

# Japanese /r/ is not feature-less: A rejoinder to Labrune (2014)

## Abstract

Labrune (2014) argues that Japanese /r/ is structurally empty. This reply argues that the phonological characteristics of /r/ which are discussed by Labrune (2014) come with many systematic exceptions, and hence they are better handled in terms of violable constraints. Alternative analyses based on Optimality Theory (Prince & Smolensky, 1993/2004) are presented. This reply also points out that the three constraints on /r/ that are discussed by Labrune (2014) are in fact not specific to /r/, and therefore, motivating structural emptiness based on these patterns would face a problem of not being able to distinguish these segments. Based on these considerations, this reply concludes that /r/ (and other segments) should have segmental contents.

## 1 Introduction

Labrune (2014) argues that Japanese /r/ is “phonologically empty” (p. 1). Building on previous studies making use of the underspecification theory (e.g. Mester & Ito 1989), Labrune (2014) goes so far as to say that /r/ is “totally featureless at the abstract level” (p.14). This reply article reviews some of the evidence that is discussed in Labrune (2014), and shows that the behavior of /r/ actually shows that it has features.<sup>1</sup> In particular, this paper argues that the phonological characteristics of /r/ which are discussed by Labrune (2014) come with many systematic exceptions, and hence should instead be handled in terms of violable constraints. To provide explicit accounts of the behaviors of /r/ using violable constraints,

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<sup>1</sup>Although some pieces of evidence in Labrune (2014) come from patterns of Old Japanese and historical developments of /r/, Labrune (2014) makes it explicit that the same argument holds for Modern Japanese—that Japanese /r/ is synchronically structurally empty (p.2). The current reply is exclusively about the synchronic phonology of Modern Japanese, and has nothing to say about the diachronic natures of /r/.

Labrune (2014) also argues that /r/ is unmarked (pp.13-14). This reply remains neutral about this claim—/r/ may or may not be unmarked in Japanese phonology. This reply instead focuses on the claim that /r/ is structurally empty.

alternative analyses in terms of Optimality Theory (Prince & Smolensky, 1993/2004) are presented.

In addition, this reply also points out that the three constraints on /r/ that are discussed by Labrune (2014) are in fact not specific to /r/, and therefore, motivating structural emptiness based on these patterns would face a problem of not being able to distinguish these segments. Based on these considerations, this reply concludes that /r/ (and other segments) should have segmental contents, at least to the degree that these segments can be distinguished from each other.

While the specific aim of this reply is to reexamine the arguments presented in Labrune (2014), this reply can also be understood in the broader context of the debate about whether some segmental behaviors should be understood in terms of underspecification or (violable) constraints. Labrune (2014) argues that /r/ is in a sense a special segment in Japanese, and attempts to explain its behavior in terms of the underspecification theory (Archangeli, 1988). This reply instead uses violable constraints to explain the behaviors of /r/. (As stated in footnote 1, this reply remains neutral about the markedness of /r/, and focuses on the claim that it is structurally empty.) For other arguments against the underspecification theory of special segmental behaviors (such as those of coronals: Paradis & Prunet 1991), of which Labrune (2014) is an example, see Gafos & Lombardi (1999), Kurisu (2000), McCarthy & Taub (1992), McCarthy (1994, 2002), Prince & Smolensky (1993/2004), Steriade (1995) among others.

## 2 Resistance to gemination

First, Labrune (2014) points out, citing Mester & Ito (1989), that Japanese does not allow geminates of /r/, and uses this observation to suggest that Japanese /r/ is structurally empty (pp.8-9). However, it is not only /r/, but approximants in general, which cannot be geminated in the phonology of Japanese, as exemplified below in (1) (Kawagoe, to appear; Kawahara, 2012, to appear; Kawahara et al., 2011).

- (1) Lexical geminates in Japanese
  - a. /katta/ ‘bought’ vs. /kata/ ‘frame’
  - b. /isso/ ‘if so’ vs. /iso/ ‘beach’
  - c. /konna/ ‘such’ vs. /kona/ ‘power’
  - d. \*/korra/
  - e. \*/kowwa/
  - f. \*/kojja/

Labrune’s (2014) account of the resistance against gemination in terms of structural emptiness would not be able to distinguish between /r/, /w/ and /j/ in Japanese—one would have to assume that all of these segments are structurally empty, which is not desirable, because we would not be able to distinguish these segments. Instead, these segments need to have segmental specifications, at least enough so that all of these segments can be distinguished from each other. The prohibitions against these types of geminates are better accounted for in terms of constraints against /rr/ and glide geminates: \*/rr/, \*/ww/, and \*/jj/.<sup>2</sup>

Moreover, gemination of /r/ is possible in emphatic gemination patterns (Aizawa, 1985; Kawahara, 2001, 2013; Nasu, 1999), as in (2). Geminate /rr/ also appears in some loanwords, particularly in those from Arabic and Italian, which themselves have liquid geminates, as shown in (3).

(2) /rr/ created by emphatic gemination

- a. /karrui/ ‘very light’
- b. /zurruui/ ‘very cunning’
- c. /hirroi/ ‘very spacious’

(3) /rr/ in loanwords

- a. /arraa/ ‘Allah’
- b. /diaberri/ ‘Diabelli’
- c. /morutaderra/ ‘mortadella’

One may consider these geminates of /r/ to be “marginal” in the sense that they are found only in the emphatic conditions and some loanwords; however, the fact that they can

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<sup>2</sup>This reply assumes that there are distinctive constraints against /r/-geminates and glide geminates for the reason that is stated below; however, nothing hinges on this assumption—it may as well be that a constraint that is active in Japanese phonology is a general constraint, \*APPROXIMANTGEMINATE. One reason to assume distinct constraints for /rr/ and glide geminates is because they may have different phonetic groundings. Gemination and /r/ are inherently mutually incompatible in the sense that /r/ is a short segment in Japanese (Campbell, 1992; Sagisaka & Tohkura, 1984) and gemination requires that the consonant be long (Kawahara, to appear); making /r/ a trill may satisfy both of these conflicting requirements, but a trill comes with its own articulatory difficulty (Solé, 2002). When Japanese speakers pronounce geminate /rr/ as in (2) and (3), impressionistically speaking, they often make a sound that is similar to a lateral geminate [ll]. On the other hand, the prohibitions against glide geminates may be attributed to their confusability with corresponding singletons (Kawahara, 2012; Kawahara et al., 2011; Podesva, 2000, 2002).

This paper throughout touches on phonetic grounding of the constraints deployed in the analyses, but whether or not the constraints are phonetically motivated does not affect the argument of this paper. Explicit discussion of phonetic grounding of phonological constraints, I believe, makes the constraints more plausible (see e.g. Hayes & Steriade 2004; Kager 1999; Myers 1997). However, I fully acknowledge that not everyone accepts this view (see e.g. Blaho 2008 and Hale & Reiss 2000). I reiterate that the arguments of this paper would hold even if none of the constraints are phonetically-motivated.

appear at all shows that the resistance of /r/ against gemination is better handled by a violable constraint \*/rr/.

For the sake of illustration, I illustrate how this violable constraint would work in Optimality Theory (Prince & Smolensky, 1993/2004), in which constraints are violable.<sup>3</sup> Let  $\text{MAX}(\mu)$  be a faithfulness constraint that prohibits mora-deletion or degemination (see McCarthy & Prince 1995 for the initial formulation of the MAX constraint). Let us posit a specific rendition of this faithfulness constraint for emphatic environments,  $\text{MAX}(\mu)_{\text{emph}}$  (for morphologically-specific constraints, see, e.g., Benua 1997; Ito & Mester 1999, 2003, 2008; Kurisu 2005; Pater 2000, 2010). If the ranking  $\text{MAX}(\mu)_{\text{emph}} \gg */rr/ \gg \text{MAX}(\mu)$  holds, then geminate /rr/ is allowed only in the emphatic forms, as illustrated in the tableaux in (4) and (5):

- (4) \*/rr/  $\gg$   $\text{MAX}(\mu)$ : no geminate /rr/

/arra/	$\text{MAX}(\mu)_{\text{emph}}$	*/rr/	$\text{MAX}(\mu)$
→ /ara/			*
/arra/		*!	

- (5)  $\text{MAX}(\mu)_{\text{emph}} \gg */rr/$ : geminate /rr/ allowed in emphatic forms

/karui+ $\mu_{\text{emph}}$ /	$\text{MAX}(\mu)_{\text{emph}}$	*/rr/	$\text{MAX}(\mu)$
/karui/	*!		*
→ /karrui/		*	

The structure-based theory of the lack of /rr/ is not able to handle these exceptional appearance of /rr/.<sup>4</sup>

As Labrune (2014) discusses (p.9) (see also Kuroda 1965, Mester & Ito 1989 and Kawahara 2006), glides and /r/ pattern differently in the context of /ri/-suffixation. The suffix /-ri/ causes gemination of root-final consonants (e.g. /patta-ri/ ‘stopped’); when the root final consonants are glides, a coda nasal is inserted instead (e.g. /bonya-ri/ ‘absent-mindedly’), whereas neither gemination nor nasal insertion occurs when the root-final consonant is /r/ (e.g. /koro-ri/ ‘rolling’). To account for this difference between /r/ and glides, in addition to \*/rr/, there needs to be some constraint that prohibits an /nr/ sequence; for example, it could be a constraint that is grounded on the phonetic difficulty of implementing a ballistic tongue gesture for /r/ after the oral closure of a nasal. Whatever the nature of this

<sup>3</sup>It would be possible to model the Japanese patterns in other models of grammar which deploy violable constraints, such as Harmonic Grammar (Legendre et al., 1990; Pater, 2009, to appear) or MaxEnt Grammar (Goldwater & Johnson, 2003; Hayes & Wilson, 2008). This reply uses Optimality Theory because it is probably best-known—Labrune (2014) presents an Optimality-Theoretic analysis to derive the quality of /r/ from its structural emptiness as well (pp. 16-21). The crucial point here is the *violability* of constraints.

<sup>4</sup>Not being able to easily accommodate exceptions is a general problem for structural explanations of phonological patterns (McCarthy, 2002; Padgett, 1995, 2002; Pater, 2000).

constraint is, it is important to note that this constraint too is violable, as Japanese has many lexical items with /nr/ sequences (e.g. /kon**n**ran/ ‘confusion’ and /kon**n**raddo/ ‘Conrad’). Attempting to derive the prohibition against /nr/ from the structural emptiness of /r/ (Labrune 2014, p.9) cannot explain these exceptions.

In relation to this argument based on lack of geminate /rr/, Labrune (2014) argues that /r/ fails to trigger assimilation, and this is because “there is simply nothing in its phonological structure to assimilate” (p. 9). However, since assimilating to /r/ would result in /rr/, which is independently prohibited, this lack of assimilation triggered by /r/ cannot be considered as an additional argument for the structural emptiness of /r/. Moreover, all the examples of assimilation provided on page 9 of Labrune (2014), which supposedly show the lack of assimilation to /r/, have /r/ as the first consonant and another consonant as the second consonant (e.g. /wakar**a**nai/ → /wakar**n**ai/ → /wakar**n**nai/ ‘not know’). However, it is independently known that assimilation in VC<sub>1</sub>C<sub>2</sub>V clusters always results in VC<sub>2</sub>C<sub>2</sub>V, never in VC<sub>1</sub>C<sub>1</sub>V (see Jun 1995, 2003, 2004; Ohala 1990 and also McCarthy 2008; Wilson 2001 for a similar observation in consonant cluster simplification). Therefore, the argument based on the lack of assimilation to /r/ is doubly-confounded.

### 3 Resistance to palatalization

Another argument that is put forth for the emptiness of structural content for /r/ is the fact that /r/ does not undergo palatalization process in mimetic forms. In Japanese mimetics, palatalization expresses “uncontrolledness”, and where this palatalization occurs is arguably determined by phonological considerations (Hamano, 1986; McCarthy, 2003; Mester & Ito, 1989; Zoll, 1997). While whether the loci of palatalization can really be determined phonologically is much debated (Alderete & Kochetov, 2009; Schourup & Tamori, 1992), one point that is clear is that /r/ does indeed resist palatalization (Alderete & Kochetov, 2009). However, this avoidance of palatalization does not support the structural emptiness of /r/. As Kurisu (2009) notes, a constraint against palatalized /r/ is cross-linguistically motivated (Hall, 2000; Rose, 1997), and has an articulatory basis as well—the tongue tip gesture required for /r/ may be articulatorily incompatible with the tongue dorsum raising required for palatalization (Recasens, 1990; Recasens & Espinosa, 2006).

An argument for the account of the lack of palatalized /r/ in terms of violable constraints comes from the fact that palatalized /r/ does indeed appear in many lexical items, especially in Sino-Japanese items. Some minimal pairs from Sino-Japanese words/stems are shown in (6):

- (6) Minimal pairs in terms of palatalization on /r/

- a. /**rj**aku/ ‘abbreviation’ vs. /raku/ ‘easy’
- b. /**rj**oku/ ‘green’ vs. /roku/ ‘six’
- c. /**rj**oo/ ‘amount’ vs. /roo/ ‘prison’
- d. /**rj**o/ ‘travel’ vs. /ro/ ‘road’ (both bound morphemes)

Palatalized /r/ is most often found in Sino-Japanese words (Moreton et al., 1998; Moreton & Amano, 1999), but some non-Sino-Japanese words with palatalized /r/ are also found both in native words (e.g. and ) and loanwords, as in (7) and (8)

- (7) Yamato items containing /rj/
  - a. /**rj**aa/ ‘if (casual)’
  - b. /toor**j**anse/ ‘don’t pass (song lyric)’
  - c. /**rj**uu-to/ ‘conspicuously dressed’
- (8) Loanwords containing /rj/
  - a. /**ry**uumati/ ‘Rheumatism’
  - b. /**ry**ukku/ ‘backpack’
  - c. /**ry**uuto/ ‘lute’

These examples yet again show that the resistance to palatalization is better expressed in terms of a violable constraint, which is operative in the formation of palatalized forms in the mimetics phonology,<sup>5</sup> but is violated elsewhere, at least in the Sino-Japanese phonology, but presumably also in other sectors of Japanese phonology.

Again, to illustrate this analysis, an Optimality Theoretic analysis follows (see Kurisu 2009 for a fuller analysis of mimetic palatalization within Optimality Theory). We posit \*/rj/, a constraint against palatalized /r/, which is cross-linguistically independently motivated (see above). This constraint is operative in determining the locus of palatalization in mimetic forms, as in (9).

- (9) \*/rj/ determines the location of /j/ in mimetic forms

/noronoro+j/ ‘slow’	*/rj/
→ /njoro-njoro/	
/norjo-norjo/	*!

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<sup>5</sup>This constraint is operative in the mimetic phonology to the extent that the palatalized word formation is phonological (see Schourup & Tamori 1992 for arguments that this palatalization is not really phonological, as it comes with many lexical irregularities, both semantically and phonologically). It is at least true, however, that /rj/ is underrepresented in the mimetics phonology (Alderete & Kochetov, 2009).

This markedness constraint, however, is dominated by a faithfulness constraint, MAX(pal) (McCarthy & Prince, 1995), which protects underlying palatalization. As a result, forms like /rjoku/ surface faithfully. This constraint ranking is illustrated in (10).

(10) IDENT(pal)  $\gg$  \*/rj/ protects underlying palatalization on /r/

/rjoku/	MAX(pal)	*/rj/
→ /rjoku/		*
/roku/	*!	

If /r/ were phonologically completely empty on the other hand, then it would not be able to support the palatalization feature in the Sino-Japanese phonology at all.

Another important point to be noted about Japanese phonology is that /r/ is not the only segment that resists palatalization. Indeed, nowhere in the Japanese phonology do we find palatalized labial glide, /wj/. An attempt to explain the lack of palatalization in terms of structural emptiness would not be able to distinguish /r/ and /w/.

## 4 Prohibition in word-initial position

As Labrune (2014) points out (pp.3-4), Japanese /r/ cannot appear word-initially, at least in native words (also known as “Yamato” words) (Tateishi, 1990). However, this prohibition against /r/ in word-initial positions does not constitute evidence for its structural emptiness in and of itself. Rather, in order to state the constraint, it is more natural to assume that /r/ has phonological contents, and a constraint prohibits those phonological contents word-initially. Based on an extensively cross-linguistic survey, Flack (2007, 2009) finds an array of phonological elements that can be prohibited in word/phrase-initial positions in natural languages (e.g. [h], [ʔ], [ŋ], rhotics, and glides—see also Smith 2002) and it would be unrealistic to assume that these kinds of elements all lack phonological structures.

Moreover, yet again, prohibition against word-initial /r/ comes with exceptions; this constraint is violated in Sino-Japanese words and loanwords. See (6) above for Sino-Japanese examples; some examples from loanwords are given in (11):

(11) Loanwords beginning with /r/

- a. /**r**uuto/ ‘root’
- b. /**r**emon/ ‘lemon’
- c. /**r**aamen/ ‘ramen’
- d. /**r**entaru/ ‘rental’

A violable constraint offers a way to express the restricted prohibition against word-initial /r/ in Yamato-words.<sup>6</sup> Following, Ito & Mester (1999, 2003, 2008), we can posit stratum-specific faithfulness constraints; for the sake of illustration, let them be  $\text{MAX}_{\text{Foreign}}$  and  $\text{MAX}_{\text{Yamato}}$ . The ranking  $\text{MAX}_{\text{Foreign}} \gg * \text{INITIAL}/r/ \gg \text{MAX}_{\text{Yamato}}$  would get us the right outcome, as shown in the tableaux in (12) and (13):<sup>7</sup>

(12)  $\text{MAX}_{\text{Foreign}} \gg * \text{INITIAL}/r/$ : Initial /r/ is allowed for foreign items

/raamen/ <sub>Foreign</sub>	$\text{MAX}_{\text{Foreign}}$	*INITIAL/r/	$\text{MAX}_{\text{Yamato}}$
→ /raamen/		*	
/aamen/	*!		

(13)  $* \text{INITIAL}/r/ \gg \text{MAX}_{\text{Yamato}}$ : Initial /r/ is not allowed for Yamato items

/riki/ <sub>Yamato</sub>	$\text{MAX}_{\text{Foreign}}$	*INITIAL/r/	$\text{MAX}_{\text{Yamato}}$
/riki/		*!	
→ /iki/			*

Furthermore, like the restrictions on gemination and palatalization, /r/ is not the only segment that is prohibited in the native phonology of Japanese; voiced obstruents are also prohibited word-initially in Japanese (Kuroda, 2002; Martin, 1987; Tanaka & Yashima, 2013). To the extent that we need to distinguish voiced obstruents and /r/—which we indeed do—the prohibition against /r/ in word-initial position cannot be used for an argument for its structural emptiness—that would entail that both /r/ and voiced obstruents are structurally empty, which is not desirable.<sup>8</sup>

## 5 Some remarks on other arguments

Before closing this reply, some remarks on other arguments presented in Labrune (2014) are in order. First, Labrune (2014) points out that phonetic realizations of /r/ in Japanese vary

<sup>6</sup>A constraint against word-initial /r/ can be grounded on the possible articulatory difficulty of initiating a ballistic gesture for /r/ word-initially. See also Flack (2005) for various restrictions on word-initial liquids in other languages, and discussion of possible phonetic grounding (see also Steriade 2001 and Smith 2002 for related discussion).

<sup>7</sup>This analysis assumes that deletion is the repair strategy to avoid word-initial /r/ in the native phonology, but other repair strategies are of course possible. The Richness of the Base hypothesis (Kurusu, 2000; McCarthy, 2002; Prince & Smolensky, 1993/2004; Smolensky, 1996) requires us that we posit an underlying form with an initial /r/ even for Yamato words, and that such words do not surface faithfully.

<sup>8</sup>There are exceptions to word-initial prohibition against voiced obstruents (e.g. /damas-u/ ‘to deceive’), but there are exceptions to word-initial prohibition against /r/ as well (/risu/ ‘squarrel’; see also footnote 3 of Labrune 2014). See Tanaka & Yashima (2013) for the experimental evidence for the psychological reality of word-initial prohibition against voiced obstruents in native Japanese phonology. As far as I know, there are no psycholinguistic studies on the prohibition against word-initial /r/.



substantially across phonetic contexts, dialects, and speech styles. I do not disagree with this observation. Phonetic variability of segments, however, in and of itself does not mean that that structure is phonologically empty. For example, as shown in Table 1 (adapted from Kingston & Diehl 1994), [+voice] in English is realized differently phonetically across phonetic contexts—for example, there is much voicing during closure intervocalically, but not word-initially or word-finally (Kingston & Diehl, 1994; Lisker, 1986). However, this phonetic variability is not usually taken to be evidence that English [+voice] is phonologically empty.

Table 1: Variable phonetic realizations of English [+voice] consonants. Adapted from Kingston and Diehl (1994: 427)

	[+voice]
utterance-initial or pre tonic	shorter lag VOT F <sub>1</sub> lower F <sub>0</sub> lower weaker burst
intervocalic or posttonic	closure voicing shorter closure longer preceding vowel F <sub>1</sub> lower F <sub>0</sub> lower
utterance-final or postvocalic	longer preceding vowel closure voicing possible shorter closure F <sub>1</sub> lower

In general, it is not unusual for one phonological segment to receive different phonetic realizations across different phonetic context—the variability often appears exaggerated when speech style differences and dialectal differences are taken into consideration. In short, /r/ is not special in receiving various phonetic realizations (see Kingston et al. 2012 for a more recent discussion on this issue).

Labrune (2014) also argues that /r/ is epenthetic<sup>9</sup>—to the extent that /r/ is phonologically contentless and there are mechanisms to fill its content, this observation makes sense,

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<sup>9</sup>Whether /r/ can be epenthetic in Japanese or in any other languages in general is debatable (see de Lacy 2006; Lombardi 2002; Staroverov 2014), although I do not have strong arguments against this view from Japanese (though see Kawahara 2003 for an argument that Japanese resolves hiatus by glide insertion of /j/ and /w/, depending on the quality of the first vowel). One point to note, however, is that evidence from verbal inflection patterns, used by Labrune (2014) (pp.10-12), probably should not be used for phonological argumentation, because “phonological” changes in verbal inflection patterns in Japanese are not replicated with nonce words (Batchelder, 1999; Griner, 2001; Vance, 1987, 1991), and it is likely that Japanese speakers store all the inflected verbal patterns in their memories (see also Kobayashi et al. 2012 on neurolinguistic insights on this issue).

because epenthesis can simply insert an empty phonological slot, and the rest can be taken care of by taking a “free-ride” (McCarthy, 2005) of default feature insertion mechanisms. This view of epenthetic segments was in fact not uncommon (Archangeli, 1984; Abaglo & Archangeli, 1989; Ito, 1986), when the underspecification theory was widely accepted, but has been much argued against, based on the fact that epenthetic segments in some languages are not completely phonologically inert (Davis, 1995; Steriade, 1995).

Third, Labrune (2014) states that /r/ is unstable, citing some sporadic examples in which /r/ is deleted or inserted (synchronically or diachronically) (p. 7). However, this argument is based on sporadic examples, and /r/ is not the only segment that is deleted or inserted sporadically (e.g. /kawai/ → /kaai/ ‘cute’, /daia/ → /daija/ ‘diamond’, and /ideru/ → /deru/ ‘to get out’).

Finally, Labrune (2014) uses vowel coalescence across /r/ in the Ryukyuan languages in an attempt to support the phonological emptiness of /r/ in (Standard) Japanese. However, it is dangerous to use data from one dialect to argue for a phonological nature of a structure in another dialect, let alone from a different language—Ryukyuan and Japanese were separated apart during the first few centuries AD (Pellard, to appear), and it would be a stretch to assume that they still retain the same phonological system.

## 6 Conclusion

Three restrictions on /r/ discussed by Labrune (2014) all come with exceptions, suggesting that these restrictions are better expressed in terms of violable constraints. The three restrictions are also not exclusively about /r/, and the structural account fails to account for these observations. Alternative analysis making use of violable constraints are better suited to model the phonological characteristics of /r/ in Japanese.

## References

- Abaglo, P. & Diana Archangeli (1989) Language particular underspecification: Gengbe /e/ and Yoruba /i/. *Linguistic Inquiry* **20**: 457–480.
- Aizawa, Yoshiko (1985) Intensification by so-called “choked sounds”—long consonants—in Japanese. In *The Study of Sounds 21*, The Phonetic Society of Japan, ed., 313–324.
- Alderete, John & Alexei Kochetov (2009) Japanese mimetic palatalization revisited: Implications for conflicting directionality. *Phonology* **26**(3): 369–388.
- Archangeli, Diana (1984) *Underspecification in Yawelmani Phonology and Morphology*. Doctoral dissertation, Massachusetts Institute of Technology, published 1988, Outstanding Dissertations in Linguistics Series, Garland, New York.
- Archangeli, Diana (1988) Aspects of underspecification theory. *Phonology* **5**: 183–208.

- Batchelder, Eleanor Olds (1999) Rule or rote? Native-speaker knowledge of Japanese verb inflection. *Proceedings of the Second International Conference on Cognitive Science* .
- Benua, Laura (1997) *Transderivational Identity: Phonological Relations between Words*. Doctoral dissertation, University of Massachusetts, Amherst.
- Blaho, Sylvia (2008) *The syntax of phonology: A radically substance-free approach*. Doctoral dissertation, University of Tromsø.
- Campbell, Nick (1992) Segmental elasticity and timing in Japanese. In *Speech Perception, Production and Linguistic Structure*, Y. Tohkura, E. V. Vatikiotis-Bateson, & Y. Sagisaka, eds., Ohmsha, 403–18.
- Davis, Stuart (1995) Emphasis spread in Arabic and Grounded Phonology. *Linguistic Inquiry* **26**: 465–498.
- de Lacy, Paul (2006) *Markedness: Reduction and Preservation in Phonology*. Cambridge: Cambridge University Press.
- Flack, Kathryn (2005) Lateral acoustics and phonotactics in Australian languages. In *University of Massachusetts Occasional Papers in Linguistics 31: Papers in Experimental Phonetics and Phonology*, Kathryn Flack & Shigeto Kawahara, eds., Amherst: GLSA, 37–58.
- Flack, Kathryn (2007) *The Sources of Phonological Markedness*. Doctoral dissertation, University of Massachusetts, Amherst.
- Flack, Kathryn (2009) Constraints on onsets and codas of words and phrases. *Phonology* **26**(2): 269–302.
- Gafos, Adamantios & Linda Lombardi (1999) Consonant transparency and vowel echo. In *Proceedings of NELS 29, vol. 2: papers from the poster sessions*, Pius Tamanji, Mako Hirotani, & Nancy Hall, eds., Amherst, MA: GLSA, Department of Linguistics, University of Massachusetts, 81–95.
- Goldwater, Sharon & Mark Johnson (2003) Learning OT constraint rankings using a maximum entropy model. *Proceedings of the Workshop on Variation within Optimality Theory* : 111–120.
- Griner, Barry (2001) *Productivity of Japanese verb tense inflection: A case study*. MA thesis, University of California Los Angeles.
- Hale, Mark & Charles Reiss (2000) “Substance abuse” and “dysfunctionalism”: Current trends in phonology. *Linguistic Inquiry* **31**: 157–169.
- Hall, Alan T. (2000) Typological generalizations concerning secondary palatalization. *Lingua* **110**: 1025.
- Hamano, Shoko (1986) *The Sound-Symbolic System of Japanese*. Doctoral dissertation, University of Florida, [Published by CSLI in 1998].
- Hayes, Bruce & Donca Steriade (2004) Introduction: The phonetic bases of phonological markedness. In *Phonetically Based Phonology*., Bruce Hayes, Robert Kirchner, & Donca Steriade, eds., Cambridge: Cambridge University Press, 1–33.
- Hayes, Bruce & Colin Wilson (2008) A Maximum Entropy model of phonotactics and phonotactic learning. *Linguistic inquiry* **39**: 379–440.
- Ito, Junko (1986) *Syllable Theory in Prosodic Phonology*. Doctoral dissertation, University of Massachusetts, Amherst.
- Ito, Junko & Armin Mester (1999) The phonological lexicon. In *The Handbook of Japanese Linguistics*, Natsuko Tsujimura, ed., Oxford: Blackwell, 62–100.

- Ito, Junko & Armin Mester (2003) *Japanese Morphophonemics*. Cambridge: MIT Press.
- Ito, Junko & Armin Mester (2008) Lexical classes in phonology. In *The Oxford Handbook of Japanese Linguistics*, Shigeru Miyagawa & Mamoru Saito, eds., Oxford: Oxford University Press, 84–106.
- Jun, Jongho (1995) *Perceptual and Articulatory Factors in Place Assimilation: An Optimality Theoretic Approach*. Doctoral dissertation, University of California, Los Angeles.
- Jun, Jongho (2003) Positional faithfulness, sympathy and inferred input. Ms. Souel National University.
- Jun, Jongho (2004) Place assimilation. In *Phonetically based Phonology*, Bruce Hayes, Robert Kirchner, & Donca Steriade, eds., Cambridge: Cambridge University Press., 58–86.
- Kager, René (1999) *Optimality Theory*. Cambridge: Cambridge University Press.
- 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 (2001) Similarity among Variants: Output-Variant Correspondence, BA thesis, International Christian University, Tokyo Japan.
- Kawahara, Shigeto (2003) On a certain kind of hiatus resolution in Japanese. *Phonological Studies* 6: 11–20.
- Kawahara, Shigeto (2006) A faithfulness ranking projected from a perceptibility scale: The case of [+voice] in Japanese. *Language* 82(3): 536–574.
- Kawahara, Shigeto (2012) Amplitude changes facilitate categorization and discrimination of length contrasts. *IEICE Technical Report. The Institute of Electronics, Information, and Communication Engineers*. 112: 67–72.
- Kawahara, Shigeto (2013) Emphatic gemination in Japanese mimetic words: A wug-test with auditory stimuli. *Language Sciences* 40: 24–35.
- 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, Melanie Pangilinan, & Kelly Garvey (2011) Spectral continuity and the perception of duration. Ms. Rutgers University (Talk presented at International Conference on Geminates 2011, Kobe University, Jan 2011).
- Kingston, John & Randy Diehl (1994) Phonetic knowledge. *Language* 70: 419–454.
- Kingston, John, Aditi Lahiri, & Randy L. Diehl (2012) Voice. ms. University of Massachusetts, University of Oxford and University of Texas at Austin.
- Kobayashi, Yuki, Yoko Sugioka, & Takane Ito (2012) ERP responses to violations in Japanese verb conjugation patterns. *Proceedings of CogSci 2012* : 611–616.
- Kurisu, Kazutaka (2000) Richness of the base and root-fusion in Sino-Japanese. *Journal of East Asian Linguistics* 9: 147–185.
- Kurisu, Kazutaka (2005) Gradient prosody in Japanese. *Journal of East Asian Linguistics* 14: 175–226.
- Kurisu, Kazutaka (2009) Palatalisability via feature compatibility. *Phonology* 26(3): 437–475.
- Kuroda, S.-Y. (1965) *Generative Grammatical Studies in the Japanese Language*. Doctoral dissertation, MIT.
- Kuroda, S.-Y. (2002) Rendaku. In *Japanese/Korean Linguistics 10*, Noriko Akatsuka &

- Susan Strauss, eds., Stanford: CSLI, 337–350.
- Labrune, Laurence (2014) The phonology of Japanese /r/: A panchornic account. *Journal of East Asian Linguistics* **23**(1): 1–25.
- Legendre, Géraldine, Yoshiro Miyata, & Paul Smolensky (1990) Harmonic Grammar – A formal multi-level connectionist theory of linguistic well-formedness: Theoretical foundations. In *Proceedings of the Twelfth Annual Conference of the Cognitive Science Society*, Mahwah, NJ: Lawrence Erlbaum Associates, 388–395.
- Lisker, Leigh (1986) “Voicing” in English: A catalog of acoustic features signaling /b/ versus /p/ in trochees. *Language and Speech* **29**: 3–11.
- Lombardi, Linda (2002) Coronal epenthesis and markedness. *Phonology* **19.2**: 219–251.
- Martin, Samuel E. (1987) *Japanese language through time*. Yale University Press.
- McCarthy, John J. (1994) On coronal ‘transparency’. Talk presented at TREND, University of California, Santa Cruz.
- McCarthy, John J. (2002) *A Thematic Guide to Optimality Theory*. Cambridge: Cambridge University Press.
- McCarthy, John J. (2003) OT constraints are categorical. *Phonology* **20**(1): 75–138.
- McCarthy, John J. (2005) Taking a free ride in morphophonemic learning. *Catalan Journal of Linguistics* **4**: 19–55.
- McCarthy, John J. (2008) The gradual path to cluster simplification. *Phonology* **25**(2): 271–319.
- McCarthy, John J. & Alan Prince (1995) Faithfulness and reduplicative identity. In *University of Massachusetts Occasional Papers in Linguistics 18*, Jill Beckman, Laura Walsh Dickey, & Suzanne Urbanczyk, eds., Amherst: GLSA, 249–384.
- McCarthy, John J. & A. Taub (1992) Review of C. Paradis and J.-F. Prunet, eds., *The Special Status of Coronals: Internal and External Evidence*. *Phonology* **9**: 363–70.
- Mester, Armin & Junko Ito (1989) Feature predictability and underspecification: Palatal prosody in Japanese mimetics. *Language* **65**: 258–93.
- Moreton, Elliot & Shigeaki Amano (1999) Phonotactics in the perception of Japanese vowel length: Evidence for long distance dependencies. *Proceedings of the 6th European Conference on Speech Communication and Technology*.
- Moreton, Elliott, Shigeaki Amano, & Tadahisa Kondo (1998) Statistical phonotactics of Japanese: Transitional probabilities within the word. *Transaction of the Technical Committee on Psychological and Physiological Acoustics* **H-98-120**.
- Myers, Scott (1997) Expressing phonetic naturalness in phonology. In *Derivations and Constraints in Phonology*, Iggy Roca, ed., Oxford: Oxford University Press, 125–152.
- Nasu, Akio (1999) Chouhukukei onomatope no kyouchou keitai to yuuhyousei [Emphatic forms of reduplicative mimetics and markedness]. *Nihongo/Nihon Bunka Kenkyuu [Japan/Japanese Culture]* **9**: 13–25.
- Ohala, John J. (1990) The phonetics and phonology of aspects of assimilation. In *Papers in Laboratory Phonology I: Between the grammar and physics of speech*, John Kingston & Mary Beckman, eds., Cambridge: Cambridge University Press, 258–275.
- Padgett, Jaye (1995) Feature classes. In *University of Massachusetts Occasional Papers in Linguistics UMOP 18*, Jill Beckman, Suzanne Urbanczyk, & Laura Walsh, eds., Amherst: GLSA, 385–420.
- Padgett, Jaye (2002) On the characterization of feature classes in phonology. *Language* **78**(1):

81–110.

- Paradis, Carole & Jean-François Prunet (1991) Introduction: Asymmetry and visibility in consonant articulations. In *The Special Status of Coronals: Internal and External Evidence*, Carole Paradis & Jean-François Prunet, eds., San Diego: Academic Press, 1–28.
- Pater, Joe (2000) Nonuniformity in English secondary stress: The role of ranked and lexically specific constraints. *Phonology* **17**: 237–274.
- Pater, Joe (2009) Weighted constraints in generative linguistics. *Cognitive Science* **33**: 999–1035.
- Pater, Joe (2010) The locus of exceptionality: Morpheme-specific phonology as constraint indexation. In *Phonological Argumentation: Essays on Evidence and Motivation*, Steve Parker, ed., London: Equinox, 123–154.
- Pater, Joe (to appear) Universal grammar with weighted constraints. In *Harmonic Grammar and Harmonic Serialism*, John J. McCarthy & Joe Pater, eds., London: Equinox.
- Pellard, Thomas (to appear) The linguistic archaeology of the Ryukyu islands. In *Handbook of the Ryukyuan languages*, Patrick Heinrich, Shinsho Miyara, & Michinori Shimoji, eds., Berlin: Mouton de Gruyter.
- Podesva, Robert (2000) Constraints on geminates in Burmese and Selayarese. In *Proceedings of West Coast Conference on Formal Linguistics 19*, Roger Bilerey-Mosier & Brook Danielle Lillehaugen, eds., Somerville: Cascadilla Press, 343–356.
- Podesva, Robert (2002) Segmental constraints on geminates and their implications for typology. Talk given at the LSA Annual Meeting.
- 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.
- Recasens, Daniel (1990) The articulatory characteristics of palatal consonants. *Journal of Phonetics* **18**: 267–280.
- Recasens, Daniel & Aina Espinosa (2006) Articulatory, positional and contextual characteristics of palatal consonants: Evidence from Majorcan Catalan. *Journal of Phonetics* **34**(3): 295–318.
- Rose, Sharon (1997) *Theoretical issues in comparative Ethio-Semitic phonology and morphology*. Doctoral dissertation, McGill University.
- Sagisaka, Yoshinori & Yoh'ichi Tohkura (1984) Kisoku-niyoru onsei goosei-no tame-no onin jikan seigyō [Phoneme duration control for speech synthesis by rule]. *Denshi Tsuushin Gakkai Ronbunshi* **67**: 629–636.
- Schourup, Lawrence & Ikuhiro Tamori (1992) Palatalization in Japanese: Response to Mester and Ito. *Language* **68**: 139–148.
- Smith, Jennifer (2002) *Phonological Augmentation in Prominent Positions*. Doctoral dissertation, University of Massachusetts, Amherst.
- Smolensky, Paul (1996) On the comprehension/production dilemma in child language. *Linguistic Inquiry* .
- Solé, Maria-Josep (2002) Aerodynamic characteristics of trills and phonological patterning. *Journal of Phonetics* **30**: 655–688.
- Staroverov, Peter (2014) *Splitting and the typology of consonant epenthesis*. Doctoral dissertation, Rutgers University.
- Steriade, Donca (1995) Underspecification and markedness. In *Handbook of Phonological*

- Theory*, John Goldsmith, ed., Cambridge, MA: Blackwell, 114–174.
- Steriade, Donca (2001) Directional asymmetries in place assimilation: A perceptual account. In *The Role of Speech Perception in Phonology*, Elizabeth Hume & Keith Johnson, eds., New York: Academic Press, 219–250.
- Tanaka, Yu & Jun Yashima (2013) Deliberate markedness in Japanese hypocoristics. *Proceedings of GLOW in Asia* **IX**: 283–297.
- Tateishi, Koichi (1990) Phonology of Sino-Japanese morphemes. In *University of Massachusetts Occasional Papers in Linguistics 13*, G. Lamontagne & A. Taub, eds., Amherst: GLSA, 209–235.
- Vance, Timothy (1987) *An Introduction to Japanese Phonology*. New York: SUNY Press.
- Vance, Timothy (1991) A new experimental study of Japanese verb morphology. *Journal of Japanese Linguistics* **13**: 145–156.
- Wilson, Colin (2001) Consonant cluster neutralization and targeted constraints. *Phonology* **18**: 147–197.
- Zoll, Cheryl (1997) Conflicting directionality. *Phonology* **14**: 263–286.