Morphological contrast and merger: *ranuki* in Japanese[*]

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1 Introduction

The central notion of structural linguistics is that of *contrast* or *opposition*: The linguistic value and role of a unit cannot be reduced to its physical substance, but is crucially determined by the network of relations that it enters into with other units of a similar kind: phoneme to phoneme, morpheme to morpheme, etc. A mid front vowel /e/ in a five-vowel system is something quite different from an /e/ in a seven-vowel system, perfect tense in a system without imperfect is something different from perfect tense in a system with imperfect, etc. Structuralist phonemics is the embodiment of a theory built on contrast as a central notion.

Generative phonology, on the other hand, was virtually founded on the rejection of a strictly phonemic level of representation where all and only the contrastive units of a sound system are represented (Halle 1962). The focus was instead on the new device of the phonological derivation, with a sequence of phonological rules deriving phonetic output representations from abstract morphophonemic inputs. Neither of these two levels served as a representation of contrastive function in the sense of structuralist phonemics, and there was also no formal separation into rules neutralizing contrasts between phonemes and rules deriving allophones. All in all, classical generative phonology had little use for contrast as an operative element of the theory, and the notion was perceived as functionalist and unfit for the rigors of formal analysis.[1]

Recent work has seen an impressive re-emergence of contrast as a key element of phonological theory and analysis. Within OT Phonology, the work of Flemming 1995, 2002 and Padgett 2003, showed that considerations of contrastive function need not remain at the level of vague appeals to trends and tendencies, but can be given a precise formal expression that is fully integrated with the rest of the grammar.

The purpose of this note is to take up an example of a contrast-effect in morphology from Japanese, the so-called *ra*-dropping or *ra-nuki* (ら抜き, lit. '*ra*-pullout') in the potential form of

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[1] Every descriptively adequate theory of phonology needs a way of distinguishing contrasting segments from non-contrasting pairs of segments. In the further development of generative phonology, this task fell to underspecification, with non-contrastive features being left out in underlying representations and filled in by rule in the course of the derivation. Underspecification has been found to have fundamental problems and paradoxes (see McCarthy and Taub 1992 and Steriade 1995) and has been largely abandoned in OT (see Smolensky 1993 and subsequent work for arguments).

verbs with vowel-final stems. After a brief review of contrast-based OT phonology, we proceed to demonstrate that very similar considerations play an important role in morphology, where they can be given a parallel formal analysis.[2]

2 Contrast in OT Phonology

The contrast-based version of OT employed here (1) is taken from Ito and Mester to appear, which is in turn based on Padgett 2003.

(1)
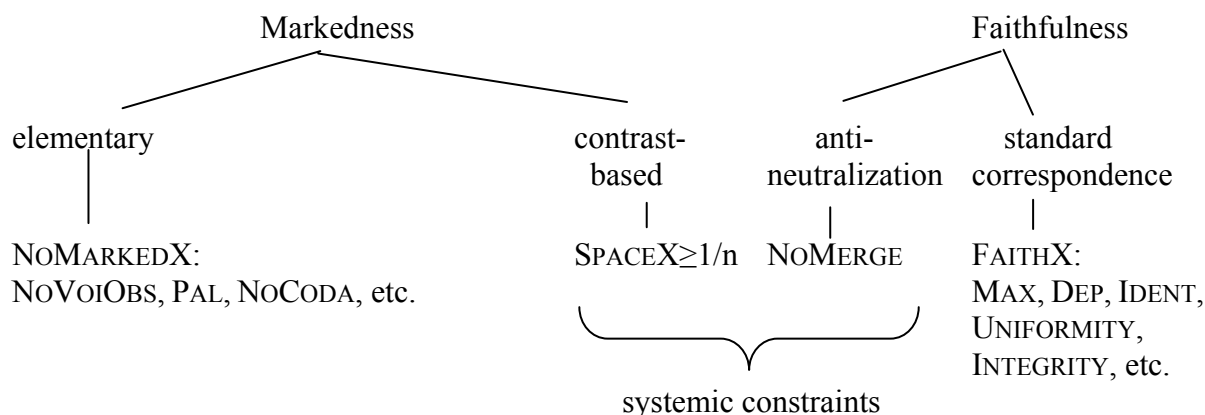
Here both the markedness and the faithfulness component of OT are enriched by systemic constraints, which are further characterized in (2) (see the works cited for discussion).

(2) Systemic markedness and systemic faithfulness constraints

Systemic Markedness:	SPACEX≥1/n	Potential minimal pairs differing in property X must differ in X by at least 1/nth of the available space
Systemic Faithfulness:	NOMERGE	No output word has multiple correspondents in the input (cf. Uniformity)

Hand-in-hand with the development of systemic OT goes a broader conception of inputs and candidates. In order to bring merger of, and contrast between, distinct forms under the purview of formal optimality-theoretic evaluation, inputs and candidates cannot exclusively consist of isolated forms (or isolated input-output pairings, in correspondence theory). Rather, a whole group of related forms must be able to constitute an input and a candidate. Systemic OT is not alone in adopting this broader conception, which it shares, for example, with proposals to admit whole paradigms as objects of optimality-theoretic evaluation, as in McCarthy to appear.[3]

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[2] In work in preparation, Shigeto Kawahara (UMass, Amherst) and Jaye Padgett (UC Santa Cruz) have independently developed a proposal along somewhat different though related lines.
[3] Note, for example, that because of the fluidity of the distinction between inflection and derivation and the fact that recursivity cannot be in principle ruled out, there is no known upper

We illustrate systemic OT with a brief look at a contrast-enhancing depalatalization process in the historical phonology of Japanese analyzed in Ito and Mester to appear, where the sibilant [ʃ] depalatalizes to [s] before the mid front vowel [e], as in (3)b.[4]

(3) a. Older system   b. Modern system

(*si)	ʃi		(*si)	ʃi
(*se)	ʃe		se	(*ʃe)
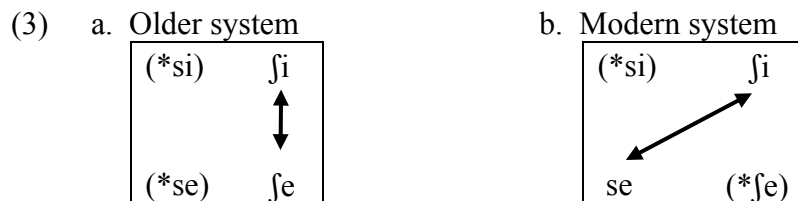
Depalatalization before [e] is baffling as a syntagmatic process since front vowels are well-known triggers of palatalization in preceding coronals, especially in sibilants. But interpreted in a systemic way, the shift can be rationalized as a means of enhancing the contrast by polarizing the consonants. Overall, [ʃi/se] is a better contrast between moras than [ʃi/ʃe]. Our analysis, summarized in (4), gives formal expression to this idea.

(4) a. Older ranking:

		PAL	µ-CONTRAST
se	ʃi	*!	
▶	ʃi / ʃe		*

b. Modern ranking:

		µ-CONTRAST	PAL
▶	se / ʃi		*
	ʃi / ʃe	*!	

The spacing constraint µ-CONTRAST is a paradigmatic markedness constraint declaring the contrast between two mora-sized items (here, [ʃi] and [ʃe]) as insufficient if they are identical at their left edges and contrast only in their vowel quality [i] vs. [e]. Ranked above PAL, a constraint demanding palatalization of sibilants before all front vowels, it gives rise to the modern system.

3   Contrast in Morphology: Verbal *ranuki* in Japanese

The phenomenon commonly known as *ranuki* "ra-dropping" is illustrated in (5) where the potential suffix *-rare* is alternatively realized in a reduced form as *-re* by deleting the syllable *ra*. The *ra*-less forms are considered substandard in textbooks and prescriptive grammars.

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limit on the size of a possible paradigm (except for the Guiness-book-of-records-fact that some paradigm in some language must be the longest known paradigm).

[4] In a more narrow transcription, many speakers have alveolo-palatal [ɕ] rather than palato-alveolar [ʃ], i.e., the segment in question is further back and involves more raising of the tongue.

(5)
  a.   kinoo-wa   yoku   ne-$\begin{Bmatrix} \text{rare} \\ \varnothing\text{re} \end{Bmatrix}$ -ta

          yesterday-TOPIC   well   sleep-POTENTIAL -PAST
          '(I) was able to sleep well last night'

  b.   koko-kara-wa   de-$\begin{Bmatrix} \text{rare} \\ \varnothing\text{re} \end{Bmatrix}$ -mas-en

          here-from-TOPIC   exit-POTENTIAL   -POLITE-NEGATIVE
          '(You) cannot exit from here.'

We will develop an OT analysis of this phenomenon after a brief overview and preliminary considerations regarding allomorph selection.

3.1 Allomorph selection

Verbal stems in Japanese are divided into two classes: consonant-final C-stems and vowel-final V-stems.[5] The latter always end in a final vowel [i] or [e].

(6)

V-stems		C-stems	
tabe-	'eat'	hak-	'sweep'
ne-	'sleep'	oyog-	'swim'
sabi-	'get rusty'	kas-	'lend'
ki-	'wear'	yom-	'read'
mi-	'see'	sin-	'die'
make-	'lose'	tob-	'fly'
kari-	'borrow'	kaw-	'buy'
home-	'praise'	wakar-	'understand'

Most verbal suffixes have different allomorphs that occur with C-stems and V-stems, respectively (7).

(7) Suffix allomorphy for V-stems and C-stems

verbal stem	V-stem e.g., tabe- 'eat'	C-stem e.g., nom- 'drink'
a. present negative	...V-nai	...C-anai
b. plain present	...V-ru	...C-u
c. inchoative	...V-joo	...C-oo
d. conditional	...V-reba	...C-eba
e. causative	...V-sase-	...C-ase-
f. passive	...V-rare-	...C-are-

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[5] In traditional Japanese grammar, the corresponding terms are *godan-katuyou*五段活用 and *itidan katuyou* 一段活用, respectively.

g. imperative	...V-ro	...C-e
h. potential	...V-rare-	...C-e-

Traditional treatments (e.g., Kuroda 1965 and McCawley 1968) approach suffixal allomorphy as a strictly phonological matter. The resulting analyses (using insertion rules or deletion rules) remain necessarily construction-specific and of limited generality and can in any case not be extended to cover either the whole scale suppletion seen in the imperative <-ro, -e> ((7)g) or the large divergence between the allomorphs seen in the potential <-rare, -e> ((7)h) in a natural way, but the latter two are just as much part of the overall picture as the more 'regular' cases ((7)a-f).

The alternative would be to regard all allomorphs as listed, together with specifications of their environments. In traditional phonological analysis, this is an unappealing choice since, by assimilating everything to the worst-case suppletion scenario (7)g, it means making no contact with the phonotactic generalizations so clearly visible in (7), leading to massive redundancy.

In OT, we can have the best of both worlds by avoiding both construction-specific rules and unenlightening listing of allomorph environments: The allomorphs are listed, but the choice between the allomorphs is phonologically conditioned and falls to the usual selection mechanism. The basis idea is illustrated in (8) for the plain present allomorphs <-u, -ru>. Rather than specifying /-u/ as attaching to C-stems, and /-ru/ as attaching to V-stems, the allomorphs are both available to attach to both types of stems, and choosing either one fulfills faithfulness constraints. It is then up to the phonological markedness constraints to choose the allomorph phonotactically most appropriate for each environment.[6] As seen in (8), ONSET and an appropriate version of CODACOND choose the vowel-initial allomorph as optimal for the consonant-final stems, and vice versa for the consonant-initial allomorph.

(8) Plain present allomorph selection

'write'; 'eat'			CodaCond	Onset	Faith
a. /kak/ /<-u, -ru>/	►	kak-u			
		kak-ru	*		
		kakI-ru			*Dep
		ka∅-ru			*Max
b. <tabe>, /<-u,-ru>/		tabe-u		*	
	►	tabe-ru			
		tab∅-u			*Max

In a similar way, allomorph selection for (non-*ranuki*) potentials proceeds as in (9) (where we consider only candidates with the correct plain present allomorph).

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[6] This way of treating phonologically controlled allomorph selection is proposed in Mester 1994 for Latin verbs and has been further developed in, among others, Tranel 1998 for the French definite article.

(9) Potential allomorph selection

			CodaCond	Onset	Faith
a. /kak/ /<-rare, -e>/ /<-u, -ru>/	▶	kak-e-ru			
		kak-rare-ru	*		
		kakI-rare-ru			*Dep
		ka∅-rare-ru			*Max
b. <tabe>, /<-rare, -e>/ /<-u, -ru>/	▶	tabe-rare-ru			
		tabe-e-ru		*	
		tabe-Te-ru			*Dep
		tab∅-e-ru			*Max

3.2   *Ranuki* variation in OT

The particular *ranuki* variation of interest occurs in the potential suffix for V-verbs as exemplified above in (5). Despite being stigmatized by grammar mavericks as sloppy and lazy pronunciation, *ra*-less forms are abundantly observed in speech as well as in casual/informal writing. *Ranuki* is insightfully discussed by Gunji and Sakamoto 1999: 88-92 as an example of one of the ongoing changes in contemporary Japanese, and our understanding of the phenomenon has been considerably enhanced by the results of an undergraduate senior research project on casual speech contractions in Japanese conducted in Spring 2003 by the members of the UCSC undergraduate Japanese language research group (Ryan Tanaka, Eric Terao, Ember VanAllen, and Fujiko Yamamoto). Their Google web search (May 2003) resulted in 38,400 hits for *ne-rare-ta* and 52,300 hits for *ne-re-ta*. Similar numbers for many other verbs confirm the robust presence of the *ranuki* variation in contemporary Japanese, and the frequency of the often denigrated *ranuki* potentials with *-re* instead of *-rare*.

OT-treatments of variation and associated change have developed various ways of making the grammar generate further outputs besides the standard winners, whether by assuming that the ranking of constraints in an OT-grammar is only partial, such that certain pairs of constraints are not ranked with respect to each other and either order yields a valid competition (as in Nagy and Reynolds 1997, Antilla 1997, Ito and Mester 1997, and many other works, see Müller 1999 for general discussion), by having recourse to a more powerful stochastic notion of constraint ranking (Boersma 1997, Boersma and Hayes 2001), or by allowing direct (but limited) access in the evaluation to a rank-ordered set of non-optimal candidates (Coetsee 2004). The evidence considered here will not decide between these different theories of variation; for concreteness, we make use of a generic non-ranking format. For the *ranuki* case at hand, the crucial interaction is between the faithfulness constraint MAX-IO (protecting segments from being deleted) and a 'laziness' constraint that favors the *ra*-less form which we will here identity with a constraint ruling out sequences of *r*-initial syllables. An initial attempt at an analysis is depicted in (10). In order to simplify the tableau, we consider only candidates with the correct choice of allomorph (/-rare/ instead of /-e/, see (9)b).

(10)   Variation for the potential form: [ne-rare-ta]~[ne-re-ta]

	/ne-rare-ta/ 'sleep-potential-past'	(i) Max-IO	(ii) *rVrV
►(i)»(ii)	ne-rare-ta		*
►(ii)»(i)	ne-re-ta	**	

The *-rare* form surfaces if the constraint *rVrV is ranked below the faithfulness constraint MAX, and the *ra*-less form wins if ranked above it. For consonant-final stems, the potential allomorph is *-e*, and there is no variation, since the constraint *rVrV is irrelevant here.

It might appear as if the variation can be captured in this way, but there is an immediate problem: There is no general phonological tendency in Japanese to reduce sequences of r-initial syllables, as illustrated with a sampling of words in (11).

(11)   Words with *…rVrV…* sequences

arare	'hail, rice crackers'	raretu	'enumeration'
burari	'casually, unexpectedly'	rarii	'rally'
gerira	'guerrilla'	rireki	'personal history'
gururi	'circumference'	ririsii	'manly, valiant'
hirari	'quickly, nimbly'	riron	'theory'
honoruru	'Honolulu'	roorerai	'Lorelei'
irori	'hearth'	surari	'easily, smoothly'
karera	'they'	suriru	'thrill'
kiriri	'firmly, uprightly'	tororo	'grated yam'
moraru	'morals'	turara	'icicle'
oriru	'get off, go down'	uraraka	'beautiful, calm'

These forms have no short variants and refute the idea that the ranking of *rVrV and Max is generally undetermined in the grammar of Japanese. Rather, faithfulness must outrank the markedness constraint. One might consider restricting *rVrV to verbal suffixes. Besides the fact that such a relativization of a markedness constraint to a particular morpheme class[7] is not unproblematic, it remains ineffective because there is a passive suffix <-rare, -are> homophonous with the potential after V-stems (*home-rare-ru* 'be able to praise' or 'be praised', etc.) which has no ranuki variant *-re* (12). In fact, we will see below that the fact that there is no *ranuki* in passive turns out to hold a partial key to the solution.[8]

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[7] And in particular, to affixes: see Albright 2004 for an argument that certain markedness constraints have root-specific variants, resulting in morpheme structure conditions on roots (as opposed to other forms).

[8] There is also no *–re* variant for the homophonous honorific ending (*sensei-ga kaette ko-rare-ta/*ko-re-ta* "the teacher returned-HONORIFIC").

(12)
   a.   sensei-ni   yoku   home-$\left\{\begin{array}{l}\text{rare}\\\text{*}\varnothing\text{re}\end{array}\right\}$ -ta

               teacher-DATIVE   often praise-PASSIVE -PAST
               '(He) was often praised by the teacher.'

   b.   kodomo-ni-wa   mi-$\left\{\begin{array}{l}\text{rare}\\\text{*}\varnothing\text{re}\end{array}\right\}$ -ta-ku nai

               child-DATIVE-TOPIC   see-PASSIVE -VOLITIONAL-NEGATIVE
               '(I) don't want to be seen by (my) children (in such a situation).'

The upshot is that *ranuki* only occurs in the potential form of V-verbs, and can therefore not be attributed to a markedness constraint like *rVrV, even when the latter is restricted to the verbal suffixes. A remaining last move of desperation, viz., restricting *rVrV to the potential suffix— i.e., to a single morpheme— misses, besides its stipulative nature, an important systemic generalization. The sequence *...rare...* itself is not the problem (as can be seen by the numerous words with *rVrV* sequences in (11)), rather, there is a systemic reason for *ranuki*.

3.3   Paradigm contrast

Recall that the passive suffix is homophonous with the potential suffix (13)a, but *ranuki* creates a distinction between the potential and the passive forms, as illustrated in (13)b.[9]

(13)   a. standard: potential form: …V-rare…
                          passive form: …V-rare…

        b. *ranuki*:   potential form: …V-re…
                          passive form: …V-rare…

Just as seen with the depalatalization effects illustrated in (3)-(4) above, *ranuki* is the result of a systemic (paradigmatic) constraint, this time, the morphological contrast constraint PARCONTRAST[10] (14) requiring overt phonological differences between the cells of the morphological paradigm of a given lexical item (see Kenstowicz 2002 for an earlier proposal along similar lines).

(14)   ParadigmContrast (PARCONTRAST)
        The cells of a paradigm are pair-wise phonologically distinct. Assign one mark for each
        pair of paradigm members that are not phonologically distinct.

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[9] The potential *-rare* form is homonymous not just with the passive, but also with one kind of honorific (traditionally often understood as a special use of passive morphology), and it has been suggested that the homonymy of the potential with the honorific *-rare* might be, from a practical point of view, even more pernicious than the homonymy with the pure passive.
[10] In the interest of unifying the overall theory, PARCONTRAST could conceivably be interpreted as an instantiation of NOMERGE, here militating against phonologically identical realizations of two cells in the paradigm.

We cannot simply substitute PARCONTRAST for *rVrV in conventional single-input OT tableaux such as in (10), because the potential form and the passive form, which derive from separate inputs, are each evaluated in separate tableaux. Like other systemic constraints, PARCONTRAST needs to evaluate and compare the output forms of both potential and passive forms in a single tableau. Previous work on output-output correspondence has developed a variety of mechanisms for such tasks (see Benua 1997, Burzio 1994, Ito and Mester 1997, Kenstowicz 1996, 1997, Steriade 1997, among others). We here follow McCarthy to appear in explicitly admitting whole paradigms as candidates—but with a focus on contrast, instead of uniformity and invariance. Tableau (15) illustrates the idea of the approach.

(15)   Contrast in paradigm selection

	Candidate paradigms for /tabe-/ 'eat'	(i) Max-IO	(ii) ParContrast
►(i)»(ii)	potential \<rare\>: tabe-rare- passive\<rare\>: tabe-rare- causative\<sase\>: tabe-sase- … …		*
►(ii)»(i)	potential\<rare\>: tabe-re- passive\<rare\>: tabe-rare- causative\<sase\>: tabe-sase- … …	**	

In the first candidate paradigm (15)a, the potential and passive forms are identical, and hence violate PARCONTRAST, whereas in the second candidate paradigm (15)b, with the *ra*-dropped potential form, PARCONTRAST is fulfilled. Since PARCONTRAST is variably ranked with respect to Max-IO, both candidate paradigms are viable outputs for V-verbs.

Potential forms of C-stems (16), on the other hand, are predictably unaffected by the change. Their allomorph *–e* is distinct from the passive suffix *–are*, hence, the fully faithful candidate paradigm fulfills PARCONTRAST, and harmonically bounds all other candidate paradigms. Since the fully-faithful candidate does not violate PARCONTRAST, reranking the two constraints makes no difference for the outcome.[11]

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[11] A significant number of consonant-final stems end in [r] (e.g., *wakar-u* 'understand'), and they superficially resemble vowel-final stems with an r-initial suffix (e.g., *tabe-ru*). Some oft-cited minimal pairs are: *i-ru* 'exist' vs. *ir-u* 'need', or *ki-ru* 'wear' vs. *kir-u* 'cut'. Such [r]-ending stems are common because there is an independent stem-forming -r- (*kumo-r-u* 'be cloudy' cf. *kumo* 'cloud', *demo-r-u* 'to do a demonstration', cf. *demo* 'demonstration', *hamo-r-u* 'harmonize', *memo-r-u* 'put in memo form', *sabo-r-u* 'to skip class', also in *toma-r-u* vs. *tome-ru* 'stop', intrans./trans. Therefore, another possible approach to *ranuki* is analogical leveling, namely, *ranuki* treats the V-verbs like r-ending C-Verbs ("metanalysis": cf. *a napron > an apron*, etc.). Thus, the vowel-final *tabe-ru* 'eat-present' is reanalyzed as consonant-final *taber-u*, and the expected potential suffix would then be *taber-e-* instead of *tabe-rare-*. This kind of leveling would have to be very partial, however, because V-Verbs are treated as C-Verbs only in their potential forms, and remain V-verbs in every other respect. For example, full reanalysis of taberu as a C-verb instead

(16)

	Candidate paradigm for /nom-/ 'drink'	Max-IO	ParContrast
►	potential: nom-e- passive: nom-are- causative: nom-ase-		

From a diachronic perspective, and conjecturing that *ranuki* potentials with *-re* will ultimately replace the current potentials with *-rare*, the most likely course of the change in progress affecting the potentials of V-stems in Japanese is as a four-stage process (17).[12]

(17)

Stage (i): starting point	the standard system without any *ranuki* variation (with fixed ranking of MAX-IO » PARCONTRAST)
stage (ii): variation	the (current) system with variation, where PARCONTRAST is unranked with respect to MAX-IO (MAX-IO, PARCONTRAST)
stage (iii): reordered ranking	pure *ranuki* system (with fixed ranking of PARCONTRAST » MAX-IO)
stage (iv): reanalysis of input	pure *ranuki* system with reanalysis of input<-rare> to <-re>, where the ranking between PARCONTRAST and MAX-IO becomes irrelevant.[13]

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of a V-verb predicts, against the actual facts, a conjugational paradigm with a C-form negative **taber-anai* instead of the V-form *tabenai* 'does not eat', a C-form hortative **taber-oo* instead of the V-form *tabe-joo* 'let us eat', etc.

[12] As a reviewer points out, it is unclear whether stages (iii) and (iv) are really separable. This would depend, for example, on the existence of speakers who start out at stage (ii) early in life and then move on to stage (iii) later, without a reanalysis of the input form of the potential suffix (which might come with the new generation). The standard conception of linguistic change in generative grammar since Kiparsky 1965 (see Sanders 2003 for a recent application in OT) assumes that the succession of grammars usually involves a stage like (iii) with adult grammars which have undergone change but no reanalysis of inputs. We have no reason to doubt its existence in principle, but have so far not investigated the facts that might bear on this question in the case here under discussion.

[13] It is important to note that what we are observing here is a requirement that the different members of a paradigm be distinct, not a general homonymy avoidance. PARCONTRAST applies only within the paradigm of a single lexical item and rules out the identity of two of its cells (here, potential and passive). It is not applicable across paradigms: there seems to be no homonymy avoidance between different lexical items. For example, the non-*ranuki* potential forms of /ki-/ 着る 'wear' and /kir-/ 切る 'cut' are different: *ki-rare-ru* 'can wear' vs. *kir-e-ru* 'can cut'. With *ranuki*, the two forms become segmentally identical: *ki-re-ru* 'can wear', *kir-e-ru* 'can cut'. The lack of homonymy avoidance even in dialects without a distinction between accented and unacented verbs (such as the city dialect of Fukuoka, see Smith 1999), where the two forms are also acceutally identical, shows that forms of different paradigms do not compete against each other in a single tableau.

We now have in place a basic analysis of *ranuki* variation in the system of Japanese verbal derivation, where a floating systemic contrast PARCONTRAST interacts with the faithfulness constraint MAX-IO.

4   Further Consequences: Allomorphy Correspondence

The analysis so far raises two related questions regarding other competing candidate paradigms:

(i) Why does the potential suffix *–rare* change to *–re*, and not to any other phonological shape?
(ii) Why, instead of the potential suffix, doesn't the passive suffix *–rare* reduce to *–re*?

Question (i) calls attention to the fact that PARCONTRAST accounts for why some change occurs to differentiate the potential and the passive as members of the paradigm. However, it does not tell us what the resulting shape of the potential suffix should be. That is, why do we find *ranuki* (*-rare* → *-re*), and not *re*-dropping *(-rare* → *-ra*), or a feature change *(*such as *-rare* → *nare*), all of which would satisfy PARCONTRAST? Some other plausible competing candidate paradigms that satisfy PARCONTRAST are listed in (18).

(18)

	Candidate paradigms for /tabe-/ 'eat' that satisfy PARCONTRAST	Max-IO	Comments
a.	potential<rare>:　　　tabe-__re- passive<rare>:　　　tabe-rare- causative<sase>:　　tabe-sase- …　　　　　…	**	Actual winning candidate paradigm.
b.	potential<rare>:　　　tabe- nare- passive<rare>:　　　tabe-rare- causative<sase>:　　tabe-sase- …　　　　　…		No MAX-IO violations. The deletion candidate (a) wins as long as some suitable constraint, such as IDENT-IO[nas], outranks MAX-IO.
c.	potential<rare>:　　　tabe-ra_- passive<rare>:　　　tabe-rare- causative<sase>:　　tabe-sase- …　　　　　…	**	Same number of MAX-IO violations. Constraint penalizing deletion at the right-edge, such as ANCHOR-RIGHT.
d.	potential<rare>:　　　tabe-_are- passive<rare>:　　　tabe-rare- causative<sase>:　　tabe-sase- …　　　　　…	*	Less MAX-IO violations. ONSET must be higher ranked than MAX-IO?

As noted in the *Comments* column, in order for the desired candidate paradigm (18)a <tabe-re-, tabe-rare-, tabe-sase-> to win, it becomes necessary not only to invoke another faithfulness constraints (18)c, but also to find the strategically correct rankings between faithfulness constraints (18)b and between faithfulness and markedness constraints (18)d. Unfortunately, it is unlikely that all the constraint rankings required to achieve this result are correct for the language at large. Thus ONSET cannot simply outrank MAX-IO, since there are many onsetless syllables in

Japanese output forms. The other rankings are also difficult to justify from other parts of the grammar, which means that the learner would have to learn the ranking purely from the *ranuki* phenomenon—a fairly unlikely event. The ranking configuration {IDENT-IO[F], C} >> MAX-IO needed in (18)b (with F=[nas] and C=PARCONTRAST) is intrinsically problematic for at least some C, F: For example, {IDENT-IO[voi], *CODA/[+voi, –son]} >> MAX-IO predicts wholescale deletion as a repair to avoid voiced coda obstruents, instead of voice neutralization—a pattern systematically unattested in languages (see Lombardi 2001, Steriade 2001, Pater 2003, and de Lacy 2003 for discussion and a variety of partial solutions).

Question (ii) is perhaps still more problematic. Even granted that all other constraints and necessary rankings are sorted out so that *ra*-deletion is the optimal repair, why does the change affect the potential and not the passive? Why is the optimal candidate paradigm the one with *ranuki* in the potential (19)a, and not the one with *ranuki* in the passive (19)b?

(19)

			Max-IO	Comments
a.	potential<rare>: passive<rare>: causative<sase>: …	tabe-re- tabe-rare- tabe-sase- …	**	Actual winning candidate paradigm
b.	potential<rare>: passive<rare>: causative<sase>: …	tabe-rare- tabe-re- tabe-sase- …	**	passive *ranuki*: Identical faithfulness and markedness violations with winner.

The winner (19)a and the competing candidate (19)b have identical faithfulness and markedness violations, therefore appealing to some other constraint, or attempting to rerank some pair of constraints, cannot resolve the problem. One might take the bull by the horns and argue that the choice of (19)a instead of (19)b is a truly accidental outcome, things could just as well have been otherwise. We show below that this is not so.

Answers to both of the questions posed above are to be found not by scrutinizing the faithfulness and markedness profiles of individual verbal suffix allomorphs, but, pursuing the logic of the systemic constraints investigated here, by comparing the similarity relations between the allomorphs of the various suffixes given in (20) (repeated after (7) above).

(20)   Suffix allomorphy for V-stems and C-stems

verbal stem	V-stem e.g., tabe- 'eat'	C-stem e.g., nom-'drink'
present negative	...-nai	...-anai
plain present	...-ru	...-u
inchoative	...-joo	...-oo
imperative	...-ro	...-e
conditional	...-reba	...-eba
causative	...-sase-	...-ase-
passive	...-rare-	...-are-
potential	...-rare-	...-e-

This list of suffix allomorphs quickly reveals that, apart from the suppletive imperative <-ro/-e>, the usual shape variation is limited to a single segment: an initial consonant in <-ru/-u>, <-reba/-eba>, <-rare/-are>, <-sase/-ase>, <-joo/-oo>, or an initial vowel in <-anai/-nai>. The distance between the allomorphs of the potential <-rare, -e>, on the other hand, constitutes a much more significant divergence between the allomorphs.

This, we suggest, is the key to understanding why the potential suffix changes by *ranuki* from <-rare, -e> to <-re, -e> and not to the other alternatives given in (18), and why it is the potential suffix and not the passive suffix that undergoes the change (see (19)): The actually observed change, as opposed to the alternatives mentioned, reduces the divergence between the allomorphs to a single segment, making them more similar to the usual case. In the next section, we implement this idea in a more formal way.

4.1   Allomorph correspondence

What we need is a precise way of measuring the distance between allomorphs that are exponents of the same morpheme, in order to be able to meaningfully compare different groups of associated allomorphs in terms of the degree of separation between the members, and compare different groups of this kind as candidates, each representing a different way of realizing a particular morpheme. In a general sense, this is the idea of "paradigm uniformity", but generalized so as to include both (inflectional) *stem* allomorphy (the usual domain of paradigm uniformity) and *affix* allomorphy.

Building on earlier proposals to limit variation within a paradigm (in particular, by Kenstowicz 1996, 1997), our most immediate model is McCarthy to appear ("Optimal Paradigms"), which is, however, limited to the shared stem (lexeme) in inflectional paradigms (cf. also the analysis of the affix-shape generalization in Tagalog in Kaufman 2003). We extend it here to a fully general correspondence constraint governing all kinds of allomorphs. As a first step (21), we postulate that for any two morphs *allo₁* and *allo₂* that are exponents of the same morpheme, there is a correspondence relation between their segments (i.e., not mediated through some underlying form that they are associated with).

(21) Allomorph correspondence relation R
Let m_1 and m_2 be two morphs that stand in a relation of allomorphy, as co-exponents of one and the same morpheme μ. Then there is a correspondence relation R between the segments of m_1 and the segments of m_2.

Using a simple schematic example for illustration, consider the set of allomorphs <tan, an, ta, a> in the array of forms (22).

(22) mi- *tan*-u
      mep- *an*- u
      mi- *ta*- su
      mep-*a*- su

A typical[14] correspondence relation R holding between the members of <*tan, an, ta, a*> is given in (23).

(23)
   a.   b.   c.   d.   e.   f.

  t a n   t a n   t a n   a n   a n   t a
   | | | | | | | |
  a n   t a   a   t a   a   a

What we are interested in here is the overall similarity between these elements, not the extent to which they are each similar to some specific element, be it a classic underlying form or a designated member among the elements themselves (such as the most informative allomorph, as in the theory developed in Albright 2002).

The fact that there is no base-derivative priority in the relation we are studying here means, for example, that it is neither appropriate to reckon the non-corresponding *t* in (23)a as a MAX-violation from the perspective of *tan* nor as a DEP-violation from the perspective of *an*. Rather than mechanically extending the MAX/DEP approach to this case of correspondence, and thereby implicitly declaring each form as some kind of quasi-base, which results in a doubling of penalties, as in McCarthy to appear, it seems more straightforward to recognize it for what it undeniably is—a flaw of the ordered pair <tan, an> as a member of the correspondence relation. In order to express this adequately, all we need is a type of segmental faithfulness that is more general than the standard variety, which is immediately individuated in terms of the MAX/DEP differentiation. Our proposal is stated in (24).

(24) Allomorph Correspondence Constraint (ALLOCORR)
Let R be an allomorph correspondence relation between the segments of m_1 and those of m_2. Then one violation of ALLOCORR is incurred for each segment in m_1 or m_2 that is not included in R, i.e., has no correspondent in the other form.

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[14] Here and in what follows, we simplify by taking only one-to-one (injective) relations into account, forgoing a distracting discussion of the formal machinery necessary to deal with fusions and splits.

paradigm and a C-final stem paradigm in tandem. In order to simplify the display, the tableau in (28) limits itself to the potential and the passive, and furthermore shows only the suffix portion of the paradigm.

(28)

	potential: /<-e, -rare>/ passive: /<-are, -rare>/ …	(i) Max-IO	(ii) ParContrast	(iii) AlloCorr
a. faithful candidate ▶(i)»(ii)	potential: <-e, -rare> passive: <-are, -rare> …		*	*** *
b. *ranuki* (potential) ▶(ii)»(i)	potential: <-e, -re> passive: <-are, -rare> …	**		* *
c. *ranuki* (passive)	potential: <-e, -rare> passive: <-are, -re> …	**		*** *

The faithful candidate (28)a violates PARCONTRAST because the potential and the passive overlap in the allomorph (-rare), and it shows four ALLOCORR violations (three for the potential, and one for the passive). As before (see (15)), the faithful candidate comes out as the winner in competitions where MAX-IO dominates PARCONTRAST. With the opposite ranking, one of the PARCONTRAST-fulfilling candidates (28)b,c is the winner. Among these two candidates, (28)(b) has *ranuki* in the potential, and (c) has *ranuki* in the passive, and this is where ALLOCORR is crucial. The ALLOCORR violations for (28)(b) are minimal: one in the potential <-e, -re>, and one in the passive <-are, -rare>. In (28)c, the *ranuki* passive <-are, -re> also accrues one violation, just like <are, -rare> (the non-corresponding segment is now *a* instead of *r*). The potential <-e, -rare>, on the other hand, accrues two fatal ALLOCORR violations in addition to the one shared with <-e, -re>. The paradigm with *ranuki* in the passive (28)(c) is therefore harmonically bounded by the paradigm with *ranuki* in the potential (28)(b), and will never be a winner.

Other PARCONTRAST-fulfilling candidates discussed earlier are also accounted for by the allomorphic correspondent constraints. In the *"re-nuki"* candidate (29)d, where *re* deletes rather than *ra*, the deletion of *re* leads to an additional ALLOIDENT violation since the corresponding vowels *e* and *a* are no longer identical. Changing a segmental feature to avoid a PARCONTRAST violation, as in (29)e, does not reduce the number of ALLOCORR violations, and in addition incurs an ALLOIDENT violation.

(29)

d. *re-nuki*	potential: <-e, -ra> passive: <-are, -rare> …	ALLOIDENT violation
e. feature change	potential: <-e, -nare> passive: <-are, -rare> …	IDENT-IO violation

5   Conclusion

This paper makes the proposal that morphological systems are governed, among other things, by an interrelated pair of constraints: (i) the contrast constraint PARCONTRAST, which requires differences among the members of the paradigm, and (ii) the allomorphic correspondence constraint ALLOCORR, which requires similarity among the allomorphic instantiations of a morpheme. While many details and a number of fundamental questions remain to be settled, the analysis of the *ranuki* phenomenon in the system of verbal derivation in Japanese developed here as a test case shows that this contrast-based and intrinsically systemic pair of constraints allows us to make some progress towards unified explanations in morphology.

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