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The Vowels of Proto-Japanese

Bjarke Frellesvig and John Whitman

1. Introduction

In this paper we propose the following short vowels for pJ:¹

- (1) *i, *e, *a, *o, *u, *ī, *ə

Vowel length has been reconstructed for pJ, based mainly on interpreting low pitch in EMJ as reflecting pJ long vowels, supplemented with Ryūkyūan evidence in the form of what seem to be primary long vowels. Vovin 1993 offers additional external evidence. The precise role of this feature in changes between pJ and OJ is far from clear. Vowel length has been proposed to have been a conditioning environment for certain sound changes. For example, vowel raising only applying to short vowels (Hayata 1998), or loss of *m and *r only taking place after (some) short vowels (Whitman 1985). The hypothesis we set forth here deals only with short vowels.

We employ the transcription in (2) of the OJ *kō/otsu-rui* syllables, which we believe represents a reasonable phonemic interpretation.²

(2)	transcription		examples	examples	
	Orthographic	Phonemic		Gloss	Orthographic
	<i>Ci</i> ₁	/Ci/	‘3’	<i>mi</i> ₁	/mi/
	<i>Ci</i>	/Ci/	‘1,000’	<i>it</i>	/ti/
	<i>Ci</i> ₂	/Cwi/	‘body’	<i>mi</i> ₂	/mwi/
	<i>Ce</i> ₁	/Cye/	‘woman’	<i>me</i> ₁	/mye/
	<i>Ce</i>	/Ce/	‘hand’	<i>te</i>	/te/
	<i>Ce</i> ₂	/Ce/	‘eye’	<i>me</i> ₂	/me/
	<i>Co</i> ₁	/Cwo/	‘child’	<i>ko</i> ₁	/kwo/
	<i>Co</i>	/Co/	‘ear (of grain)’	<i>po</i>	/po/
	<i>Co</i> ₂	/Co/	‘this’	<i>ko</i> ₂	/ko/

The pJ vowels we posit give the vowels and diphthongs of OJ as in (3):

(3) proto-japanese oldjapanese pre-oj sequences oj

*i	i	*uo, *ua	wo
*e	i, ye	*ui, *ii	wi
*a	a	*ai, *ai	e
*o	u, wo	*ia, *ia, *ii	ye
*u	u		
*i	o		
*ə	o		

The main original point in this paper is to posit two pJ sources of OJ /o/ (i.e., *otsu-rui* *o*, *o*₂). We also discuss the hypothesis that two pJ vowels, /*o/ and /*e/, raised to OJ /u, wo/ and /i, ye/, and propose a specific environment for this development. The paper is structured in the following way. In §2 we present what was until recently the standard view, that pJ had only four short vowels. §3 summarizes the problems with that view, leading to the establishment of pJ /*e, *o/. In §4 we propose a novel analysis, based on mid-vowel raising, of the development of the pJ system of demonstratives. In §5 we present and discuss evidence for setting up two pJ sources for OJ /o/; the evidence is both internal and comparative.

2. Four Vowel Hypothesis for Proto-Japanese

Until recently the main view held that there were only four primary pJ vowels (Miller 1967, Ohno 1977; Matsumoto 1974, 1984; Unger 1977): /*i, *a, *u, *ə/ reflected as OJ /i, a, u, o/. This found its main support in the following facts.

2.1. Frequency of OJ Syllable Types

*Co*₁, *Ce*₁, *Ce*, *Ce*₂, and *Ci*₂ are restricted in the OJ lexicon. A count of the text occurrence of the different syllable types in the *Man'yōshū* shows the following distribution (Ohno 1980: 151ff):

(4)	<i>Ci</i> ₁	<i>Ci</i>	<i>Ci</i> ₂	<i>Ce</i> ₁	<i>Ce</i>	<i>Ce</i> ₂
	3,160	6,103	370	686	2,299	853
	<i>Ca</i>	<i>Co</i> ₁	<i>Co</i>	<i>Co</i> ₂	<i>Cu</i>	
	12,120	1,030	3,631	5,280	6,415	

A frequency count in running text gives no accurate picture of lexical distribution, but these figures do indicate that the main primary vowels were those in the syllables *Ci*₍₁₎, *Ca*, *Co*₍₂₎, *Cu*.

2.2. Lexical Distribution of *Cye*, *Ce*, *Cwi*, *Cwo*

Cwi is infrequent in the OJ lexicon. It is almost exclusively found in morpheme-final position. The only exceptions among simple forms are: *mwina* ‘all’, *pwiwe-* ‘to scrape, slice thin’, *kwisi* ‘shore’, *kwiri* ‘fog’. Of these, *mwina* may be thought to be a compound: *mwi-na* ‘body-person’; about *pwiwe-*, see Whitman 1985: 133; *wi* in *kwisi* and *kwiri* may in fact be rare examples of sporadic “umlaut” under influence of *i* in the following syllable, going back to **kusi/kosi/k̄isi* and **kuri/kori/k̄iri* (cf. Hachijō-jima *kuri*, K *kwulwum*). Sometimes *kokwida* ‘this much’ is also cited, but that is at least bimorphemic: *kokwi-da*.³ *Cye* and *Ce* are also lexically rather infrequent. By far the most occurrences are in morpheme-final position, but while simple words with nonfinal *Cye* and *Ce* are rare, they are not exceptional. There are, for example, approximately 15 disyllabic *CyeCV* and *CeCV* nouns. It should be noted that although *Cwi*, *Cye*, and *Ce* have a fairly light functional load, they play an important part in OJ verbal morphophonology.⁴ Also *wo* is fairly infrequent and occurs mostly in final position; see further §3.1 below.

It should finally be noted that whereas simple morphemes of the structure *CiCi*, *CaCa*, *CoCo*, *CuCu* all are well represented in the lexicon, there are no simple morphemes of the type *CyeCye*, *CeCe*, *CwiCwi*. *CwoCwo* is rare: *mwomwo* ‘hundred’ and *mwomwo* ‘thigh’ look like reduplications; early OJ *mwokwo* (~ later OJ *mukwo*) ‘partner, bridegroom’ may be a compound with *kwo* ‘child’.

2.3. Secondary Origin of OJ *Cye*, *Ce*, *Cwi*, *Cwo*

An important part of the four vowel hypothesis is that *Cye*, *Ce*, *Cwi*, and *Cwo* arose as contractions of vowel sequences, as in the following frequently cited examples.

- (5) *ia > ye **saki-ari* ‘bloom-is’ > *sakyeri* ‘is blooming’
 *io > ye **pi-oki* ‘sun-put’ > *pyeki* Proper name
 *ai > e **taka-iti* ‘high-market’ > *taketi* Proper name
 *oi > e **tono-iri* ‘palace-enter’ > *toneri* ‘palace servant’
 *ui > wi **waku-iratukwo* ‘young-honored.male’ > *wakwiratukwo*
 *oi > wi **opo-isi* ‘big-stone’ > *opwisi* Proper name
 *uo > wo *situ-ori* ‘native.weaving-weave’ ~ *sitwori* ‘type of cloth’
 *ua > wo **kazu-ap-* ‘number-join’ > *kazwope-* ‘count’

The vowel sequences which were contracted were either (a) simple jux-

tapositions with a vowel initial morpheme as the second part, as in the examples here; in such cases, the vowels were contracted where univerbation took place. Alternatively (b), vowel sequences or diphthongs arose through loss of a consonant. Potential examples of this type are discussed in the next section.

2.4. *Alternation between Primary Vowel and Secondary Vowel/Diphthong*

A number of nouns have alternating shapes with variation in the final syllable; these are often referred to as “apophonic nouns.” One variant, the free form (known as *roshutsukei* ‘exposed form’), occurs in word-final position, while the other, the compound form, (*hifukukei* ‘covered form’), usually occurs in compounds or derived forms. Traditionally the compound form is thought to represent the original shape of the root.

(6)		free form	compound form	
	wi ~ u	‘body’	<i>mwi</i>	~ <i>mu-kapari</i> (‘substitute’) ‘hostage’
		‘spirit’	<i>kamwi</i>	~ <i>kamu-kaze</i> (‘wind’) ‘divine wind’
		‘moon’	<i>tukwi</i>	~ <i>tuku-ywo</i> (‘night’) ‘moonlit night’
		‘stem’	<i>kukwi</i>	~ <i>kuku-tati</i> (‘stand’) ‘flower stalk’
	wi ~ o	‘tree’	<i>kwi</i>	~ <i>ko-dati</i> (‘stand’) ‘grove’
		‘fire’	<i>pwi</i>	~ <i>po-no-po</i> (gen- ‘grain.ear’) ‘flame’
		‘Hades’	<i>yomwi</i>	~ <i>yomo-tu-kuni</i> (gen- ‘land’) ‘id.’
	e ~ a	‘eye’	<i>me</i>	~ <i>ma-pye</i> (‘side, direction’) ‘front’
		‘saké’	<i>sake</i>	~ <i>saka-duki</i> (‘cup’) ‘saké cup’
	e ~ o	‘back’	<i>se</i>	~ <i>so-muku</i> ‘turn’

One view of these cases is that the free form originates from the contraction of the original root-final vowel with a morpheme of the shape **i* (Yoshitake 1928) This conforms to the contractions noted above. The function and origin of this **i* is subject to some debate, but one view relates it to the subject marker *i* vestigially attested in 8th century Japanese.

Another view, not necessarily inconsistent with the first, derives the apophonic nouns from consonant final shapes, with the final consonant being lost before **i* (Whitman 1985). The evidence for the reconstructed final consonants in (7) is comparative. In some cases it is not possible to identify the consonant, hence the notation **səC-i* in (d).

- (7) a. ‘body’ *mwi* < **mu-i* < **mum-i*
 b. ‘tree’ *kwi* < **kī-i* < **kīr-i*
 c. ‘eye’ *me* < **ma-i* < **mar-i*
 d. ‘back’ *se* < **sə-i* < **səC-i*

The final consonant is also thought to have been deleted in composition before another consonant, thus **mum+kapari* → *mukapari*.

Yet a third view of the apophonic nouns reconstructs a specific final consonant, *-*r*, which was reduced to a yod in phrase final position but dropped before a following consonant (Murayama 1962):

- (8) a. ‘tree’ *kwi* < **kəy* < **kər*
 b. ‘grove’ *komura* < **kər* + **mura* ‘group’

These three hypotheses concur in the conclusion that /wi/ and /e/ in apophonic nouns are secondary.

3. Problems with the Four Vowel Hypothesis

The four vowel hypothesis is by and large enough to account for mainland Japanese dialects, but even within that restricted domain there are some problems, primarily concerning OJ /wo/.

3.1. OJ /wo/

Wo has a limited occurrence and is found mostly, though not exclusively, in final position. See Martin 1987:60–62 for a list of OJ words with *wo*. However, by far the most occurrences of *wo* cannot be etymologized as secondary. Instead it seems likely that *wo* is a reflex of a primary pJ vowel, in addition to the four primary vowels usually posited, viz. **o*. The idea is that **o* raised, merging with **u* in all positions except final where it became *wo*; this conditioning environment is reflected in the lexical distribution of *wo*. Internal evidence for raising of **o* may be found in dialectal correspondences like Eastern OJ *o* :: Central OJ *u*, e.g., the conjectural auxiliary Eastern *-(a)mo* :: Central *-(a)mu*, as well as variation between *u* and *wo* within the OJ lexicon, e.g., *mwokwo* ~ *mukwo* ‘partner, bridegroom’ (of which *mwokwo* is rare, early, and not found in later stages of Japanese, whereas *mukwo* is the form used, as *muko*, in EMJ onwards). See Hayata 1998, Matsumoto 1995: 79ff, 132f for *wo~u* forms; see also Thorpe 1983.

3.2. OJ /i/ :: proto-Ryūkyūan *e

A number of scholars have pointed out that comparative Ryūkyūan-Japanese evidence gives support for an additional front vowel, reconstructed by Hattori (1976, 1979–80) and Thorpe (1983) as pJR *e. These involve cases where pR *e corresponds to OJ *i*. Hattori and Thorpe reconstruct pR *e for words where North Amami dialects give a central vowel /ü/ corresponding to /i/ elsewhere in the Ryūkyūs as well as OJ. Examples of this sort are listed in (9); the pR reconstructions follow Thorpe (1983):

(9) OJ	PROTO-RYŪKYŪAN
midu ‘water’	:: *medu
oyobi ‘finger’	:: *UyUbe (*U reflects original pR *u or *o.)
piru ‘garlic’	:: *peru
kizu ‘wound’	:: *kezu
idu ‘wh’	:: *edu
pidi ‘elbow’	:: *pedi

Whitman (1985:57) hypothesizes that these correspondences reflect original pJR *ə. An umlaut-like process raised and fronted *ə before *C_{son}(C)i, where C_{son} represents a sonorant. In the same environment, *ə was fronted to *e in pR, where it fell together with secondary *e from the sources discussed in §2. PJ *ə > OJ *o* elsewhere and the chief argument for this hypothesis is a distributional gap: OJ /o/ is rare before C_{voi}i.

However Miyake (to appear) cites Serafim (1999) for a number of forms that counter-exemplify Whitman’s umlaut hypothesis and thus strengthen the Hattori/Thorpe argument for pJR *e. These include OJ *sima* ‘island’ :: pR *sema and OJ *sita* ‘tongue’ :: pR *seta (Serafim’s reconstructions). These reconstructions, if correct, indicate that some instances of pR *e :: OJ *i* must reflect a pJR vowel other than *i or *ə.

OJ internal evidence for *e is scarce. Some occurrences of *e* in Eastern OJ corresponding to central OJ *i*, e.g., the adnominal form of the adjective auxiliary: Eastern OJ *-ke* :: Central *-ki*, may be considered to reflect a pre-raising stage; note there is a single example of central OJ *-kye* for *-ki* of this auxiliary in an early poem (K 32). Furthermore, Miyake (to appear) presents philological evidence for reconstructing pJ *e.

We propose that pJ *e raised in the same environments as *o, merging with *i in all positions except final, where it became OJ *ye*. A possible example of original *e reflected as central OJ /ye/ is *me > mye ‘woman’

~ *-mi-* (in *womina* ‘young woman’, *wo-* ‘small’, *na* ‘person’) or *omina* ‘old woman’ < *o?* + *mi* + *na*). This example parallels the environment for the reflex of **o* as *wo* discussed in §3.1. Another possible example of this type is OJ *iro-* ‘of the same mother’ < ? *ye* ‘placenta’ + *-ro* nominal suffix.

3.3. Mid-Vowel Raising

The arguments summarized above for the two mid vowels **e* and **o* point to a six vowel system with three mid vowels for pJR, as recently proposed by Serafim (1999) and Miyake (to appear).

(10) six vowel hypothesis for pjr

<i>*i</i>	<i>*u</i>	
<i>*e</i>	<i>*ə</i>	<i>*o</i>
	<i>*a</i>	

Serafim and Miyake advance the view that pJR **e*, **o* raised in pre-OJ and merged unconditionally with **i*, **u*, respectively. We adopt the view that the outcome of raising was conditioned, as proposed by Hattori (and Hayata for **o*), but we believe that the condition should be stated in terms of position in the word. We hypothesize that mid pJ vowels raised as follows:

- (11) **o* > *wo* in final position; *u* elsewhere
**e* > *ye* in final position; *i* elsewhere

It is possible, as Hattori and Hayata propose, that length was the crucial conditioning factor in this process. Under this view, short **e* and **o* merged with **i*, **u*, but long **ee* and **oo* gave OJ *ye* and *wo*. (This is simply tantamount to proposing that the first half of the vowel raised, although not described in that way by Hattori and Hayata.) There are a number of problems with this view. First, there seems to be no independent evidence for the long vowel in virtually all of the relevant cases. There is also no explanation for why we find no *CyeCV* < **CeeCV* or *CwoCV* < **CooCV*. Finally, the condition seems to imply that all word final vowels were lengthened; although allophonic lengthening is plausible for monomoraic words in phrase-final position, as in modern Kansai dialects, it is difficult to find supporting evidence for lengthening of all final vowels. We therefore state the condition for raising in terms of final position in the word.

Raising must be thought to have been all but complete in the central dialect at the time OJ was written down, but forms such as *mwokwo* for *mukwo* and *-kye* for *-ki* suggest that the change was not entirely complete. The Eastern forms cited above are thought to reflect pre-raising varieties, suggesting that the eastern dialects completed raising later than the central dialect. Alternations involving eastern forms also show that the word-final environment may have been interpreted differently across dialects. For example, the well-known contrast between central *sugusu* ‘pass it’ and eastern *sugwosu* ‘id.’ may indicate that in the latter dialects root- or stem-final, rather than word-final, position was the environment for **o* giving *wo*. Similar considerations may hold for alternations within central OJ, such as *sukunasi* ‘few’ ~ *sukwosi* (attested with /wo/ in the *Shinsen jikkyō* 892).

Without invoking vowel lengthening or long vowels it seems likely, and simpler to assume, that raising followed the course of a gradual phonetic diphthongization, eventually giving a high vowel, except in certain environments. In these environments the diphthongal realization was phonemicized as a diphthong. Our proposal is that word-final position is the core environment where the diphthongal realization was phonemicized.

- (12) **o* > [wo > u] → /wo, u/
**e* > [je > i] → /ye, i/

4. Demonstratives

Mid-vowel raising offers an interesting explanation for an apparent shift in the Japanese demonstrative systems. From EMJ onwards Japanese has a three term demonstrative system with proximal (*ko*), mesial (*so*), and distal (*ka*) terms, in addition to an interrogative (*i-* ~ *idu-*), virtually identical to NJ *ko-*, *so-*, *a-*, *do-*. In fact, the three term demonstrative system is an EMJ innovation: OJ has only a two term plus interrogative (*ko* [speaker], *so* [non-speaker], *i-* ~ *idu-* [interrogative]) system, as shown by Hashimoto (1966, 1982).⁵ However, researchers have pointed out that there is some evidence for an earlier additional demonstrative *i-*, retained as the OJ personal pronoun *i* (second person), and also in *ima* ‘now’ < *i* ‘this’ + *ma* ‘interval’. If *i* does reflect an earlier demonstrative, it would be proximal. This raises the possibility that OJ *i* descends from an earlier proximal pronoun, which was displaced by the ancestor of OJ *ko*.

Comparison with the MK demonstrative system supports this scenario. Proximal (*i*), mesial (*ku*), distal (*tye*), and interrogative (*e-* ~ *enu*) give

excellent formal matches with OJ *i*, *ko*, *so*, and *i*, respectively, but the deictic functions appear shifted in two positions in the series: MK *ku* (mesial) matches OJ *ko* (speaker), and MK *tye* (distal) matches OJ *so* (non-speaker).

We hypothesize that the OJ system evolved from a pJ system much like that reflected in MK, with pJ proximal **i* and interrogative **e*, in addition to mesial and distal, as in (13) below. What upset the pJ system, we suggest, was raising of pre-OJ */*e/* which resulted in homonymy between the pre-OJ proximal **i* (< pJR **i*) and interrogative **i* (< pJR **e*), a stage we represent as pre-OJ.a. It is not desirable for paradigmatically opposed forms to be homonymous. We suggest that this was resolved by proximal **i* being discarded (retained only in fossilized compounds) and mesial **ki* and distal **si* being reinterpreted as speech-event participant and nonparticipant respectively (pre-OJ.b). This was subsequently reinterpreted as speaker and nonspeaker, respectively, the system exhibited by OJ. The OJ system was later augmented to include a distal (*ka*), giving the EMJ and later system.

(12)		proximal	mesial	distal	interrog
	MK	<i>i</i>	<i>ku</i>	<i>tye</i>	<i>e</i>
		proximal	mesial	distal	interrog
	pJ	<i>*i</i>	<i>*ki</i>	<i>*si</i>	<i>*e</i>
		proximal	mesial	distal	interrog
	pre-OJ.a	<i>*i</i>	<i>*ki</i>	<i>*si</i>	<i>*i</i>
		participant	nonparticipant		interrog
	pre-OJ.b	<i>*ki</i>	<i>*si</i>		<i>*i</i>
		speaker	nonspeaker		interrog
	OJ	<i>ko</i> (~ <i>i</i>)	<i>so</i>		<i>i-</i> ~ <i>idu-</i>
		proximal	mesial	distal	interrog
	EMJ	<i>ko</i>	<i>so</i>	<i>ka</i>	<i>i-</i> ~ <i>idu-</i>

It is worth noting that the shift of the mesial in a three-term demonstrative system to replace the original proximal is mirrored in the development of the Latin demonstrative system. Thus in the earlier Latin three-term system composed of proximal *hic* (*haec*, *hoc*) ‘this’ (close to speaker), mesial *iste* (*ista*, *istud*) ‘that’ (close to hearer), and distal *ille* (*illa*, *illud*) ‘that yonder’ (distant from speaker and hearer), the original mesial term *iste* came to replace proximal *hic* in its function (Väänänen 1963: 128–129).

c. *Co* ~ *Ce*

mo ‘algae; ?seaweed’ ~ *me* ‘(edible) seaweed’
so- ‘back’ ~ *se*
yo ‘branch’ ~ *ye* (*yo* is found in *pito-yo* ‘QQQ’)
yo- ‘good’ ~ *ye-*

d. *Ca* ~ *Ce*

ka- ‘hair’ ~ *ke*
ka- ‘day(s)’ ~ *ke*
ma- ‘eye’ ~ *me*
sa- ‘narrow’ ~ *se-*
ta- ‘hand’ ~ *te*

It is here (18b) and (18c) which are of interest. It is clear that not all cases of apophony involve variation between a compound and a free variant, but the point is that, again, the picture is not very persuasive for $o \sim wi < *oi$ being regular and $o \sim e < *oi$ irregular. Instead, we interpret this to support our proposal that OJ *o* has two sources, $*i$ and $*\text{ə}$, and that the forms above should be reconstructed and understood as (18'), with $*i$ and $*\text{ə}$ merging (eventually to give OJ *o*) at some point after the contractions had taken place.

- (18') b. $*ki > ko- \sim kwi < *ki-i$
 $*ni > no- \sim ni < *ni-i$
 $*pi > ko- \sim pwi < *pi-i$
 $*si > so- \sim si < *si-i$
- c. $*m\text{ə-} > mo \sim me < *m\text{ə-i}$
 $*s\text{ə-} > so \sim se < *s\text{ə-i}$
 $*y\text{ə} > yo \sim ye < *y\text{ə-i}$
 $*y\text{ə-} > yo- \sim ye- < *y\text{ə-i}$

It must be noted here that the picture is different if we look at polysyllabic stems. Among polysyllabic stems we only find the three alternations OJ *CVCu-* ~ *CVC(w)i*, *CVCo-* ~ *CVC(w)i* and *CVCa-* ~ *CVCe*; but not *CVCo-* ~ *CVCe* (the alternation which supports our proposal of two pJ sources for OJ *o*). This indicates that the distinction between pre-OJ $*i$ and $*\text{ə}$ was maintained longer in monosyllabic stems than in polysyllabic, or, more likely perhaps, that contraction in final position was completed earlier (before the merger of $*i$ and $*\text{ə}$) in monosyllabic than in polysyllabic stems.

5.1.3. Verb Derivation

Also basic stem of the secondary, derived verb classes, the *nidan* verbs, are thought to be derived through contraction of a root or stem final vowel with an **-i*,⁶ and they thus, where the source is reflected independently in OJ, take part in alternations like those exhibited by the apophonic nouns:

(19) **kami nidan:** *-(w)i-*

-u- ~ -(w)i- *sabu-* ‘lonely’ ~ *sabwi-* ‘get desolate, fade’ (< **sabu-i*)

-o- ~ -(w)i *opo-* ‘big’ ~ *opwi-* ‘get big; grow’ (< **opo-i*)

shimo nidan: *-e-*

-a- ~ -e- *aka(-)* ‘red’ ~ *ake-* ‘redden, lighten’ (< **aka-i*)

Where the source of a *nidan* verb survives independently, the relation between source and derived verb base is morphologically equivalent to that between compound and free form of the apophonic nouns, with the OJ reflex of the source (*sabu-*, *opo-*, *aka(-)* above) corresponding to the compound form (*hifukukei*) and the stem of the *Nidan* verb (*sabwi-*, *opwi-*, *ake-*) to the free form (*roshutsukei*). Note, however, that syntactically the degree of boundness in the examples above is opposite that holding between compound and free form of the apophonic nouns: *sabu-*, *opo-*, and *aka(-)* are less bound than *sabwi-*, *opwi-*, *ake-*.

As illustrated here, the *kami nidan* verbs, with bases ending in *-(w)i*, are generally derived from roots or stems reflected with OJ *-u* or *-o*. Among the 30 odd *kami nidan* verbs found in OJ, approximately half have clearly identifiable sources in OJ *-u* or *-o* (such as *sabu-* or *opo-* above). On the other hand, the much larger and productive class of *shimo nidan* verbs, with bases ending in *-e*, are thought to involve root- or stem-final *-a*; in some cases it is possible to identify a source which survived independently (such as *aka-*), but in the large majority of cases it is not. Thus, the picture here is much like with polysyllabic apophonic nouns. On the whole, we do not find *nidan* verbs taking part in the alternation *-o- ~ -e-*; that is to say, we generally do not find *shimo nidan* verbs from identifiable sources with OJ *-o-*.

However, a single lexical pair may be cited: *kome-* ‘hide, enclose’ ~ *komor-* ‘hide (oneself)’. It should be noted that *kome-* only is attested once (*Nihon shoki*, song 1), in the compound *tuma-gome* ‘wife-hiding, wife-enclosing’, which further has a *kami nidan* variant, *tuma-gomwi-* ‘id.’ (*Kojiki*, song 1). The form *kome-* does suggest, however, the possibility of a root **kəmə-*, reflected in *komor-* and *kome-* as shown in (20).⁷

(20) $*kəmə-r- > komor- \sim kome- < *kəmə-i$

Looking further, to more grammatical morphemes, we do in fact find $o \sim e$ in alternations between a verb form, or particle, and a verb(-like morpheme), in the following three cases which may be thought to reflect the $*i$ involved in the formation of the Nidan verbs: (a) $so \sim se-$: $se-$ is the (derived vowel) base of the verb ‘to do’; the OJ reflex of its root, so , is used in the prohibitive construction $na\dots-so$ as a fossilized imperative, and as a focus particle on its own (later becoming zo). (b) $koso \sim kose-$: $-kose-$ is the (derived vowel) base of a defective optative auxiliary verb which uses the OJ reflex of its root, $koso$, as imperative, and as a focus particle on its own. (c) $to \sim te-$: $-te-$ is the adverbializer and gerund formant which may be thought to be derived (as a nonfinite verb(-like) form) from the source of OJ to which itself is nonfinite copula, case and conjunctive particle, and (obsolete) gerund formant. (See Frellesvig 2001: 12–16 about $kose$, $koso$, te , to .) These forms thus seem to be relevant examples of $o \sim e$ in verb(like) derivation and we suggest that they go back to $*sə$, $*kəsə$, $*tə$, respectively, and should be reconstructed as in (21).

(21) $*sə > so \sim se- < *sə-i$
 $*kəsə > koso \sim kose- < *kəsə-i$
 $*tə > to \sim te < *tə-i$

5.1.4. Summary

In this subsection we have presented evidence internal to OJ for two pJ sources of OJ o . Overall this evidence consists in the existence of alternations between OJ $o \sim e$ in addition to the more widely recognized $u \sim (w)i$, $o \sim (w)i$ and $a \sim e$. Although $o \sim e$ has a more limited distribution, especially numerically, than the other three, it is found in the same three general contexts: lexical contractions (§2.3, §5.1.1), (monosyllabic) apophonic nouns (§2.4, §5.1.2), and verb(-like) derivation (§5.1.3). We thus suggest that these four alternations within OJ reflect contractions of four different pJ vowels with a following $*i$, as in (16) above, repeated as (22).

(22) $*u > u \sim (w)i < *ui$ $*ə > o \sim e < *əi$
 $*i > o \sim (w)i < *ii$ $*a > a \sim e < *ai$

5.2. Supporting Comparative Evidence

In addition to the well known correspondences involving OJ /o/ :: Middle Korean /u/ [ɨ] (23), it has been pointed out that a number of convincing lexical pairs support a correspondence OJ /o/ :: MK /o/ [ʌ] (Kōno 1967/1979: 561, Martin 1966: 220), as in (24).

- (23) **mk** *u* :: **oj** *o* **pj**
 a. *ku* ‘that’ (mesial) :: *ko* < **kɨ* (demonstrative)
 b. *mūsú-* ‘wh(at)’ :: *mosi* < **mɨsi* (conjectural adv.)
 c. *túmul-* ‘rare’ :: *tomo-si* < **tɨmɨ-* ‘scarce’
 d. *tul-* < **tulú-* ‘hold, lift’ :: *tor-* < **tɨr-* ‘take’
 e. *mulu-t* ‘all’ :: *moro-* < **mɨrɨ* ‘all’
- (24) **mk** *o* :: **oj** *o* **pj**
 a. *tolk* ‘chicken’ :: *tori* < **tɨr(-i)* ‘bird’
 b. *kóth-* ‘alike’ :: *koto-si* < **kɨtɨ-* ‘resemble’
 c. *mot* ‘eldest, chief (of kin)’ :: *moto* < **mɨtɨ* ‘base, origin’
 d. *nol-* ‘fly’ :: *nor-* < **nɨr* ‘ride’ (Martin 1966)
 e. *koWol* ‘county’ :: *kopori* < **kɨpɨr(-i)* ‘county’ (loan)

The existence of two sets of correspondences indicates that two pJR vowels were involved: OJ *o* < pJR **ɨ* :: MK *u* [ɨ], and OJ *o* < pJR **ə* :: MK *o* [ʌ]. The same two sets of correspondences emerge in OJ correspondences for MK words in final /l/ or /y/:

- (25) **mk** *ul* :: **oj** *wi, o-* **pj** **ɨy*
 a. *púl* ‘fire’ :: *pwi, po-* < **pɨy* ‘fire’
 b. *mulu-/mull-* < **mulul* ‘withdraw’ :: *mwi-, mo* < **mɨ-* ‘turn around’
 c. *kuluh* ‘stump, counter for trees’ :: *kwi, ko-* < **kɨy* ‘tree’
- (26) **mk** *o* :: **oj** *e* **pj** **əy*
 a. *mól* ‘seaweed’ :: *me, mo* < **mə(y)* ‘seaweed’
 b. *póyam* ‘snake’ :: *pemi* < **pəym(-i)* ‘snake’
 c. *póy* ‘boat’ :: *pe* < **pəy* ‘prow of boat’

The seven vowel hypothesis accounts directly for the existence of two sets of Korean correspondences for OJ /o/. Note that the OJ apophonic nouns ‘fire’ and ‘tree’ in (25) behave exactly as predicted on internal grounds by the hypothesis that their nuclear vowel results from pJ **ɨ*.

Likewise, in ‘seaweed’ in (26), while not strictly speaking an apophonic noun, the vowel alternates between /e/ and /o/, suggesting on internal grounds the pJ shape **mə(y)* confirmed by the MK comparison.

6. Conclusion

Recapitulating, we propose the following vowel system for pJ.

- (27) *i *ĩ *u
 *e *ə *o
 *a

As a system, (27) has the advantage of not having more distinctions among mid than high vowels, a structural weakness of the six vowel system in (10). It is worth noting that it is also a typologically well-attested system. Crothers (1978) reports that vowel system type 7:2 (seven vowels with two of the central vowels /i/, /ə/, or /ü/) is the fifth most common in his sample of vowel systems, and the most common type among seven vowel systems, with 14 exemplars. Three of these are reported with the exact system in (27): Amharic, Sundanese, and Rumanian. In contrast, the system in (10) is quite rare: Crothers reports 29 examples of languages with six vowels including one central vowel, but only one of these, Malay, has the system in (10). In general, there seems to be a strong typological pressure for six vowel systems with one central vowel to include back rounded /ɔ/. This pressure is less strong for seven vowel systems with two central vowels.

The seven vowel hypothesis also provides a somewhat more balanced set of vowels involved in the alternations known as Arisaka’s laws: neutral: *i, *e; “central”: *ĩ, *ə; and “back”: *u, *o, *a, with the “central” and “back” sets in opposition. In conjunction with this, note that the syllable /.wo/ has had three distinct pJ sources under the seven vowel hypothesis: */.wə/, */.wi/; */.wo/, thus representing a merger of three different vowels. This helps explain why .wo appears to escape the effects of Arisaka’s laws, combining both with /o/ (as in *towo* ‘ten’ < **tɪwi/təwə*) and, e.g., /a/ (as in *awo* ‘blue’ < **awo*).

We discussed earlier in this paper the oft-remarked tendency for comparative reconstruction to enrich phonemic inventories, while internal reconstruction, with its focus on reduction of synchronic irregularities or statistical skewing, tends to shrink them. The history of recent research on Japanese fits this pattern, with the four vowel hypothesis discussed in

§2, based on internal reconstruction, representing a radical reduction from the proto-Japanese-Korean inventory reconstructed by Martin (1966) based on comparative data. The bulk of the evidence indicating a seven vowel system is internal, but it also receives support from comparative evidence. The richer inventory that we have proposed in this paper is thus in many ways a return to the type of system envisaged by the scholar who has been the source of our inspiration in this as in so much of our work.

NOTES

1. In this paper we use the term “proto-Japanese” for reconstructions based on comparison of all attested varieties of main island Japanese and Ryūkyūan, equivalent to the “proto-Japanese–Ryūkyūan used by some scholars or the “proto-Japonic” of Serafim (1999). Other abbreviations are also standard: EMJ = Early Middle Japanese; MJ = Middle Japanese; OJ = Old Japanese; MK = Middle Korean.
2. An indexing notation (Ci_1 , Ci , Ci_2 ; Ce_1 , Ce , Ce_2 ; Co_1 , Co , Co_2), as used first by Wenck (1959) (in the form of superscripts) and later adopted by some Japanese scholars, such as Matsumoto and Hayata (in the form of subscripts), has the advantage of an unambiguous transliteration of the orthographic distinctions, as does Martin’s Yale system (1987) (Cyi , Ci , Ciy ; Cye , Ce , Cey ; Cwo , Co , $C\underset{o}{o}$), but phonemically they overspecify. Our phonemicization differs from most others in aligning neutral Ce syllables with Ce_2 . Like Unger (1977), we use Cwi for Ci_2 rather than the Ciy of Martin (1987) or Cuy of Whitman (1985). We shall use this transcription when writing OJ words, but will use the subscript notation when referring to orthographic distinctions.
3. Cf. the following OJ forms built on *koko-/kokwi-* ‘this much’: *kokoda*, *kokwida*, *kokodaku*, *kokwidaku*, *kokoba*, *kokobaku*, *kokwibaku*. *koko-/kokwi-* is itself analyzable at least into *ko* ‘proximal’ + *-kV* ‘degree, quantity’; cf. *i-ku-* ‘how much’ and *so-kV-* ‘that much’, both with a number of derived forms.
4. The *nidan* verb bases end in *-wi* and *-e*; the Imperative of *yodan* verbs is *-ye*, but the Exclamatory (*izenkei*) *-e*, and the *yodan* Stative auxiliary is *-yer-*.
5. Most accounts posit a three term ‘proximal–mesial–distal’ system for OJ, built on *ko–so–ka*. However, there is no evidence within OJ of *ka* being a productive member of the demonstrative system. Two forms are attested in OJ: long *kare* is found once (M 18.4045); what may be taken to be short *ka*, as distinct from the adverb *ka* ‘this way’, is attested at most twice, both in dialect poems (M 14.3565, 20.4384). While these forms most likely represent the budding of the distal demonstrative which is so frequent in EMJ, they

clearly did not form a productive integrated part of the OJ system of demonstratives. Other *ka-* based forms often cited are actually found only from EMJ. The description of the semantics of the OJ demonstrative system is due to Hashimoto (1966) whose study is the first to consider the OJ system on its own merits, rather than in terms of the EMJ system. Hashimoto shows that the *ko-* versus *so-* system is entirely speaker based, with no primary reference to the hearer. “Speaker,” *ko-*, refers to what is within the speaker’s domain of direct sensory perception, or experience. “Non-speaker,” *so-*, refers to what is outside of the speaker’s domain of direct experience.

6. This **-i* is thought either to be a derivational (?transitivity) morpheme, going back further to **-Ci-*, or the Infinitive formant.

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