996, 1999a,b, 2003, 2011, to appear; Kubozono et al. 2008; McCawley 1968 among many others).[5]

Arguing against this commonly-held view in the generative tradition, Labrune (2012b) instead proposed to treat these heavy syllables as a sequence of a vowel (a full mora) and the following element (/Q/, /N/, /R/, /J/). The current paper refers to the this proposal by Labrune (2012b) as "the syllable-less theory" of Japanese. In essence, the syllable-less theory of Japanese decomposes heavy syllables into a sequence of two moras, doing away with the grouping of the two. One main basis of this proposal is the alleged lack of the interaction between the nucleus and the following element (/Q/, /N/, /R/, /J/). This paper thus starts with a review of the evidence that the vowel and the following tautosyllabic element do interact phonetically.

3 Phonetic evidence for heavy syllables in Japanese

One argument that is raised for the syllable-less theory of Japanese is the "[a]bsence of phonetic clues for the existence of a rhyme-like constituent" (Labrune, 2012b, p.120), where "a rhyme-like constituent" refers to the combination of a vowel and any of the following /Q/, /N/, /R/, and /J/. In other words, the claim put forth by Labrune (2012b) is that there is no phonetic interaction between the nucleus and the following /Q/, /N/, /R/ and /J/. However, existing evidence suggests that there is phonetic interaction between the the nucleus and the following tautosyllabic element, contrary

[4]The behavior of moraic nasals before fricatives is also debated. Vance (2008) says that it is realized as a nasalized dorso-velar approximant, [ɯ̃ɰ̃] (p.97). A recent EPG study by Kochetov (2014), however, shows that moraic nasals assimilate in place and stricture to the following fricatives, like pre-stop moraic nasals. The exact assimilative natures of moraic nasals in Japanese are irrelevant to the main point of this paper, however.

[5]As can be seen in this list, Haruo Kubozono should perhaps be given the most credit for establishing the existence of syllables in the prosodic organization of Japanese phonology. Contributions by Junko Ito and Armin Mester have also been significant and substantial.

to the claim by the syllable-less theory of Japanese.

First, phonetic experiments have revealed that the first part of geminates affects the quality and duration of the preceding vowel. Kawahara (2006) shows, for example, that f0 is higher before geminates than before singletons (when the preceding vowels are accented)—/Q/ raises f0 of the preceding vowel within the same syllable. Relatedly, Idemaru & Guion (2008) and Ofuka (2003) show that the fall in f0 due to pitch accent is greater across a geminate consonant than across a singleton consonant; i.e. the realization of pitch accent on the preceding vowel is affected by /Q/. Fukui (1978) reports that f0 falls toward geminates in the preceding vowels in unaccented words. These patterns instantiate a case in which the nucleus and the following tautosyllabic /Q/ interact.

Moreover, as acknowledged by Labrune (2012b), vowels are longer when followed by a geminate consonant (i.e. /Q/) than when followed by a singleton consonant (Campbell, 1999; Fukui, 1978; Han, 1994; Hirata, 2007; Idemaru & Guion, 2008; Kawahara, 2006; Port et al., 1987)—/Q/ lengthens its preceding vowel in the same syllable. Labrune (2012b) claims that this interaction does not instantiate a true phonetic interaction between the nucleus and the following tautosyllabic element, because we should expect shortening rather than lengthening (pp.120-121). However, pre-geminate lengthening is a phonetic interaction nevertheless, and not even a cross-linguistic anomaly, as other languages show similar pre-geminate lengthening: Finnish (Lehtonen, 1970, pp.110-111), Persian (Hansen, 2004), Shinhala (Letterman, 1994), and Turkish (Jannedy, 1995; Lahiri & Hankamer, 1988). Just because vowels lengthen, instead of shorten, in front of a geminate, it does not mean that a vowel and /Q/ do not interact. They do interact, and the way they interact is not even cross-linguistically strange (see Kawahara to appear for a recent review).

Likewise, vowels are longer before a moraic nasal (/N/) than in open syllables (Campbell, 1999, pp.34-35)—/N/ lengthens a preceding tautosyllabic vowel. The fact that both /Q/ and /N/ induce tautosyllabic vowel lengthening indicates that this lengthening is a general, syllable-based phenomenon. In other words, Japanese vowels are phonetically longer before a consonant within the same syllable. The syllable-less theory of Japanese cannot explain this observation.

There is yet another aspect in which a vowel and a moraic nasal interact. Campbell (1999) shows that the duration of a vowel and the duration of the following moraic nasal correlate negatively with each other—the longer the vowel, the shorter the consonant (pp.34-35). This phonetic interaction is a typical durational compensation effect, which is observed commonly across many languages (e.g. Broselow et al. 1997; Lehiste 1970; Port et al. 1980). Indeed, Campbell (1999) suggests that "[the negative correlation] is consistent with the view that they both occupy a space within the same higher-level framework, accommodating to each other to optimally fill this frame" (p.35)—the frame is the syllable (note that the title of Campbell's paper is, "A study of Japanese speech timing from the syllable perspective").

A vowel and the following /N/ interact not only in terms of duration, but also in terms of

quality. Vowels are nasalized before a nasal consonant within the same syllable (=/N/) in Japanese (Campbell, 1999; Vance, 1987; Starr & Shih, 2014; Vance, 2008, 2013), just as in English (Cohn, 1993), but this nasalisation does not occur across a syllable boundary: e.g. [hõn.da] 'Honda' vs. [ho.ne] 'bone'. As Vance (2013) points out, Labrune (2012a,b) acknowledges this coda-induced nasalization process explicitly: the phonetic representations in (4) in Labrune (2012b) show that nasaliaztion applies to the vowel only if the vowel and the nasal are in the same syllable. As Vance (2013) notes, it is somewhat puzzling why this coda-induced nasalization was not considered to constitute evidence for the phonetic interaction between the nucleus and the following tautosyllabic element.

Finally, there is also evidence that long vowels cannot be treated as a non-interacting sequence of two elements, a vowel and the following /R/, as in the syllable-less theory of Japanese. Hirata & Tsukada (2009) show that long vowels are generally more dispersed with each other in terms of first and second formants than short vowels. If the long vowels were represented simply as a sequence of a vowel and /R/, this dispersion effect remains unaccounted for. This dispersion effect cannot be relegated as a matter of a mechanical issue; i.e. speakers cannot reach the formant targets in short vowels because short vowels are too short for speakers to achieve their acoustic targets (Lindblom, 1963)—Hirata & Tsukada (2009) did not find a comparable dispersion effect when the speakers produced short vowels at a slower speaking rate. Therefore, the formant dispersion patterns of long vowels should be considered as a result of intentional articulatory control. In order to account for this observation, long vowels need to be treated as having different formant characteristics from short vowels. For this reason, long vowels cannot be treated as a mere sequence of a short vowel and /R/.

To complete the discussion on the phonetics of heavy syllables in Japanese, I know of no phonetic evidence for syllables containing diphthongs. This is partly because /VJ/ sequence is syllabified monosyllabically as [.Vi.] within a morpheme, and heterosyllabic parsing occurs across a morpheme boundary; i.e. [.V.#.i] (see Kubozono to appear). Therefore, the effect of syllable boundary is confounded by the effect of a morpheme boundary. In addition, the phonetic boundaries between any two vowels are very difficult to locate with precision because of their spectral continuity, and therefore, it is next to impossible to reliably measure, for example, the duration of [V] next to [i] (Turk et al., 2006).[6]

Setting aside the case of diphthongs, in summary, there is a non-negligible set of phonetic evidence for the interaction between the nucleus and the following tautosyllabic element, suggesting that Japanese has syllables. At the very least, the claim that there is no phonetic evidence for the

[6]Though not discussed in Labrune (2012b), Labrune (2012a) states that in a sequence of two vowels, "there is no significant gradual change of the quality of the first vowel towards the second one...contrary to what generally occurs with diphthongs in other languages" (p. 54), suggesting that two vowel sequences in Japanese are phonetically "more separable" than those in other languages. Kawahara (2012b) argues through spectrogram and waveform inspection that this claim is perhaps not well supported.

interaction between a vowel and the following /Q, N, R/ is not correct.

4 Psycholinguistic evidence for syllables in Japanese

Labrune (2012b) makes a very strong statement that "none of the many psycholinguistic studies which have been conducted has been able to establish the cognitive reality of the syllable in Japanese" (p.120). While it is true that the dominant segmentation pattern by Japanese speakers is mora-based (e.g. Otake et al. 1993),[7] this statement by Labrune (2012b) is too strong, and this section reviews evidence that falsifies this claim.

First, Inagaki et al. (2000) report an experiment which addresses the issue of whether Japanese speakers make use of syllables in their speech segmentation. Since the Japanese kana-orthography is mora-based in that one letter usually corresponds to one mora (see Labrune 2012a: Chapter 1), speech segmentation pattern by adult speakers is substantially influenced by this mora-based writing system. Inagaki et al. (2000) thus tested the effect of literacy acquisition on speech segmentation.

Their task was a "vocal-motor" task in which Japanese-speaking children made a counting gesture as they produced stimulus words, in this particular experiment by moving a doll on a sequence of circles. For example, a word like [kurejoɴ] 'crayon' can be counted with three gestures if they are segmented in terms of syllables ([ku.re.joɴ]), but with four gestures if they are segmented in terms of moras ([ku-re-jo-ɴ]). They found that Japanese children show mixture of syllable-based parsing and mora-based parsing, and that as they learn Japanese orthography, the mora-based parsing becomes more dominant. This experiment shows that the dominance of mora-based parsing is partly due to the Japanese orthography.

Proponents of the syllable-less theory may suggest that how Japanese pre-literate children show segmental parsing effects is not relevant to the organization of adult Japanese prosody; after all, adults speakers do show dominant mora-based segmental parsing patterns, after they learn the Japanese orthographic system (e.g. Otake et al. 1993, among others). However, if there is no evidence for syllables in the phonetics and phonology of Japanese, how do Japanese-learning children acquire syllable-based parsing? In other words, if Japanese is entirely syllable-less, where does the syllable-based parsing pattern come from? One could argue that the syllable-based parsing pattern may come from the innate, universal mechanism/bias rather than from learning the phonetics and phonology of Japanese. However, this universalist view of syllables is exactly what is argued

[7] The work by Otake and his colleagues was influential in establishing the role of moras in Japanese speech segmentation. In later work, however, they weakened their view that moras play a dominant role in early speech processing in Japanese: "Our results indicate no role for morae in early spoken-word processing; we propose that rhythmic categories constrain not initial lexical activation but subsequent processes of speech segmentation and selection among word candidates." (Cutler & Otake, 2002, p.296)

against by Labrune (2012a,b).

Moreover, even adult speakers show evidence for syllable-based segmentation patterns. To address the question of whether syllables affect the speech planning by Japanese speakers, Tamaoka & Terao (2004) visually presented two types of stimuli: (i) trisyllabic, trimoraic nonce words (CVCVCV), and (ii) disyllabic, trimoraic nonce words (CVXCV where X is /Q/, /N/, /R/, or /J/). The task was to pronounce the visually presented words as quickly as possible. The results show that the disyllabic stimuli showed shorter naming latencies than trisyllabic stimuli, despite the fact that both types of the stimuli had three moras. Tamaoka & Terao (2004) conclude that "syllabic units are...used for naming tasks requiring phonological production" (p.20). Tamaoka & Makioka (2009) replicated this finding, further showing that CVXCV disyllabic nonce words induced both shorter naming latencies and lower error rates than CVCVCV trisyllabic nonce words.

Nakamura & Kolinksy (2013) used a dichotic listening task to show the relevance of syllables in the speech perception by Japanese listeners. In this task, two different sounds were simultaneously presented to listeners—one sound to the left ear and the other to the right ear. It has been shown for languages other than Japanese that in such a dichotic listening paradigm, a sound or a sound unit can "migrate" from one ear to another (Kolinsky & Morais, 1996; Kolinksy et al., 1995). Nakamura & Kolinksy (2013) show that this migration can occur at the syllable level in Japanese; for example, when listeners are presented with /geN.ru/ to one ear and /haJ.do/ to the other ear, they can report to have heard /geN.do/ 'limit' and /haJ.ru/ 'to enter'. The illusionary migration can occur at the syllabic level—/geN/ and /haJ/ can switch with one another.

Finally, Labrune (2012b) mentions that "[t]he mora is the metric unit of Japanese verse in poetry and singing" (p. 116). This is indeed a commonly-held view, and Japanese *haiku* is a famous example in which metrical units are based on moras. However, here too again, the story is not this simple, and syllables can and do play a role: a recent study by Starr & Shih (2014) shows that Japanese speakers can associate a heavy syllable to one musical note, suggesting syllables, in addition to moras, can be a unit that is relevant to text-setting in poetry. There in fact has been a body of work which show the role of syllables in musical text-setting in various types of Japanese songs and poetry (Kubozono, 1999a; Manabe, 2009; Sugito, 1998; Tanaka, 2000, 2012) (all cited and discussed by Starr & Shih 2014).

All in all, it may appear at first glance that moras are so important in psychological segmentation in Japanese, so much so that the role of syllable is hard to see. Under careful experimentation, however, the role of syllables becomes clear. Needless to say, I am not denying the role of moras in the speech segmentation of Japanese. Moras surely do play a role, but so do syllables.

5 Other remarks

Although the focus of this reply is the phonetic and psycholinguistic evidence for syllables in Japanese, I would like to respond to a few points regarding Japanese phonology that Labrune (2012b) makes.

As Ito & Mester (in press) point out, the reanalyses of syllable-based phenomena by Labrune (2012b) are recasting the distinction between head moras and non-head moras in syllable theory with "full moras" and "deficient moras": to borrow the own words of Ito and Mester, "by eschewing the syllable, proponents of the syllable-less theory must posit different types of moras with different properties, recapitulating syllable theory in a different terminology, but unfortunately within a network of assumptions entirely specific to Japanese." (quoted from the unpublished ms version, p11). Therefore the reanalyses by Labrune (2012b) show that the patterns previously analyzed with syllables *can* be analyzed without syllables, but it is not necessarily the case that they *must* be, and Labrune (2012b) herself carefully seems to admit this point.[8] For this reason, the experimental evidence reviewed above should suffice to support the evidence for syllables in Japanese.[9]

Nevertheless I believe that there are a few phonological and theoretical issues which would merit explicit response from the proponents of the syllables in Japanese, which I take up on in this section. See also Ito & Mester (in press), Kawahara (2012b) and Tanaka (2013) for other reactions against the syllable-less theory of Japanese.

5.1 The lack of onset optimization

Labrune (2012b) argues that Japanese lack "onset optimization" (p.121-122), and this constitutes evidence for the lack of syllables. What is meant by the "the lack of onset optimization" is lack of resyllabification across a morpheme boundary, or what is more generally known as "onset maximization" (Clements & Keyser, 1983; Ito, 1986; Prince & Smolensky, 1993/2004; Steriade,

[8]For example, when Labrune (2012b) discusses initial lowering patterns (p.123), she says that the syllable-based analysis "does not have more explanatory power than" the syllable-less theory, but she avoids saying that the syllable-less explanation is *better*. Moreover, at the end of section 4, she says "this [syllable-less] analysis is not uncontroversial—some readers might still feel that...[some of the phenomena discussed in the paper] make a case for the syllable, or that the cost of accepting that some languages might lack syllables would be too high for phonological theory in particular and for the theory of universals in general (p.134)".

[9]Besides the alleged lack of phonetic and psycholinguistic evidence for syllables, which have already been addressed in sections 3 and 4 of this reply, there are two more points that Labrune (2012b) raised against the existence of syllables in Japanese. First, Labrune (2012b) cites Poser (1990) and argues that it is problematic that syllable boundaries and foot boundaries may not coincide (p.122). In footnote 9, however, it is acknowledged that this problem disappears once a certain assumption, which is a plausible one, is made. Second, Labrune (2012b) argues that speech errors are dominantly mora-based rather than syllable-based (p.120). However, the second example cited by Labrune (2012b) ([ʤ**uu**go paasento] as [ʤ**uŋ**go paasento] 'fifteen percent') can be considered to be syllable-based—it thus does not seem to be the case that syllable-based speech error patterns are impossible.

1982). Contrary to the asserted lack of onset maximization, Japanese does usually maximize onsets, so that underlying sequences like /arigatoR/ 'thank you' is syllabified as [a.ri.ga.too] rather than [ar.ig.at.oo]. Japanese even shows evidence for resyllabification across a morpheme boundary in verbal inflection patterns of stems that end with a consonant (Ito & Mester, in press), as shown in Table 2. In this sense, Japanese do maximize onsets and avoid codas.

Table 2: Resyllabification and onset maximization in Japanese verbal inflectional paradigms.

	morpheme composition	syllabification	gloss
negative	/na**k+a**nai/	[na.**ka**.nai]	'not cry'
polite	/na**k+i**masu/	[na.**ki**.ma.su]	'cry (polite)'
non-past	/na**k+u**/	[na.**ku**]	'cry'
conditional	/na**k+e**ba/	[na.**ke**.ba]	'if cry'
volitional	/na**k+o**o/	[na.**koo**]	'let's cry'

What Labrune (2012b) discusses is the lack of syllabification across a stem boundary in Sino-Japanese compounds; e.g. /aN/ 'safe'+/i/ 'easy' is syllabified as [ãN.i], rather than [a.ni] (Ito & Mester, 1996, in press; Kurisu, 2000). However, the prohibition against resyllabification across a compound boundary is hardly surprising: it is a cross-linguistically well-observed alignment effect, in which syllable boundaries and compound boundaries are required to be aligned with each other (McCarthy & Prince, 1993).

5.2 On phonological minimality

One argument that has been advanced for the role of syllables in Japanese comes from the prosodic minimality requirement (Ito, 1990; Ito & Mester, 1992/2003, in press). The observation is that in loanword truncation, words can be truncated to disyllabic, bimoraic forms ([demonsutoreeʃoɴ] → [demo] 'demonstration'), but not to monosyllabic, bimoraic forms; when the initial syllables of the base forms are heavy, the truncated form takes an extra light syllable (e.g. [maikuroɸooɴ] → [maiku], *[mai] 'microphone' and [paamanento] → [paama], *[paa] 'permanent (hair style)'). This truncation pattern shows that Japanese prosodic minimality is defined based on the number of syllables in addition to the well-known bimoraic requirement—one syllable, despite being bimoraic, is too small (Ito, 1990; Ito & Mester, 1992/2003, in press).

Labrune (2012b) discusses this pattern (p.126-128), and argues that this apparent prohibition against a monosyllabic forms should instead be attributed to a general ban on heavy syllables (or /N/, /R/ or /J/ in the syllable-less theory) at the end of a prosodic word. This argument, however, faces an empirical problem, because when compounds are truncated with an additional morpheme, truncated forms can end with a heavy syllables (e.g. [kuso] + [geemu] → [kuso**gee**] 'crappy game'

and [araundo] + [saatii] → [ara**saa**] 'around thirty'). No examples of bi-morpheme truncation that I know of take an extra light syllable when they end with a heavy syllable, unlike mono-morphemic truncation (i.e. *[arasaati]). To eschew this problem, Labrune (2012b) argues that different principles operate on mono-morphemic truncation patterns and bi-morphemic truncation patterns.

However, the syllable-based minimality explanation is superior in that it automatically explains why bi-momorphic truncated compounds can end in heavy syllables, without postulating that mono-morphemic truncation and bi-morphemic truncation are governed by different principles: bi-morphemic compounds can result in heavy syllables, because one morpheme can supply enough material so that the minimality requirement is already satisfied.[10]

5.3 On the Occam's razor argument

Ultimately, it is hard to prove the absence of anything (though see Gallistel 2009). Labrune (2012b) fully acknowledges this difficulty: "Of course, lack of positive evidence does not automatically provide negative evidence, but it should at least lead us to question the initial postulate that Japanese is a syllable language (p.119)." Behind this logic is Occam's razor—everything else being equal, we should not posit a theoretical device, here syllables, unless there is explicit need to do so.[11] This reply article argued throughout that there is indeed evidence, both phonetic and psycholinguistic, to posit syllables, but even if these arguments were not to hold, it is important to bear in mind that everything else is *not* being equal.

To be concrete, from the perspective of language acquisition, it would be simpler if learners can start the language acquisition process with the assumption that every language has syllables; it eliminates their task of discerning whether the target language has syllables or not (see Ito & Mester 2007, 2012, 2013; Kawahara 2012a; Kawahara & Shinya 2008; Selkirk 2005 for related discussion; cf. Hyman 1985, 2008 which are discussed by Labrune 2012b). Another argument is that a linguistic theory which does not admit language-specificity in terms of prosodic levels is more restrictive. As Ito & Mester (2007) succinctly put it, "[a] universal hierarchy cannot easily admit language-specific gaps" (p.97), and there have been attempts to establish a universal theory of prosodic hierarchy in the face of language-specific patterns (Ito & Mester, 2007, 2009, 2012, 2013; Kawahara & Shinya, 2008; Selkirk, 2005, 2011). I do not mean to imply that these conceptual arguments alone should suffice to assume the universality of syllables; it is intended as a

[10] One remaining observation to be accounted for is the lack of light-light-heavy (LLH) forms in the mono-morphemic truncation pattern (Labrune, 2002). However, it is questionable as to whether there are many base forms in the first place that are long enough so that truncation results in light-light-heavy forms.

[11] On p.119, where the relevant quote is discussed, Labrune (2012b) does not explicitly mention Occam's Razor. An explicit reference to Occam's Razor appears on p.139, however. As discussed below, Occam's Razor argumentation should be used with caution in linguistic theorization in general, because it is barely the case that everything else is the same—eliminating one theoretical apparatus often has non-negligible consequences elsewhere.

warning against the use of Occam's razor argumentation in this context.

6 Conclusion

In conclusion, Japanese has syllables. There is evidence for syllables from both phonetic and psycholinguistic point of view. Phonological consideration also suggests that Japanese has syllables. Although the syllable-less theory of Japanese phonetics and phonology is very thought-provoking, evidence remains that Japanese has syllables.

References

Broselow, Ellen, Su-I. Chen, & Marie Huffman (1997) Syllable weight: Convergence of phonology and phonetics. *Phonology* **14**: 47–82.

Campbell, Nick (1999) A study of Japanese speech timing from the syllable perspective. *Onsei Kenkyu [Journal of the Phonetic Society of Japan]* **3**(2): 29–39.

Clements, Nick & Samuel Jay Keyser (1983) *CV Phonology: A Generative Theory of the Syllable*. Cambridge: MIT Press.

Cohn, Abigail (1993) Nasalisation in English: Phonology or phonetics. *Phonology* **10**: 43–81.

Cutler, Anne & Takashi Otake (2002) Rhythmic categories in spoken-word recognition. *Journal of Memory and Language* **46**(2): 296–322.

Fukui, Seiji (1978) Nihongo heisaon-no encho/tanshuku-niyoru sokuon/hisokuon toshite-no chooshu [Perception for the Japanese stop consonants with reduced and extended durations]. *Onsei Gakkai Kaihou [Phonetic Society Reports]* **159**: 9–12.

Gallistel, Randy C. (2009) The importance of proving the null. *Psychological Review* **116**(2): 439–453.

Han, Mieko (1994) Acoustic manifestations of mora timing in Japanese. *Journal of the Acoustical Society of America* **96**: 73–82.

Hansen, Benjamin B. (2004) Production of Persian geminate stops: Effects of varying speaking rate. In *Proceedings of the 2003 Texas Linguistics Society Conference*, Augustine Agwuele, Willis Warren, & Sang-Hoon Park, eds., Somerville: Cascadilla Press, 86–95.

Haraguchi, Shosuke (1996) Syllable, mora and accent. In *Phonological Structure and Language Processing: Cross-Linguistic Studies*, Takeshi Otake & Anne Cutler, eds., Berlin: Mouton de Gruyter, 45–75.

Haraguchi, Shosuke (1999) Accent. In *The Handbook of Japanese Linguistics*, Natsuko Tsujimura, ed., Oxford: Blackwell, 1–30.

Hirata, Yukari (2007) Durational variability and invariance in Japanese stop quantity distinction: Roles of adjacent vowels. *Onsei Kenkyu [Journal of the Phonetic Society of Japan]* **11**(1): 9–22.

Hirata, Yukari & Kimiko Tsukada (2009) Effects of speaking rate and vowel length on formant frequency displacement in Japanese. *Phonetica* **66**(3): 129–149.

Hyman, Larry (1985) *A Theory of Phonological Weight*. Dordrecht: Foris.

Hyman, Larry M. (2008) Universals in phonology. *The Linguistic Review* **25**: 83–137.

Idemaru, Kaori & Susan Guion (2008) Acoustic covariants of length contrast in Japanese stops. *Journal of International Phonetic Association* **38**(2): 167–186.

Inagaki, Kayoko, Giyoo Hatano, & Takashi Otake (2000) The effect of kana literacy acquisition on the speech segmentation unit used by Japanese young children. *Journal of Experimental Child Psychology* **75**: 70–91.

Ito, Junko (1986) *Syllable Theory in Prosodic Phonology*. Doctoral dissertation, University of Massachusetts, Amherst.

Ito, Junko (1990) Prosodic minimality in Japanese. In *Proceedings of Chicago Linguistic Society: Parasession on the Syllable in Phonetics and Phonology*, Michael Ziolkowski, Manual Noske, & Karen Deaton, eds., Chicago: Chicago Linguistic Society, 213–239.

Ito, Junko & Armin Mester (1992/2003) Weak layering and word binarity. In *A New Century of Phonology and Phonological Theory*, Takeru Homma, Masao Okazaki, Toshiyuki Tabata, & Shin-Ichi Tanaka, eds., Tokyo: Kaitakusha, 26–65.

Ito, Junko & Armin Mester (1993) Licensed segments and safe paths. *Canadian Journal of Linguistics* **38**(2): 197–213.

Ito, Junko & Armin Mester (1996) Stem and word in Sino-Japanese. In *Phonological Structure and Language Processing: Cross-Linguistic Studies*, T. Otake & A. Cutler, eds., Speech Research Series 12, Berlin: Mouton de Gruyter, 13–44.

Ito, Junko & Armin Mester (2007) Prosodic adjunction in Japanese compounds. *Proceedings of Formal Approaches to Japanese Linguistics* **4**: 97–112.

Ito, Junko & Armin Mester (2009) The onset of the prosodic word. In *Phonological Argumentation*, Steve Parker, ed., London: Equinox, 227–260.

Ito, Junko & Armin Mester (2012) Recursive prosodic phrasing in Japanese. In *Prosody Matters*, Toni Borowsky, Shigeto Kawahara, Takahito Shinya, & Mariko Sugahara, eds., London: Equinox Publishing, 280–303.

Ito, Junko & Armin Mester (2013) Prosodic subcategories in Japanese. *Lingua* **124**: 20–40.

Ito, Junko & Armin Mester (in press) Word formation and phonological processes. In *The Handbook of Japanese Language and Linguistics: Phonetics and Phonology*, Haruo Kubozono, ed., Mouton.

Jannedy, Stephanie (1995) Gestural phasing as an explanation for vowel devoicing in Turkish.

Ohio State University Working Papers in Linguistics **45**: 56–84.

Kawagoe, Itsue (to appear) Phonology of sokuon, or geminate obstruents. In *The Handbook of Japanese Language and Linguistics: Phonetics and Phonology*, H. Kubozono, ed., Mouton de Gruyter.

Kawahara, Shigeto (2006) A faithfulness ranking projected from a perceptibility scale: The case of [+voice] in Japanese. *Language* **82**(3): 536–574.

Kawahara, Shigeto (2012a) The intonation of nominal parentheticals in Japanese. In *Prosody Matters: Essays in honor of Elisabeth Selkirk*, Toni Borowsky, Shigeto Kawahara, Takahito Shinya, & Mariko Sugahara, eds., London: Equinox, 304–340.

Kawahara, Shigeto (2012b) A review of The Phonology of Japanese. *Phonology* **29**(3): 540–548.

Kawahara, Shigeto (to appear) The phonetics of *sokuon*, obstruent geminates. In *The Handbook of Japanese Language and Linguistics: Phonetics and Phonology*, Haruo Kubozono, ed., Mouton.

Kawahara, Shigeto & Takahito Shinya (2008) The intonation of gapping and coordination in Japanese: Evidence for Intonational Phrase and Utterance. *Phonetica* **65**(1-2): 62–105.

Kochetov, Alexei (2014) Japanese in the typology of nasal place assimilation: Electropalatographic evidence. Talk presented at FAJL 7.

Kolinksy, Régine, José Morais, & M. Cluytens (1995) Intermediate representations in spoken word recognition: Evidence from word illusions. *Journal of Memory and Language* **34**: 19–40.

Kolinsky, Régine & José Morais (1996) Migrations in speech recognition. *Language and Cognitive Processes* **11**: 611–619.

Kondo, Mariko (1997) *Mechanisms of vowel devoicing in Japanese*. Doctoral dissertation, University of Edinburgh.

Kubozono, Haruo (1989) The mora and syllable structure in Japanese: Evidence from speech errors. *Language and Speech* **32**: 249–278.

Kubozono, Haruo (1996) Syllable and accent in Japanese: Evidence from loanword accentuation. *The Bulletin (Phonetic Society of Japan)* **211**: 71–82.

Kubozono, Haruo (1999a) Kayoo-ni okeru moora-to onsetsu [The syllable and mora in song]. In *Bunpou-to Onsei [Speech and Grammar]*, Speech and Grammar Study Group.

Kubozono, Haruo (1999b) Mora and syllable. In *The Handbook of Japanese Linguistics*, Natsuko Tsujimura, ed., Oxford: Blackwell, 31–61.

Kubozono, Haruo (2003) The syllable as a unit of prosodic organization in Japanese. In *The Syllable in Optimality Theory*, Caroline Fery & Ruben van der Vijver, eds., Cambridge: Cambridge University Press., 99–122.

Kubozono, Haruo (2011) Japanese pitch accent. In *The Blackwell companion to phonology*, Marc van Oostendorp, Colin J. Ewen, Elizabeth Hume, & Keren Rice, eds., Oxford: Blackwell-Wiley, 2879–2907.

Kubozono, Haruo (to appear) Diphthong. In *The Handbook of Japanese Language and Linguistics: Phonetics and Phonology*, Haruo Kubozono, ed., Mouton.

Kubozono, Haruo, Junko Ito, & Armin Mester (2008) Consonant gemination in Japanese loanword phonology. In *Current Issues in Unity and Diversity of Languages. Collection of Papers Selected from the 18th International Congress of Linguists*, The Linguistic Society of Korea, ed., Republic of Korea: Dongam Publishing Co, 953–973.

Kurisu, Kazutaka (2000) Richness of the base and root-fusion in Sino-Japanese. *Journal of East Asian Linguistics* **9**: 147–185.

Labrune, Laurence (2002) The prosodic structure of simple abbreviated loanwords in Japanese: a constraint-based account. *Onsei Kenkyu [Journal of the Phonetic Society of Japan]* **6**(1): 98–120.

Labrune, Laurence (2012a) *The phonology of Japanese*. Oxford: Oxford University Press.

Labrune, Laurence (2012b) Questioning the universality of the syllable: Evidence from Japanese. *Phonology* **29**(1): 113–152.

Lahiri, Aditi & George Hankamer (1988) The timing of geminate consonants. *Journal of Phonetics* **16**: 327–338.

Lehiste, Ilse (1970) *Suprasegmentals*. Cambridge: MIT Press.

Lehtonen, Jaakko (1970) *Aspects of Quantity in Standard Finnish*. Jyvaeskylaessae: Osakeyhtioen kirjapainossa.

Letterman, Rebecca S. (1994) A phonetic study of Sinhala syllable rhymes. *Working Papers of the Cornell Phonetics Laboratory* **9**: 155–181.

Lindblom, Björn (1963) Spectrographic study of vowel reduction. *Journal of the Acoustical Society of America* **35**: 1773–1781.

Manabe, Noriko (2009) *Western music in Japan: The evolution of styles in children's songs, hip-hop and other genres*. Doctoral dissertation, City University of New York.

McCarthy, John J. & Alan Prince (1993) Generalized alignment. In *Yearbook of Morphology*, Geert Booij & Jaap van Marle, eds., Dordrecht: Kluwer, 79–153.

McCawley, James D. (1968) *The Phonological Component of a Grammar of Japanese*. The Hague: Mouton.

Nakamura, Miyoko & Régine Kolinksy (2013) Multiple functional units in the preattenative segmentation of speech in Japanese: Evidence from word illusions. *Language and Speech* .

Ofuka, Etsuko (2003) Sokuon /tt/-no chikaku: Akusento gata-to sokuon/hisokuongo-no onkyooteki tokuchoo niyoru chigai [Perception of a Japanese geminate stop /tt/: The effect of pitch type and acoustic characteristics of preceding/following vowels]. *Onsei Kenkyu [Journal of the Phonetic Society of Japan]* **7**(1): 70–76.

Okada, Hideo (1999) Japanese. *Tha Handbook of the Ineternational Phonetic Association* : 117–

119.

Otake, Takashi, Giyoo Hatano, Anne Cutler, & Jacques Mehler (1993) Mora or syllable? Speech Segmentation in Japanese. *Journal of Memory and Language* **32**: 258–278.

Port, Robert, Salman Al-Ani, & Shosaku Maeda (1980) Temporal compensation and universal phonetics. *Phonetica* **37**: 235–252.

Port, Robert, Jonathan Dalby, & Michael O'Dell (1987) Evidence for mora timing in Japanese. *Journal of the Acoustical Society of America* **81**: 1574–1585.

Poser, William (1990) Evidence for foot structure in Japanese. *Language* **66**: 78–105.

Prince, Alan & Paul Smolensky (1993/2004) *Optimality Theory: Constraint Interaction in Generative Grammar*. Malden and Oxford [originally circulated in 1993 as ms. University of Colorado and Rutgers University]: Blackwell.

Selkirk, Elisabeth (2005) Comments on Intonational Phrasing in English. In *Prosodies: With Special Reference to Iberian Languages*, Sónia Frota, Marina Vigário, & Maria João Freitas, eds., Berlin: Mouton de Gruyter, 11–58.

Selkirk, Elisabeth O. (2011) The syntax-phonology interface. In *The Handbook of Phonological Theory, 2nd Edition*, John Goldsmith, Jason Riggle, & Alan Yu, eds., Oxford: Blackwell-Wiley, 435–484.

Starr, Rebecca L & Stephanie S. Shih (2014) The syllable as a prosodic unit in Japanese lexical strata: Evidence from text-setting. Ms. National University of Singapore and University of California, Merced. (Also talk presented at LabPhon 14).

Steriade, Donca (1982) *Greek Prosodies and the Nature of Syllabification*. Doctoral dissertation, MIT.

Sugito, Miyoko (1998) *Nihongo onsei no kenkyu 5: "hana" to "hana" [Studies on Japanese Phonetics 5]*. Osaka: Izumi Shoin.

Tamaoka, Katsuo & Shogo Makioka (2009) Japanese mental syllabary and effects of mora, syllable, bi-mora and word frequencies on Japanese speech production. *Language and Speech* **52**(1): 79–112.

Tamaoka, Katsuo & Yasushi Terao (2004) Mora or syllable? Which unit do Japanese use in naming visually presented stimuli? *Applied Psycholinguistics* **25**(1): 1–27.

Tanaka, Shin-Ichi (2000) Nihonkayookyoku-ni okeru rizumu-no hensen [The changing rhythm of Japanese popular songs]. *Proceedings of the 14th meeting of the Phonetic Society of Japan* : 153–158.

Tanaka, Shin-Ichi (2012) Syllable neutralization and prosodic unit in Japanese Senryu poems. Talk presented at Metrics, Music and Mind, Rome.

Tanaka, Shin-Ichi (2013) Review of Labrune, Laurence (2012) *The Phonology of Japanese*, Oxford University Press, 320p. *Onsei Kenkyu [Journal of the Phonetic Society of Japan]* **17**(1): 70–80.

Tsuchida, Ayako (1997) *Phonetics and Phonology of Japanese Vowel Devoicing*. Doctoral dissertation, Cornell University.

Turk, Alice, S. Nakai, & Mariko Sugahara (2006) Acoustic segment durations in prosodic research: A practical guide. In *Methods in Empirical Prosody Research*, Stefan Sudhoff, Denisa Lenertova, Roland Meyer, Sandra Pappert, Petra Augurzky, Ina Mleinek, Nicole Richter, & Johannes Schliesser, eds., Berlin: Walter de Gruyter, 1–27.

Vance, Timothy (1987) *An Introduction to Japanese Phonology*. New York: SUNY Press.

Vance, Timothy (2008) *The Sounds of Japanese*. Cambridge: Cambriedge University Press.

Vance, Timothy (2013) Book review: The Phonology of Japanese. *Lingua* **123**: 168–174.