Issues in the diachronic phonology of the onset consonants of Japanese

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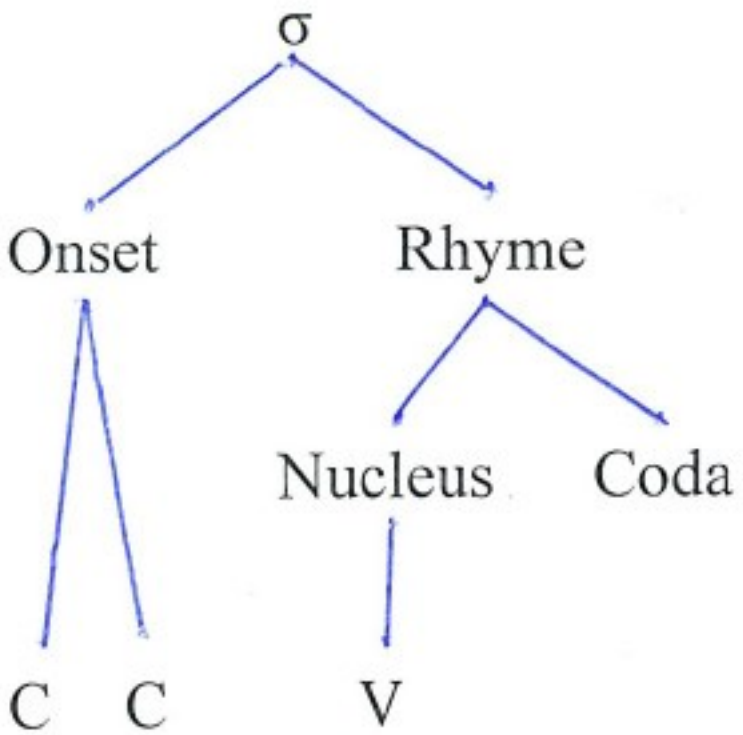
In this talk I will discuss the phonological interpretation of the phonetic realization and the phonetic and phonemic changes which have affected the Old Japanese onset consonants /p, t, k, b, d, g, s, z/ and their reflexes in later stages of the language.

Syllable structure

Through thirteen centuries of attested history, from Old Japanese (上代日本語, c. 700 - 800 AD) to the present day, the Japanese language has undergone one major structural sound change, namely the introduction of *quantity sensitivity* (or: the distinction between long and short syllables), structurally to be understood as the introduction of complex syllable nuclei. This seems to have taken place around 800 AD.

Old Japanese syllable structure

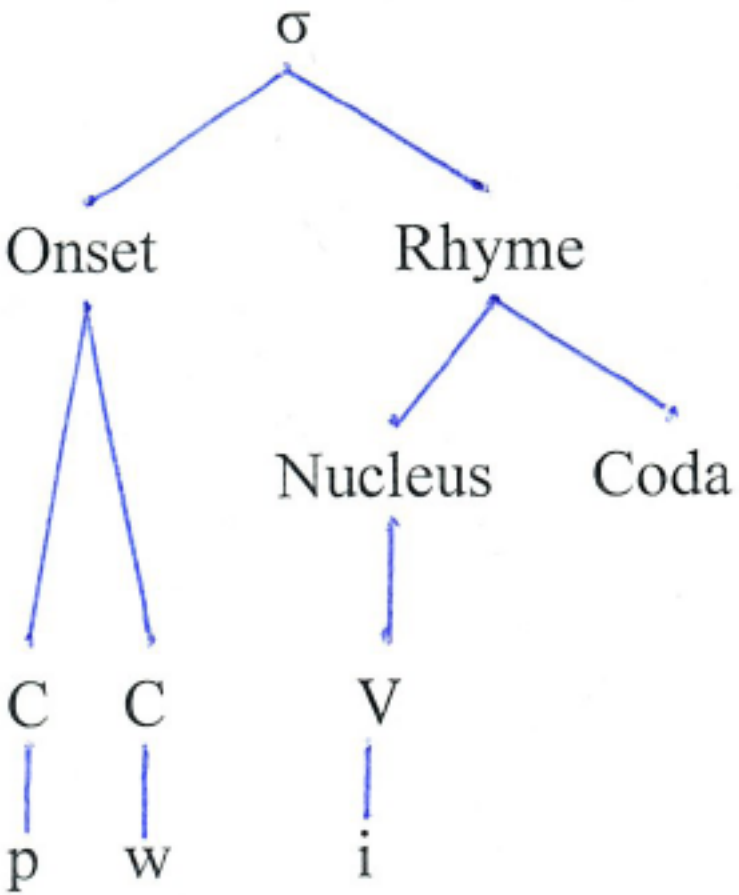


/pwi/ ‘fire’

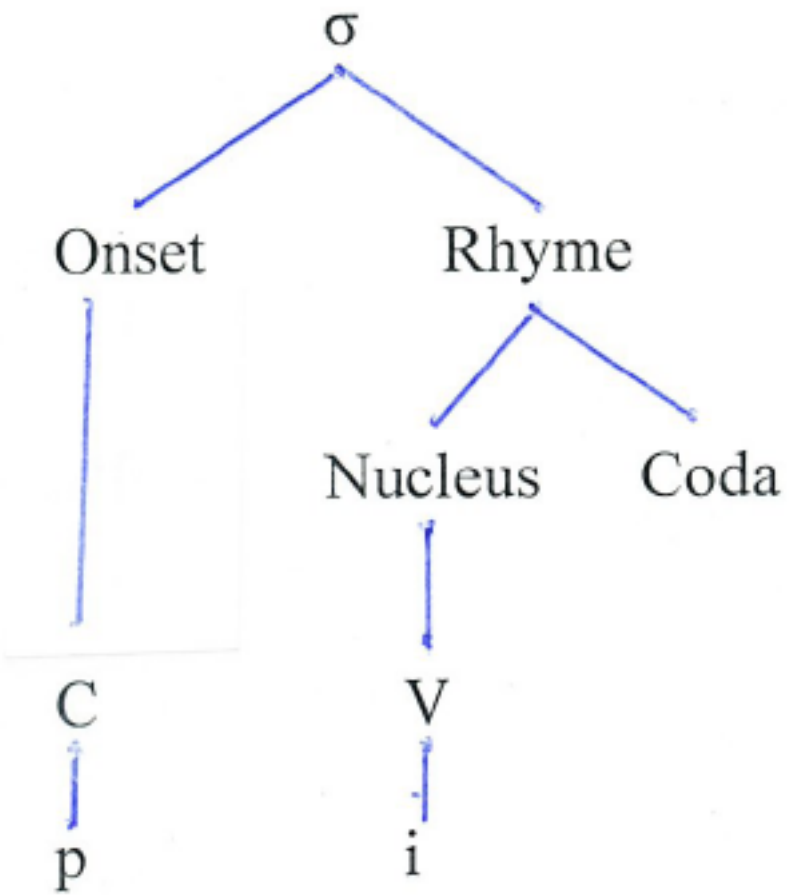
/pi/ ‘sun’

/pada/ ‘skin’

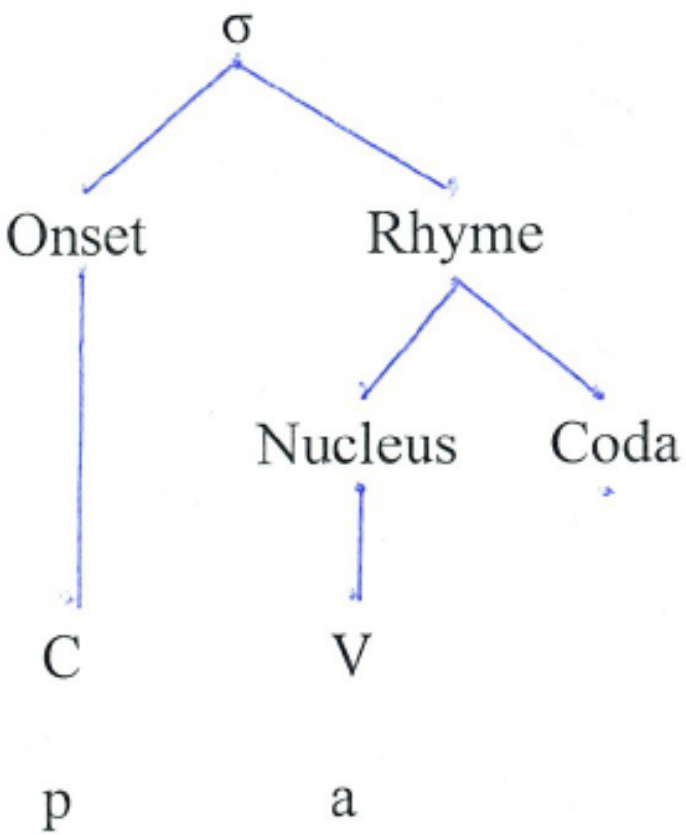
/pwi/ ‘fire’

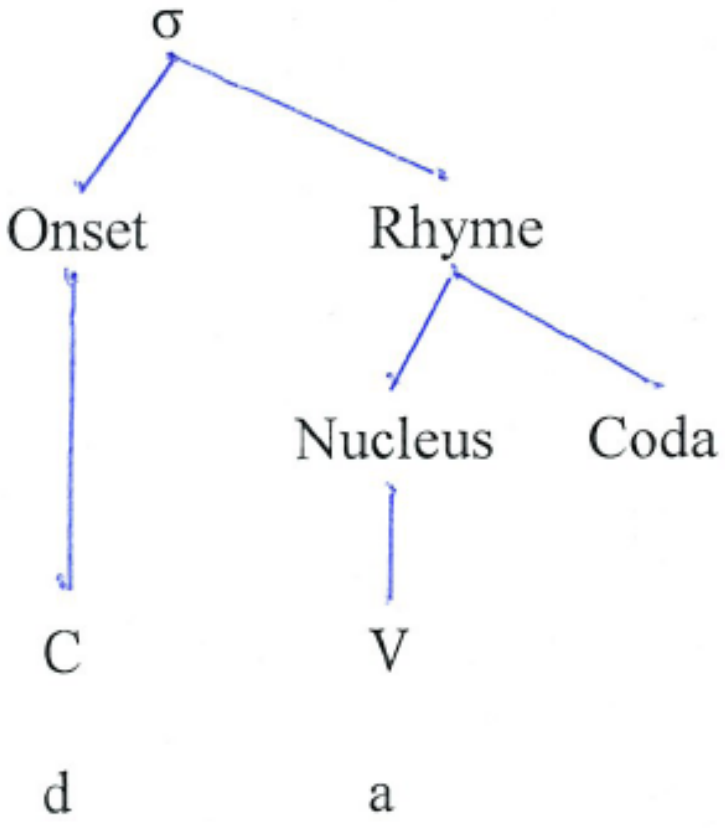


/pi/ ‘sun’



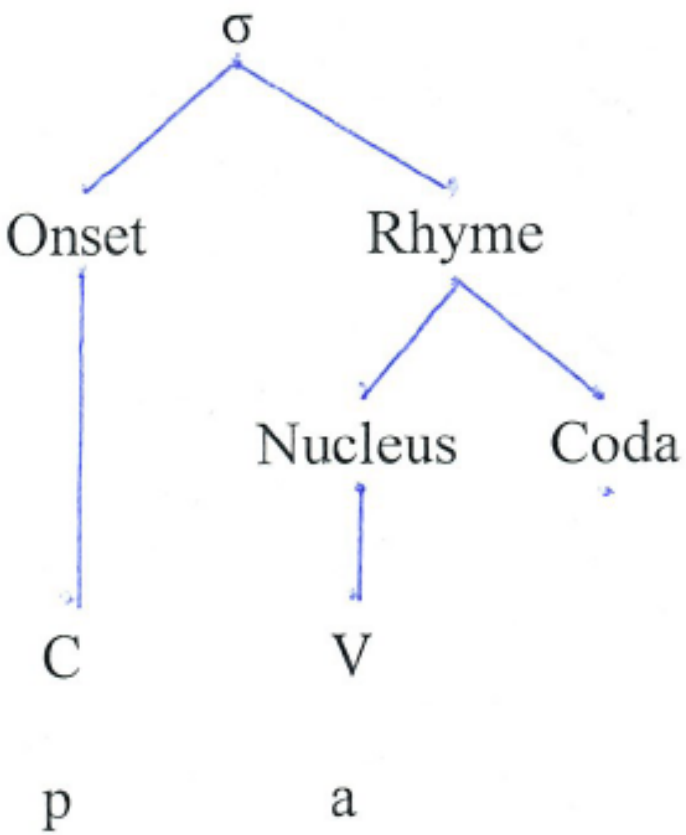
/pada/ ‘skin’

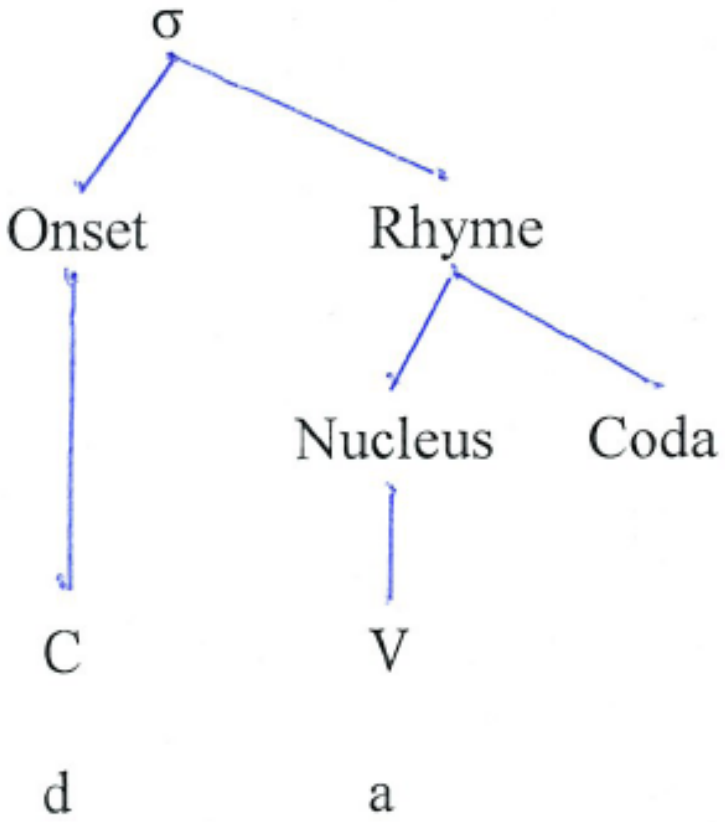

σ
Onset
Rhyme
Nucleus
Coda
C
V
p
a


σ
Onset
Rhyme
Nucleus
Coda
C
V
d
a

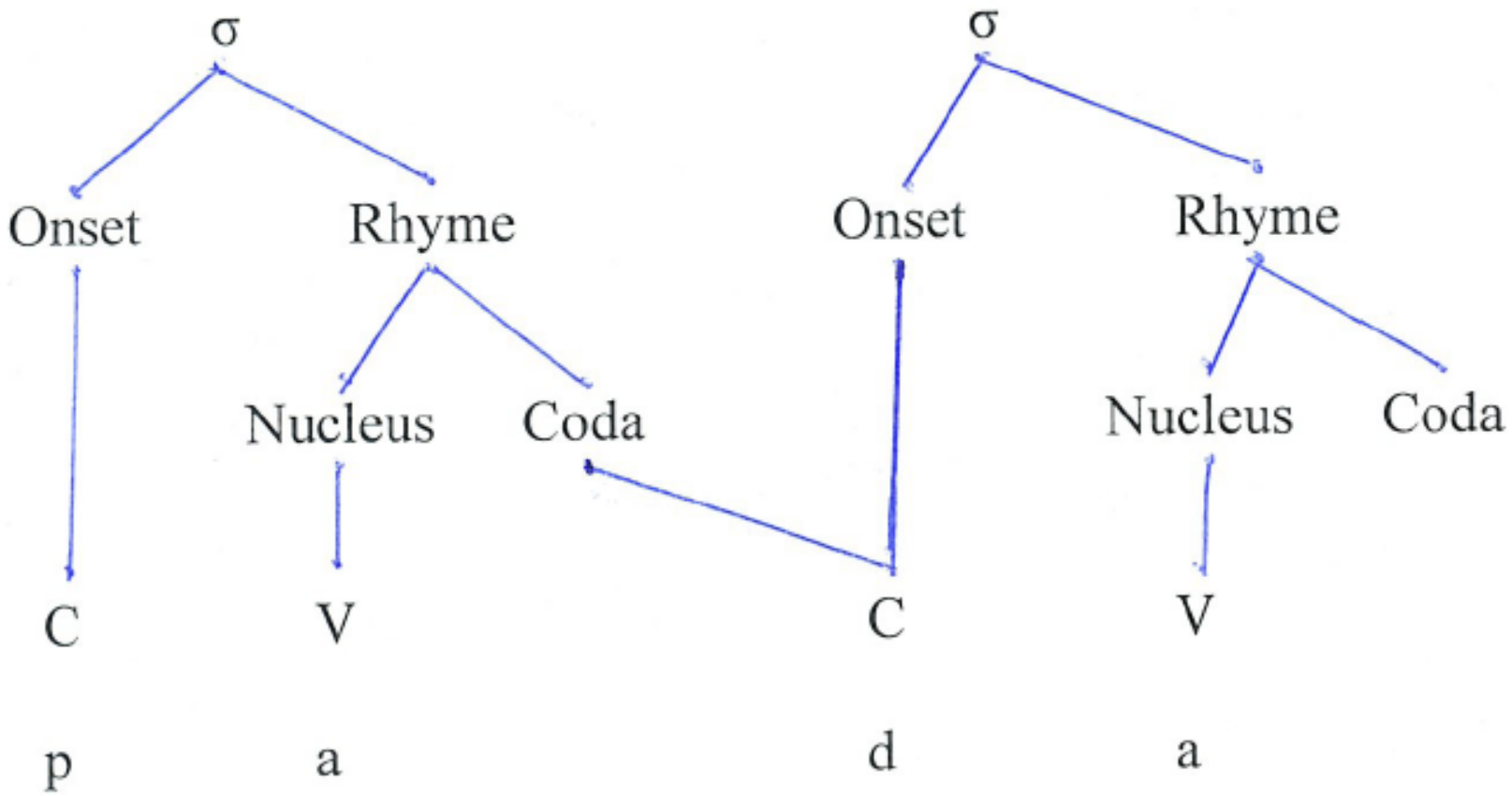
Ambisyllabication

/pada/ ‘skin’


σ
Onset
Rhyme
Nucleus
Coda
C
V
p
a


σ
Onset
Rhyme
Nucleus
Coda
C
V
d
a

/pada/ ‘skin’


σ
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Nucleus
Coda
C
V
p
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C
V
d
a

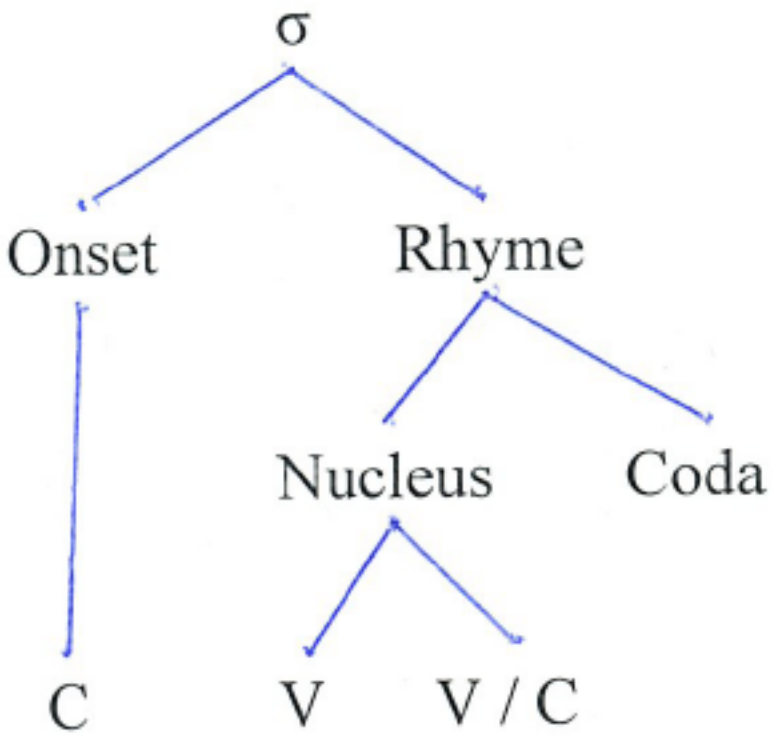
Post-OJ syllable structure

Post-OJ syllable structure

Introduction of ***quantity sensitivity***
(the distinction between *long and short*, or *heavy and light* syllables),

that is, the introduction of *complex (or branching) syllable nuclei* .

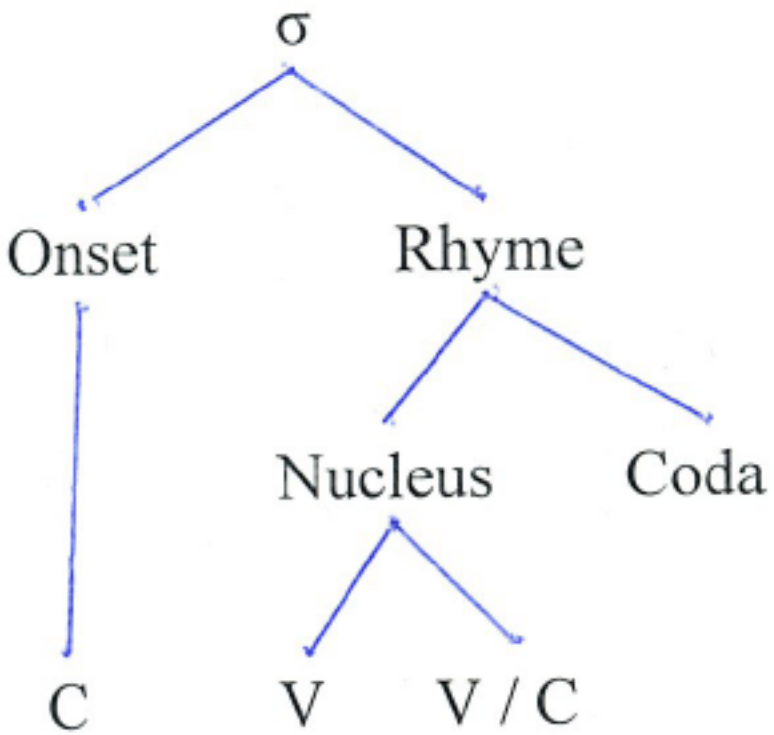
Post-OJ syllable structure



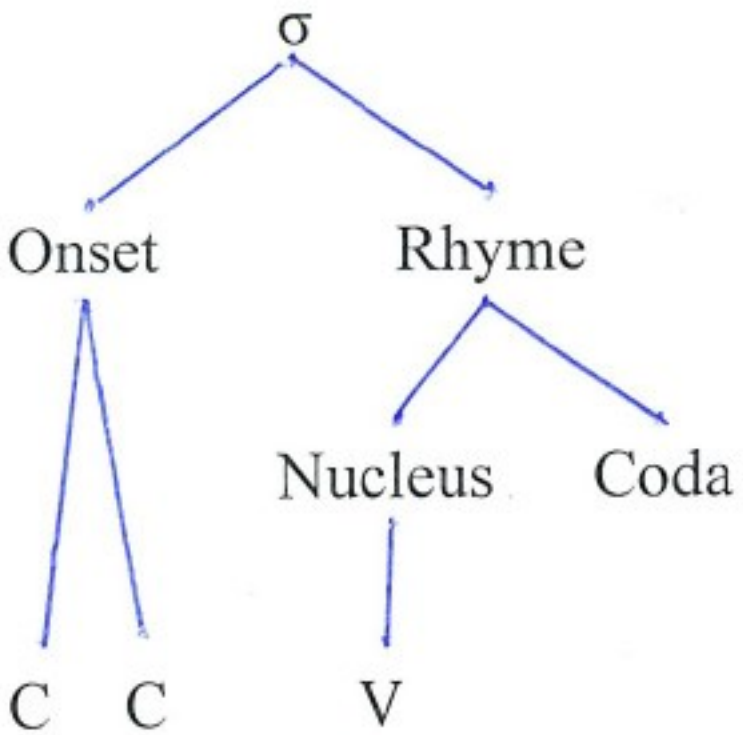
Phonemes which occur in the new (nuclear post-peak) syllable position:

/N, Q, C, I, Ĩ, U, Ũ, V/

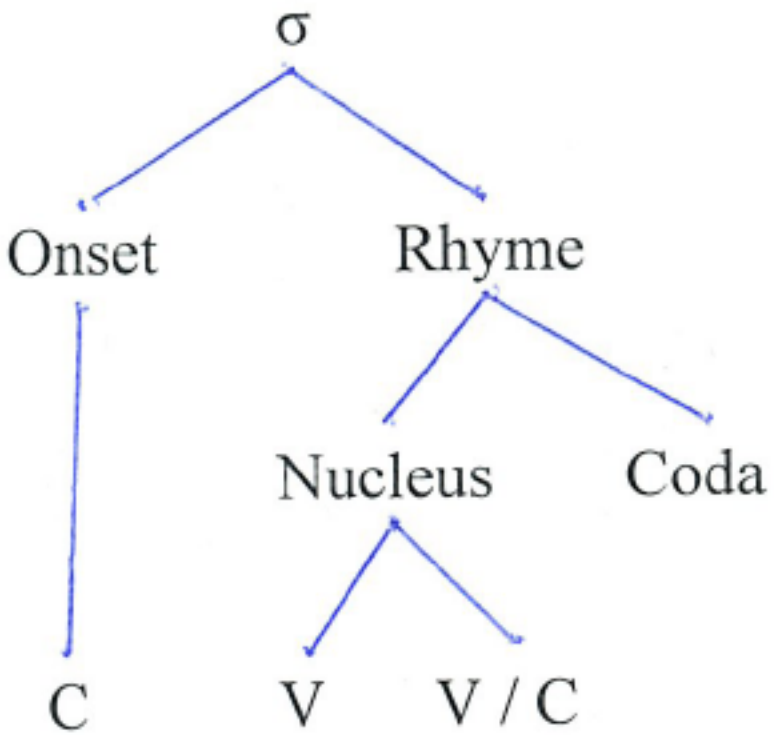
Post-OJ syllable structure



Old Japanese syllable structure

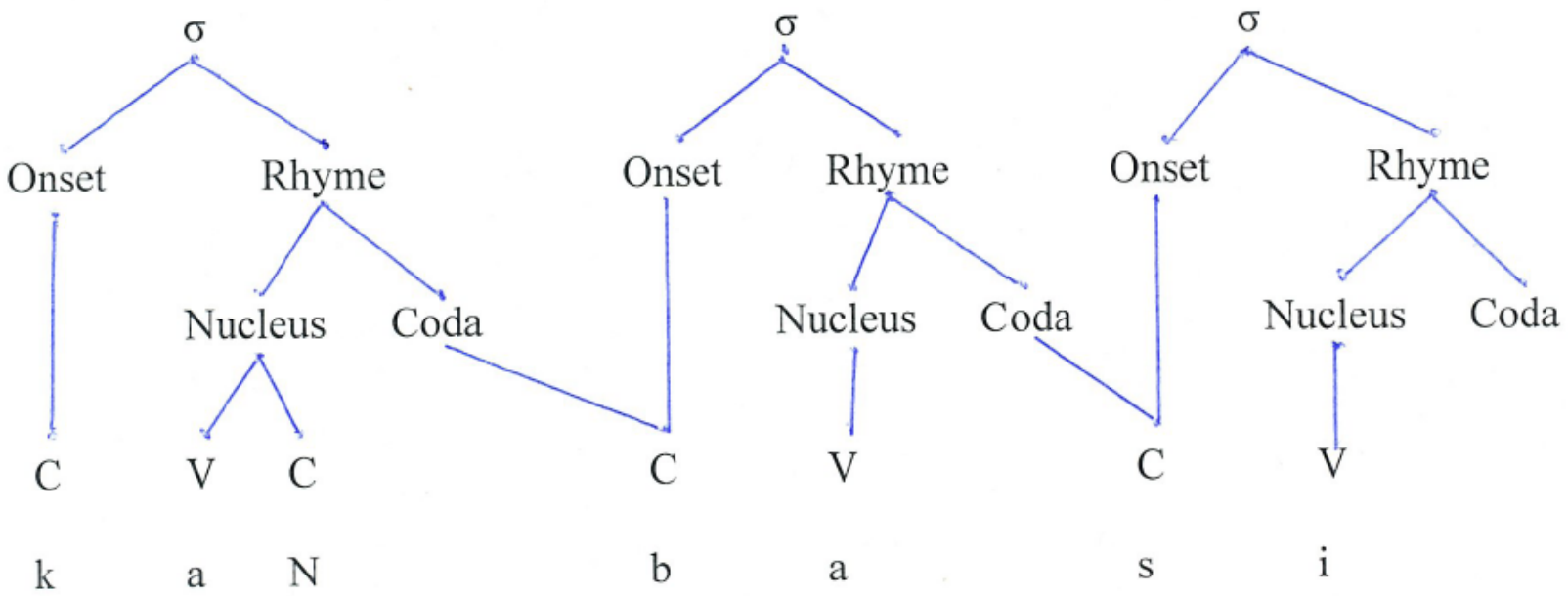


Post-OJ syllable structure

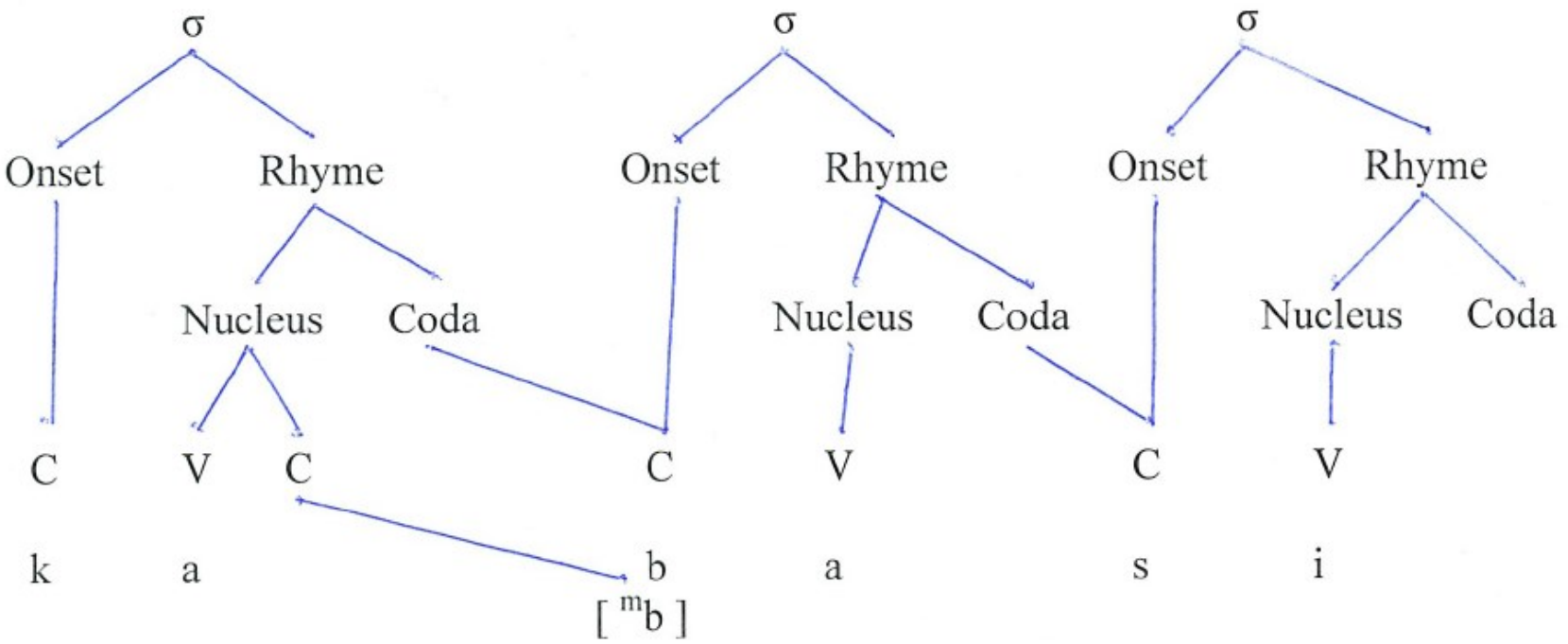


/kaNbasi/ ‘fragrant’

/kaNbasi-/ ‘fragrant’



/kaNbasi-/ ‘fragrant’



Segmental phonology

Other than the introduction of new syllable post-peak phonemes accompanying the change in syllable structure around the beginning of the EMJ period, the Japanese language has undergone remarkably few segmental sound changes.

Proto-Japanese vowels

/*i, *e, *a, *o, *u, *ɨ, *ə/

Old Japanese vowels

/i, e, a, o, u/

Proto-Japanese consonants

/*p, *t, *k, *s, *m, *n, *r, *w, *y/

/*nt/ > /d/, etc.

Old Japanese consonants

/p, t, k, s, b, d, g, z, m, n, r, w, y/

Post-OJ onset consonants

OJ and EMJ

/p, t, k, s, b, d, g, z, m, n, r, w, y/

Post-OJ onset consonants

OJ and EMJ

/p, t, k, s, b, d, g, z, m, n, r, w, y/

LMJ

/p, t, k, f, s, b, d, g, z, m, n, r, w, y/

Post-OJ onset consonants

OJ and EMJ

/p, t, k, s, b, d, g, z, m, n, r, w, y/

LMJ

/p, t, k, f, s, b, d, g, z, m, n, r, w, y/

NJ (until late 19th century)

/p, t, k, s, b, d, g, z, m, n, r, w, y, h/

However, although the inventory of onset consonant phonemes has remained quite stable since Old Japanese, a number of regular sound changes have taken place which both have changed the phonemic shape of words and morphemes and appreciably have changed the sound texture of the language.

These changes fall in a two overall sets:

(1) Phonemic changes

(2) Phonetic changes

Phonemic changes

(a) Changes in the phonotactic distribution of segments, particularly of the glides /w, y/, resulting mainly from loss of /w, y/ in many environments. This includes the loss of the socalled *kō-otsu* (甲類・乙類) syllable distinction and the loss of syllable initial /w/ before /o, i, e/ and of /y/ before /e/.

(b) Lenition of /p/, with change of intervocalic /-p-/ to /-w-/ in the 10th century (and subsequent loss before /u, o, i, e/, cf. above) and change of initial /p/ to /f/ sometime in the Middle Japanese period, followed by change to /h/ in the first half of the Modern Japanese period.

Phonemic changes, examples

OJ	EMJ	LMJ
/**kwo.pwi**/ 'love' >	/kwo.pi/ > /ko.pi/ > /ko.wi/ > /**koi**/	
/**winokwo**/ 'boar, pig' >	/winoko/ >	/**inoko**/
/**wotokwo**/ 'man' >	/wotoko/ > /**otoko**/	
/**mapye**/ 'front' >	/mape/ > /mawe/ > /**mae**/	
/**nuye**/ 'thrush/ >	/**nue**/	
/**yeda**/ 'branch' >	/**eda**/	
/**kapo**/ 'face' >	/kawo/ > /**kao**/	
/**kapa**/ 'river' >	/**kawa**/	
/**para**/ 'field'		/fara/ > NJ /**hara**/

Phonetic changes

Changes in phonetic realization rules, only to a small extent resulting in phonotactic or phonemic changes; the most important of these phonetic changes concern the phonetic parameters of

(a) **[+/-nasal] and [+/-voice]**

(b) **[+/-continuant] and [+/-strident]**

Pre-nasalization and medial voicing

	OJ	MJ	NJ
	700-800	800-1600	1600-

(i) Loss of medial voicing of
/p, t, k (, s)/
(and introduction of aspiration),

e.g. /-t-/ [-d-] [-$t^{(h)}$-]

(ii) Loss of prenasalization of
/b, d, g, z/,

e.g. /d/ [^{n}d]

[d]

Pre-nasalization and medial voicing

These two interrelated phonetic changes had no visible phonemic consequences, but resulted in a significant change in the sound texture of Japanese, as shown here in the pronunciation of the word /tanabata/ 'Vega, the Weaver' in OJ and in NJ:

	OJ	NJ
/tanabata/	[tãnã^{m}bada]	[t^{h}anabat^{h}a]

Continuousness in OJ and EMJ

Continuousness in OJ (and EMJ)

/s; z/ had both fricative and affricative variants

/s/ [s, ^{t}s, -z, -^{d}z]

/z/ [^{n}z, ndz]

/p/ had both occlusive and fricative variants

/p/ [p, ɸ, -b, -β]

/b, k, g/ most likely had both occlusive and fricative variants

/b/ [^{m}b, ^{m}β]

/k/ [k, x, -g, -ɣ]

/g/ [^{ŋ}g, ^{ŋ}ɣ]

/t; d/ possibly had both occlusive and fricative variants

/t/ [t, θ, -d, -ð]

/d/ [^{n}d, ^{n}ð]

Stops, fricatives and affricates are distinguished in terms of the phonetic parameters

[+/-continuant] and [+/-strident]

Feature definitions from Jakobson and Halle 1968 ('The revised version of the list of inherent features')

strident/mellow (distinguishes sibilants from non-sibilants):

"presence (*vs.* absence) of a higher intensity noise accompanied by a characteristic amplification of the higher frequencies and weakening of the lower formants"

abrupt/continuant (distinguishes occlusives (stops and affricates) from fricatives):

"silence (at least in the frequency range above the vocal cord vibration) followed and/or preceded by a spread of energy over a wide frequency region, either as a burst or as a rapid transition of vowel formants (*vs.* absence of abrupt transition between sound and silence)"

Consonants phonetically defined in terms of [+/-strident] and [+/-continuant]

	stops		fricatives		affricates
	[p, b, t, d, k, g	ɸ, β, θ, ð, x, ɣ	f, v, s, ʃ, z, ʒ		ʧ, ʦ, ʤ, ʣ]
[strident]	-	-	+		+
[continuant]	-	+	+		-

OJ consonant variants classified by [+/-strident] and [+/-continuant]

		strident	continuant
/s/	[s, -z]	+	+
	[^{t}s, -^{d}z]	+	-
/z/	[^{n}z]	+	+
	[ndz]	+	-
/p/	[p, -b]	-	-
	[ɸ, -β]	-	+
/b/	[^{m}b]	-	-
	[^{m}β]	-	+
/k/	[k, -g]	-	-
	[x, -ɣ]	-	+
/g/	[^{ŋ}g]	-	-
	[^{ŋ}ɣ]	-	+
/t/	[t, -d]	-	-
	[θ, -ð]	-	+
/d/	[^{n}d]	-	-
	[^{n}ð]	-	+

OJ and EMJ phonemic system

		strident Phonemic, invariant	[continuant] Redundant, subject to variation
/s/	[s, -z]	+	+
	[^{t}s, -^{d}z]	+	-
/z/	[^{n}z]	+	+
	[ndz]	+	-
/p/	[p, -b]	-	-
	[ɸ, -β]	-	+
/b/	[^{m}b]	-	-
	[^{m}β]	-	+
/k/	[k, -g]	-	-
	[x, -ɣ]	-	+
/g/	[^{ŋ}g]	-	-
	[^{ŋ}ɣ]	-	+
/t/	[t, -d]	-	-
	[θ, -ð]	-	+
/d/	[^{n}d]	-	-
	[^{n}ð]	-	+

OJ and EMJ phonemic system

	/ p, b, t, d, k, g	s, z /
strident	-	+
[continuant]	-/+	+/-

Continuousness in LMJ and NJ

After EMJ the following changes occurred which involve [+/- continuant] and [+/- strident]

(1) At some point, initial /p-/ changed to /f-/. This change is very difficult to date, as it found no orthographic expression, but it was certainly concluded by the end of the LMJ period. It is not known whether this phoneme phonetically was strident: [f]; or mellow (not strident): [ɸ]

(2) /p, t, k, b, d, g/ lost their [+continuant] variants, **e.g.**

	OJ	**NJ**
/k/	[k, x, -g, -ɣ]	[$k^{(h)}$]

(3) In the latter half of the LMJ period, /t, d/ acquired affricative variants before high vowels.

/t/ [t, ʧ, ʦ]

/d/ [d, ʣ, ʤ]

(4) Conversely, /s, z/ lost their affricative variants:

/s/	[s, ʃ]
/z/	[z]

As a result of these changes, /d/ and /z/ merged before the high vowels /i, u/:

*mi**d**u* ’water’
*mi-**z**u* ’not seeing’
*ki**z**i* ’pheasant’
*ki**d**i* ’the road to Kii’

Other than that the main outcome was that individual words and morphemes changed their pronunciation, but with no phonemic mergers or splits, e.g.

/tuma/ ‘spouse’, /katati/ ‘shape’, /usi/ ‘cow’,
/kaku/ ‘write’, /tukuru/ ‘make’, /sima/ ‘island’,
/tikara/ ‘power’.

	OJ		NJ
/**t**uma/	[**t**ũmã]		[**ʦ**uma]
/**s**ima/	[**ᵗʃ**ĩmã]	[**ʃ**ima]	
/**tuk**uru/	[tu**g**uru ~ tu**ɣ**uru]		[**ʦuk^{h}**uru ~ **ʦuk**uru]

LMJ/NJ consonant variants classified by [+/-strident] and [+/-continuant]

		continuant	strident
/p/	[p]	-	-
/t/	[t]	-	-
	[ʧ, ʦ]	-	+
/k/	[k]	-	-
/b/	[b]	-	-
/d/	[d]	-	-
	[ʣ, ʤ]	-	+
/g/	[g, ŋ]	-	-
/s/	[s, ʃ]	+	+
/z/	[z]	+	+
/f/	[f] or [ɸ]	+	?

LMJ and NJ phonemic system

		continuant Phonemic, invariant	[strident] Redundant, subject to variation
/p/	[p]	-	-
/t/	[t]	-	-
	[ʧ, ʦ]	-	+
/k/	[k]	-	-
/b/	[b]	-	-
/d/	[d]	-	-
	[ʣ, ʤ]	-	+
/g/	[g, ŋ]	-	-
/s/	[s, ʃ]	+	+
/z/	[z]	+	+
/f/	[f] or [ɸ]	+	?

LMJ and NJ phonemic system

	/ p, b, t, d, k, g	s, z	f /
continuant	-	+	+
[strident]	+/-	+	?

This means that the phonemic outcome of the "*yotsugana*" merger was as follows:

*ki**z**i* 'pheasant', *ki**d**i* 'the road to Kii' > /kidi/ [kʰidʒi]

*mi**d**u* 'water', *mi-**z**u* 'not seeing' > /mizu/ [mizu]

じ／ぢ is /di/ not /zi/ and should preferably be written ぢ and the romanization should be *di*.

Conclusion

Some of the main phonetic changes which affected onset consonants after the EMJ period may be understood in terms of the ***ranking relationship*** between, between the two distinctive feature categories [+/- continuant] and [+/- strident].

(1) initial /p-/ > /f-/

(2) loss of continuous variants of /p, t, k, b, d, g/

(3) affricativization of /t, d/ before high vowels

(4) loss of affricativization of /s, z/

Conclusion

In OJ and EMJ, the category [+/-strident] was phonemic, allowing for variation with respect to [+/-continuant].

	/ p, b, t, d, k, g	s, z /
strident	-	+
[continuant]	-/+	+/-

Conclusion

At some point the ranking was reversed, leading to the LMJ and NJ system with [+/-continuant] being the phonemic category, allowing for variation with respect to [+/-strident].

	/ p, b, t, d, k, g	s, z	f /
continuant	-	+	+
[strident]	+/-	+	?

Conclusion

It is very likely that phonetic realization and variation observed in some dialects for the reflexes of OJ /p, t, k, s, b, d, g, z/ reflect different ranking relations at different times.

Thank you for your attention

ご清聴ありがとうございました