

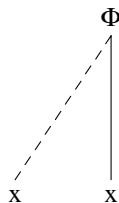
Glide Formation and Compensatory Lengthening in Japanese

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In Poser (1986) I argued that Japanese derived [yu:] from /iu/ via a rule of Glide Formation that moves the /i/ features into the onset followed by compensatory lengthening resulting from spreading of the features of the /u/ into the position vacated by the /i/, and that the existence of this rule argued for the autosegmental analysis of compensatory lengthening over that of deChene & Anderson (1979). Fukui (1986) presents an alternative analysis of these facts in which compensatory lengthening is induced not by Glide Formation but by W-Deletion, which deletes /w/ before non-low vowels. If Fukui is correct, this will eliminate one of the few known examples of compensatory lengthening induced by glide formation. More importantly, this will be the first known counterexample to the generalization that only deletions from the rhyme induce compensatory lengthening. I argue here that the novel aspects of Fukui's analysis are problematic and his claim of superiority over the analysis of compensatory lengthening of Poser (1986) is incorrect.¹

Fukui's analysis takes the form of an argument for the existence of rule (1). This rule, which he calls Leftward Spread, spreads a bundle of features from the segment to which it is linked leftward to an unspecified segment. Fukui claims that under his proposal two hitherto unrelated phenomena, compensatory lengthening and gemination, may now be unified. I agree that Japanese possesses a rule like rule (1), whose role in both compensatory lengthening and gemination Fukui is correct to point out. However, I will show that it must be Glide Formation and not W-Deletion that induces compensatory lengthening.

(1) Leftward Spread



Fukui adduces three sets of facts in support of his analysis. The first is the assimilation of verb stem-final /w/ to the initial /t/ of the past tense suffix /ta/, which he attributes to a " ...well-established rule that

¹ The paper cited here as Poser (1986) was given on 15 May 1982 at the Minifestival on Compensatory Lengthening at Harvard University. Fukui refers to the written version of this paper circulated in 1982, which is not substantially different from the published text.

deletes *w* before a consonant (see, among others, McCawley (1968))." ² Fukui proposes that this rule should be formulated so as to leave behind an empty position (which I will henceforth refer to as a *trace*) into which the features of the following consonant then spread by Leftward Spread.

My own treatment (Poser 1986) is similar to McCawley's, involving a rule assimilating coda consonants to the following consonant in most features. The rule in question is not restricted to /w/; abstracting away from the fact that it must be bled by the rules of Velar Gliding and I-Insertion, which affect the velar-stems and *s*-stems respectively, it applies to all stem-final consonants. Nor is it restricted to the past tense of verbs; within the verbal conjugation the participial suffix *te*, the conditional suffix *tara*, and the alternative suffix *tari* induce identical alternations. The same rule is probably responsible for the assimilation of nasals in other morphological contexts (including non-derived environments) to the point of articulation of the following consonant. In sum, there is no morphologically governed rule of Preconsonantal W-Deletion (to provide Fukui's version of the rule with a name). Rather, there is a very general, purely phonological rule that I will refer to as Coda Feature Deletion that deletes features other than [voice] from coda consonants.³

The second fact discussed by Fukui concerns the paradigm of the verb *iw*- "to say", whose present affirmative neutral indicative form is the apparently exceptional [yu:], "...regarded as a mystery in Japanese verbal morphology within the traditional analyses (see, among others, Bloch (1946))..." ⁴ Fukui follows the standard derivation of this form, taking the underlying form to be *iw + ru*, with the suffix-initial /r/ deleted by Continuant Deletion, which deletes a continuant consonant after another consonant, and the stem-final /w/ deleted by W-Deletion, which deletes /w/ before non-low vowels. The problem is to account for the derivation of [yu:] from the intermediate stage /iu/. In Poser (1986) I proposed that a rule of Glide Formation applied, moving the features specifying the /i/ into the onset, leaving the nucleus position free for the /u/ to spread into. Fukui proposes instead that it is W-Deletion that leaves a trace into which the /u/ spreads. The /i/ then becomes /y/ by Glide Formation, now formulated so as not to leave a trace.

Finally, Fukui discusses some casual speech reductions in which a sequence of the form *e{b,w}a* becomes *ya*: (e.g. *ikeba* => *ikya*:). Agreeing with my own observation that the assimilation of the /b/ or /w/ to the following /a/ proposed by Miyara (1980) is unnatural and unlikely, Fukui proposes instead that the rule that deletes the *w* or *b* (which I will call Casual Speech Labial Deletion) leaves behind a trace, into which the following /a/ spreads. Here again Fukui relies on my rule of Glide Formation to convert the front vowel (here /e/) to a glide, again assuming that this rule does not leave a trace. This analysis is a bit surprising, since it is merely one way (on some current views the only way) of implementing assimilation, which both he and I both find so suspicious in this case. My own proposal avoided this apparently unnatural assimilation by treating Casual Speech Labial Deletion as a complete deletion (leaving no trace), obtaining the lengthening of the /a/ by compensatory lengthening resulting from spreading into the position left empty by Glide Formation.

² To my knowledge no rule of this form (i.e. restricted to /w/ and/or formulated as a total deletion) has ever been proposed for Japanese; contrary to Fukui's implication, no such rule is to be found in McCawley (1968), who invokes a rule of assimilation of point of articulation (rule 14 in the summary on p. 125) to handle this. McCawley could not have had a rule of the form attributed to him by Fukui, since he treats the *w*-stems as underlying *p*-stems and the rules that convert underlying /p/ to [w] do not apply in pre-consonantal position.

³ This restriction of the deletion to the supralaryngeal features is necessary if the same rule that applies in the verbal paradigm is to handle the other cases of nasal point-of-articulation assimilation, since the latter takes place even in contexts in which the following consonant is voiceless. This means that Leftward Spread cannot be formulated exactly as Fukui gives it, since his formulation requires that the segment onto which the spreading occurs be entirely devoid of feature specifications. Leftward Spread must rather be formulated so as to spread the supralaryngeal features onto segments unspecified for these same features. Indeed, one may speculate as to whether the spreading of one feature onto a segment can ever depend upon the absence of specifications for any features on the same segment. I conjecture that no rules with such conditions exist.

⁴ It is quite true that this form is considered mysterious by many authors, but this reference to Bloch does not give him due credit. In point of fact, Bloch (1946:13,fn.10) recognized that this form was entirely regular, noting that "The Ind form *yuu* is the result of an automatic morphophonemic change *iwu* (*yewu*) > *yuu*." Bloch here follows the standard practice in Japanese linguistics of writing long vowels as double which I have avoided here in order to avoid ambiguity, representing vowel length instead by a following colon. (The *yewu* in parentheses reflects Bloch's tentative suggestion that /i/ might be phonemicized /ye/.)

At this point it will be instructive to summarize the rules assumed by Fukui and by the present author relevant to the facts at issue here. Rules taken to leave a trace are designated (T); others are designated (NT).

(2) Summary of Rules

Fukui		Poser	
(1) Pre-Consonantal W-Deletion	T	(1) Coda Feature Deletion	T
(2) Casual Speech Labial Deletion	T	(2) Casual Speech Labial Deletion	NT
(3) Continuant Deletion	NT	(3) Continuant Deletion	NT
(4) W-Deletion	T	(4) W-Deletion	NT
(5) Leftward Spread	NT	(5) Leftward Spread	NT
(6) Glide Formation	NT	(6) Glide Formation	T

As previously noted, my rule of Coda Feature Deletion subsumes Fukui's Pre-Consonantal W-Deletion. The rule of Leftward Spread, stated explicitly by Fukui, is implicit in my own analysis, the difference being that in Poser (1986) I assumed that the requisite spreading came about by convention rather than by language-particular rule. Whether one takes the spreading to be accomplished by rule or convention has no effect on the analysis and so is not at issue here. Otherwise, with the exception of whether or not a given rule leaves a trace, the two rule systems are the same.

Consider now Fukui's argument for the superiority of his analysis. He claims that under his proposal the compensatory lengthening phenomena observed in the present tense of *iw-* and the casual speech reductions, and the gemination observed in the past tense forms of *w-*stem verbs can be related to each other, while under my proposal they are unrelated and the gemination phenomena require an additional rule. This is not the case. In both analyses a position that is emptied by one rule is filled by spreading from the right. In both analyses distinct rules are required to create the empty position in the compensatory lengthening and gemination cases. In sum, in both analyses the two phenomena are related in that an empty position is filled by spreading from the right, and in both analyses the two phenomena are distinct in that the empty positions are created by distinct rules.

The real differences between the two proposals lie in which rules are taken to leave traces. Inspection of the above table will reveal that we disagree on the formulation of three rules. I claim that Glide Formation leaves a trace and that W-Deletion and Casual Speech Labial Deletion do not, while Fukui claims that both the latter two rules leave a trace and that Glide Formation does not. Notice that of these three Glide Formation is the only rule that removes features from a position in the rhyme; both of the others are deletions from the onset.

The least clear case is that of Casual Speech Labial Deletion. Insofar as assimilation of /b/ or /w/ to a following /a/ is taken to be unnatural, as both Fukui and I agree, my analysis, on which Casual Speech Labial Deletion does not leave a trace and the lengthening is induced by Glide Formation, is preferable to Fukui's, but there is no decisive evidence.

In the remaining two cases, however, the matter is readily settled. Consider first whether W-Deletion leaves a trace. If it does, then the vowel following a deleted /w/ should invariably lengthen as the result of the subsequent application of Leftward Spread. But as inspection of the paradigms of any of the dozens of *w-*stem verbs other than *iw-* (some of which are listed in (3)) will show, W-Deletion is not in general

accompanied by lengthening of the following vowel.⁵ Indeed, other forms of the verb *iw-*, in which the /w/ is deleted before the front non-low vowels /e/ and /i/,⁶ show no lengthening of the vowel following the underlying /w/, as illustrated in (4). In fact, *yu:* is the *only* form in the entire language in which W-Deletion is accompanied by lengthening of the following vowel. Thus, the prediction of Fukui's claim that W-Deletion leaves a trace is false; W-Deletion does not leave a trace.

(3) Present Non-Polite Affirmative Forms of W-Stem Verbs

Stem	Predicted Form	Actual Form	Gloss
haw	hau:	hau	crawl
kaw	kau:	kau	buy
kuw	kuu:	kuu	eat
maw	mau:	mau	dance
ow	ou:	ou	carry
o:w	o:u:	o:u	cover
sow	sou:	sou	skirt (coast)

(4) Selected Forms of *iw-*

Underlying Form	Predicted Form	Actual Form	Analysis
<i>iw+e+ru</i>	<i>ie:ru</i>	<i>ieru</i>	stem+potential+present
<i>iw+reba</i>	<i>ie:ba</i>	<i>ieba</i>	stem+provisional
<i>iw+mas+ru</i>	<i>ii:masu</i>	<i>i:masu</i>	stem+politeness_to_addressee+present

Although Fukui's analysis is flawed as it stands, the possibility remains that some additional rule could be added to patch things up. An *LI* referee suggests that Japanese has a "surface phonetic constraint" that bars a vowel followed by a long vowel in hiatus. In the case of [yu:] Glide Formation will bleed this constraint by desyllabifying the first vowel, leaving the /u/ long. In all other cases the vowel lengthened by spreading into the position formerly occupied by the /w/ will be shortened in order to satisfy this constraint.⁷ However, no such constraint can be maintained for Japanese; sequences of the type prohibited by the proposed constraint are to be found throughout the Japanese lexicon.

Arbitrarily many forms containing the sequences [i\$i:] and [e\$i:]⁸ may be constructed by attaching to any verb the stem /i/ and the adjectival present tense suffix /i/ to obtain a form meaning "easy to V". The examples in (5) represent a consonant-stem verb and the two types of vowel-stem verbs, ending in /i/ and /e/ respectively.

⁵ I have given here the present non-polite affirmative indicative forms, though I might equally well have chosen any form other than the non-polite negative forms, which are the only ones in which the /w/ is followed by a low vowel and therefore not deleted.

⁶ The /i/ that triggers deletion of the stem-final /w/ in *i:masu* is, on my analysis, epenthetic, and therefore not properly shown in the underlying representation.

⁷ I here interpret the proposed constraint as a phonological rule of the ordinary sort. No mainstream version of phonological theory provides a notion of "surface phonetic constraint", nor am I aware of any proposal at all that is sufficiently well worked out and coherent for me to attempt to deal with it directly.

⁸ Where it is important to indicate the location of a syllable boundary in the following examples I mark it with a \$.

(5) Easy to V Forms

Stem	Derivative	Gloss
yom-	yomi\$:	"easy to read"
mi-	mi\$:	"easy to see"
tabe-	tabe\$:	"easy to eat"

The putatively prohibited sequences are found in all sorts of nominal compounds, as illustrated in (6). The first five examples are pure Sino-Japanese compounds, the next two are purely native, and the last consists of a loanword from English and a Sino-Japanese morpheme.

(6) Compound Nouns

Compound	Gloss
zyo\$:	queen
kyo\$:	pride and stubbornness
a\$:	Eurasia
to\$:	visit Europe
i\$:	sulfur
iya\$:nasi	compulsory
e\$:gi	illustrated fan
eziputo\$:	king of Egypt

In addition to compounds, V\$V: sequences are readily found in prefix-stem collocations. The examples in (7) illustrate the honorific prefix /o/ affixed to both nouns and verbs beginning with long vowels.

(7) Prefix-Stem Sequences

Form	Gloss
o\$:kata	honorific + "manner of speaking"
o\$:gi	honorific + "fan"
o\$:su	honorific + "ace"
o\$:si-ni-nar-	honorific + "cover" + additional suffixes

Reduplicated forms also violate the proposed constraint. The process of *renyookei* reduplication produces verb forms like [i:\$i:] "shooting (arrows)", while from the onomatopoeic stratum we have the two homophonous adverbs [o:\$o:], one meaning "gloomily", the other "sometimes".

Such examples as these leave open the possibility that a more restricted phonological rule might be invoked since all of them arguably contain an internal word boundary. However, even this is implausible in view of the variety of counterexamples that may be adduced that contain no such strong boundary.

The so-called "tentative" suffix has the form [o:] after consonant stem verbs, including the /w/-stems. As the examples in (8) illustrate, this leads to sequences of the form [a\$:], [o(:)\$:], and [u\$:].

(8) Tentative Forms of /w/-Stem Verbs

Stem	Tentative	Gloss
haw-	ha\$0:	crawl
kaw-	ka\$0:	buy
kuw-	ku\$0:	eat
naw-	na\$0:	twist
ow-	o:\$0:	carry
o:w-	o:\$0:	cover

Similar sequences arise in the hyperpolite forms of adjectives whose stems end in two vowels in hiatus, as illustrated in (9).⁹

(9) Hyperpolite Adjectives

Stem	Derivative	Gloss
ao-	a\$0:	blue
yowa-	yo\$0:	weak
nau-	na\$u:	new

The present tense forms of the two adjectives whose stems end in /ai/, [kawa\$ɪ:] "cute" (< kawai + i) and [ka\$ɪ:] "itchy" (< kai + i), yield counterexamples to the proposed rule.

Finally, loanwords containing such sequences, where no boundary of any kind separates the two vowels in hiatus, are readily adopted and show no tendency to shorten the putatively offending long vowel.

(10) Loanwords Containing V\$V: Sequences

Loan	Gloss
na\$ɪ:bu	naive
ra\$u:ru	Raoult
urusi\$0:ru	urushiol
zi\$0:ru	diol

From these examples I conclude that there is little hope of generating correct verb forms in an analysis in which W-Deletion leaves a trace.

⁹ These are forms of adjectives, consisting of the stem plus the suffix /u/, used with the auxiliary verb *gozaru* in hyperpolite speech. They are historically adverbs, and indeed segmentally identical forms are used in the Kansai dialects as the ordinary adverbial forms of adjectives.

Turning to the question of whether Glide Formation leaves a trace, we may begin by noting that insofar as it is impossible to attribute the lengthening in *yu:* to a trace left by W-Deletion the only obvious alternative is to attribute it to Glide Formation. But in addition to the paradigm of *yu:* two additional sets of facts, both discussed at greater length in Poser (1986), demonstrate that Glide Formation leaves a trace.

The first set of facts are the forms of hyperpolite adjectives. When the adjective stem ends in /i/, the result is [yu:]. A couple of examples are given in (11).¹⁰ Here there is no segment intervening between the /i/ and the /u/ at any point in the derivation, so that the lengthening cannot be attributed to W-Deletion or any other deletion rule. The only possible source of the lengthening is Glide Formation.

(11) Hyperpolite Adjectives

Underlying Form	Surface Form	Gloss
o:ki+u kawai+u	o:kyu: kawayu:	big cute

The second set of facts are the Japanese forms of foreign words, borrowed from Dutch, German, and English, in *-ium* and *-eum*, which show up in Japanese with the ending *-yu:mu*, as illustrated in (12). This is predicted if Glide Formation leaves a trace. Here again, the lengthening cannot be attributed to any deletion rule since there is nothing to be deleted in the source forms of these words, and no reason to believe that in nativizing their underlying representations Japanese introduces a /w/ or anything else whose deletion might induce lengthening. No such principle of nativization has been proposed in the literature on Japanese loan phonology (Lovins 1975), nor is there any motivation for such a principle in the form of constraints on underlying representations in Japanese. If /w/ is introduced by such a principle, it is noteworthy that there are no other environments in which it reveals itself by inducing compensatory lengthening, as we would expect if, for example, it were inserted in order to prevent some sort of impermissible hiatus.

(12) Examples of Loanwords in *-ium*

¹⁰ As explained in detail in Poser (1986), although examples that undergo Glide Formation are quite common, examples that overtly exhibit it are quite rare due to the fact that there are very few *i*-stem adjectives such that the [y] derived by Glide Formation will not be deleted following the consonant preceding the stem-final *i*. The majority of *i*-stem adjectives end in /si/ ([si]), and [y] is not permitted after [s].

Japanese Form	Foreign Source
aruminyu:mu	aluminium
arusinoiteryu:mu	arsinootherium
baryu:mu	barium
iriryu:mu	illirium
karukyu:mu	kalkium
opyu:mu	opium
puranetaryu:mu	planetarium
rinoryu:mu	linoleum
serenyu:mu	selenium
tsuryu:mu	thulium
uranyu:mu	uranium
zeranyu:mu	geranium

In sum, neither W-Deletion nor Casual Speech Labial Deletion leaves a trace, but Glide Formation must be formulated so as to leave a trace and induce lengthening of the following vowel. The Japanese facts thus provide no counterexample to the generalization that only deletions from the rhyme induce compensatory lengthening. They do support the autosegmental theory of compensatory lengthening against that of deChene & Anderson (1979).

References

- Bloch, Bernard (1946) "Studies in Colloquial Japanese, Part I, Inflection," *Journal of the American Oriental Society* 66,97-109. Reprinted in Roy Andrew Miller (ed.) *Bernard Bloch on Japanese*. (New Haven: Yale University Press, 1970)
- deChene, Brent & Stephen Anderson (1979) "Compensatory Lengthening," *Language* 55,505-535.
- Fukui, Naoki (1986) "Leftward Spread: Compensatory Lengthening and Gemination in Japanese," *Linguistic Inquiry* 17.2,359-64.
- Lovins, Julie B. (1975) *Loanwords and the Phonological Structure of Japanese*. University of Chicago Ph.D. dissertation (1973), distributed by Indiana University Linguistics Club.
- McCawley, James D. (1968) *The Phonological Component of a Grammar of Japanese*. The Hague: Mouton.
- Miyara, Shinshoo (1980) "Phonological Phrase and Phonological Reduction," *Papers in Japanese Linguistics* 7,79-122.
- Poser, W. (1986) "Japanese Evidence Bearing on the Compensatory Lengthening Controversy," in E.Sezer & L. Wetzels (eds.) *Studies in Compensatory Lengthening* (Dordrecht: Foris.) pp. 167-87.