

Reflexes of Proto-Ryukyuan Mid Vowels in *Haedong Chegukki*

Marc Miyake
Independent scholar

Abstract Maner Thorpe reconstructed only two mid vowels in Proto-Ryukyuan: *e and *o. He also reconstructed nonphonemic aspiration before nonhigh vowels in a daughter of PR, Proto-Amami-Okinawan. Leon Serafim and Shinzato Rumiko build upon his reconstruction, positing intermediate stages between it and their phonetic interpretation of the Old Okinawan of the *Omoro sōshi*. However, an examination of the earlier stage of Okinawan recorded in *Haedong chegukki* reveals that (1) Proto-Ryukyuan had *əj and *a(:)j in addition to *e and (2) aspiration before nonhigh vowels was still in progress as late as the fifteenth century CE.

Keywords Okinawan. Ryukyuan. Haedong chegukki. Vowels. Aspiration.

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1 Introduction

Forty years have passed since Thorpe (1983, 31) reconstructed two mid vowels in Proto-Ryukyuan (PR), *e and *o.

PR *e is a continuation of Proto-Japonic (PJ) *e that merged with PJ *əj and PJ *aj.¹ PR *o is a merger of PJ *o and *ə.

1 Although some scholars (e.g. Martin 1987) write -i instead of -j, I prefer to distinguish between vowel sequences and vowel-glide sequences in Japonic reconstructions. *ai could be mistaken as a sequence of two syllables *a and *i that is somehow different from Korean /aj/.

In the Old Okinawan (OOK) language of the *Omoro sōshi* おもろさうし (Book of *Omoro* Songs) (1531-1623) as reconstructed² by Serafim and Shinzato (2021, 27, 34), PR mid *e raised to near-high [i] except after [ʔ] and [j], where it raised even further to true high [i].

One might expect PR *o to have raised to [ʊ], the back counterpart of front near-high [i], in OOK. And indeed Serafim and Shinzato (2021, 29) do reconstruct near-high *ʊ as a reflex of PR mid *o in pre-*Omoro sōshi* OOK. However, in *Omoro sōshi*, *ʊ raised to true high [u], though stops like *k that were aspirated before nonhigh vowels retained their aspiration in OOK (Serafim, Shinzato 2021, 28) (1).

(1) pre-OOK *ko [k^hɔ]³ > *k^hʊ > OOK [k^hu]

OOK [k^hu] with aspirated [k^h] contrasted with OOK [ku] with unaspirated [k] from PR *ku.

Phonemic aspiration was absent from PR. Thorpe (1983, 54) reconstructs nonphonemic aspiration of stops before and between non-high vowels in Proto-Amami-Okinawan, an intermediate stage between PR and OOK.⁴

Haedong chegukki 東國諸國紀 (Record of Countries across the Sea to the East; HC) contains an appendix dated 1501 recording an early variety of Okinawan that appears to be a late intermediate stage between Proto-Amami-Okinawan and the OOK of *Omoro sōshi*. I will call that variety *Haedong chegukki* Okinawan (HCO).

In this paper, I will demonstrate that the reflexes of PR mid vowels in HCO do not quite fit the Thorpe/Serafim/Shinzato (TSS) reconstruction that I have just outlined. HCO may contain a vowel-glide sequence /əj/ in some instances where the TSS model predicts a reflex of PR *e. There is even one instance of /a(:)j/ instead of a reflex of *e. Moreover, aspiration is often absent in HCO where the TSS model predicts it. I propose a revision of the TSS model, reconstructing *əj and *a(:)j in PR, and regarding aspiration as an innovation in progress in HCO rather than as a *fait accompli* at the Proto-Amami-Okinawan or PR level.

² I omit asterisks for reconstructed interpretations of written forms such as OOK as recorded in *Omoro sōshi* or what I will call *Haedong chegukki* Okinawan. Asterisks only indicate reconstructions of unwritten forms.

³ The phonetic interpretation of pre-OOK *o as [ɔ] is from Serafim and Shinzato's work (2021, 28).

⁴ Serafim and Shinzato (2021, 28) also write that "Thorpe (1983, 53-5) says that pRk [Proto-Ryukyuan] had phonetic aspiration", but Thorpe (1983, 54) posits a rule of aspiration for Proto-Amami-Okinawan, not PR.

2 *Haedong chegukki*

Haedong chegukki is a report in Classical Chinese on Japan and the Ryukyu Kingdom submitted to the Korean court in 1472 (Robinson 2012, 1). The original does not survive; the extant version from 1512 has appendices absent from the original.

One of those appendices dated 1501 is a bilingual phrasebook with 169 Ming Mandarin phrases and words followed by their equivalents in *Haedong chegukki* Okinawan (HCO). Ming Mandarin was the spoken language that educated Koreans and Ryukyuan had in common. HCO was only transcribed in the then-new hangul (H) alphabet. There was no attempt to write HCO in *kana* and *kanji*. The first entry in the phrasebook is (2).

- (2) 你是那裏的人
 lit. 'you be where ATTR person'
 우라주마피츄 (HC1)⁵
 H *ura tsʌma p^hits^hju*
 HCO /ʔʊra Ntuma Fitʊ/
 lit. 'you where person'
 'Where are you from?'

I transcribe H in italicized IPA, whereas I write HCO (i.e. my phonemic interpretation of H) in roman in slashes. I have added word spacing for clarity.

(2) exemplifies some of the difficulties of interpreting H. Although H is an alphabet and is therefore far more versatile than Chinese characters or *kana* which represent syllables rather than segments, it is not IPA. H does not have letters for all of the segments in HCO. (2) contains several instances of H letters that only approximate HCO segments (3-7):

- (3) H ㄹ *u*: HCO /ʊ/ (not /u/)
 (4) H ㄷ ʌ: HCO /Ntu/, phonetically [dʒ] preceded by vowel nasalization (not /tsʌ/)
 (5) H ㅍ *p^h*: HCO /F/ (not /p^h/)
 (6) H ㅌ *ts^h*: HCO /t/ [tʃ^h], palatalized after /i/ and aspirated before a nonhigh vowel (not /ts^h/)
 (7) H ㅈ *ju*: HCO /jʊ/ (not /ju/)

⁵ All HC appendix entries are numbered according to Tanaka (1991). Entry numbers are preceded by 'HC' to distinguish them from example numbers which also appear in parentheses: e.g. (HC1) refers to the first entry in HC, whereas (1) refers to example 1 in this paper.

I will not discuss the reasoning for all of the differences between HCO segments and their H transcriptions here, though I will explain my choice of the non-IPA symbol /F/ later.

The limitation of H that is most relevant for this paper is its paucity of letters for front vowels and for back labial vowels. H only has one front vowel letter (l *i*) and letters for two back labial vowel letters with or without a preceding palatal glide (τ *u*, π *yu*, ㄥ *o*, ㄲ *yo*). It lacks letters for [e i ɔ], the vowels I might expect to find in HCO if the TSS model is correct. I write ‘might’ because without looking further at the data, I cannot guess where HCO is on the continuum between PR and the OOK of the *Omorō sōshi*.

In theory, HCO could still retain PR *e and *o, and in fact Lin (2015, 128) reconstructs the mid vowel phonemes /e/ and /o/ in HCO.

On the other hand, HCO could be closer to the OOK of the *Omorō sōshi*. PR *e and *o could have raised to [i] and [ɔ] or even [u] as in Serafim and Shinzato’s (2021) reconstruction.

How can I determine the degree of raising in HCO or even if raising had occurred at all if H only had letters for *i*, (*j*)*u*, and (*j*)*o*? H *i*, the sole front vowel letter, could represent the HCO front vowels [i] and [e], and both H *u* and H *o* could represent HCO [ɔ], a vowel between them in height. But was that actually the case?

Before tackling that question in the following sections, I wish to point out two further types of issues with HC.

The first involves whoever transcribed HCO into H. Was there just one transcriber? If there was more than one transcriber, different transcribers could have used more than one style of transcription. And even if there was only a single transcriber, he could have changed his mind about how to transcribe HCO during the compilation of the appendix.

The second involves whoever spoke HCO for the transcriber(s). Was there just one informant? If there was more than one informant, different informants could have had different dialects or idiolects. And even if there was only a single informant, he could have varied his style of speech during the compilation of the appendix.

In short, H is an imperfect medium for recording HCO, and we do not know enough about the recorders and informants to be certain that we are dealing with a consistent transcription of a single variety of HCO. The data in HC cannot be held to the same standard as modern linguistic fieldwork. Nonetheless, we can only work with what we have. And even though the transcriptions in HC are indeed inconsistent, I will demonstrate below how that inconsistency may in fact be their saving grace.

3 Reflexes of PR *e in *Haedong chegukki*

The TSS model of Okinawan language history predicts that the HCO reflexes of PR *e were front vowels somewhere along a spectrum from mid [e] to high [i].

Without looking at HC, I might expect those reflexes to be transcribed in H as | i, ㅍ jə, and/or ㅍ jəj. H | i might represent [i] or [ɪ]. Although the other two letters may seem to be odd choices for transcribing front vowels, H ㅍ jəj is the dominant transcription of Japanese /e/ in *Irop'a* 伊路波 (The *Iroha* Syllabary), a 1492 Korean textbook of Japanese that was roughly contemporaneous with HC. H ㅍ jəj was also the usual transcription of Japanese /e/ in *Ch'ōphae sinō* 捷解新語 (Rapidly Understanding a New Language, 1618; first published 1676). The missionary romanization of Japanese from the same period renders Japanese /e/ as e, confirming that H ㅍ jəj in *Ch'ōphae sinō* was a Korean approximation of a Japanese mid front vowel. Chinese character transcriptions indicate that the Old Japanese (OJ) phoneme /e/ was also roughly pronounced [e] in the eighth century CE (Miyake 2003, 227, 250). If the pronunciation of Japanese /e/ was [e] in both the eighth and seventeenth centuries, it would be simplest to also interpret H ㅍ jəj in *Irop'a* as a transcription of Japanese [e] in the fifteenth century. H jəj is not a palatal mid vowel, but its segments share features with Japanese [e]: j is palatal and ə is mid. H ㅍ jə, a less frequent transcription of Japanese /e/ in both *Irop'a* and *Ch'ōphae sinō*, is also a combination of a palatal glide and a mid vowel. Fifteenth century Korean /ə/ may have had a fronted allophone like [ɛ] or even [e] in the vicinity of /j/, though such a phonetic detail is impossible to verify.

Although H has a letter ㅍ that is now pronounced [e] in modern Korean, in the fifteenth century, that letter was pronounced [ɛj] in Middle Korean, and that letter never appears in HC.

The letters that do appear in HC transcriptions of words with reflexes of PR *e are in Table 1.

Table 1 Transcriptions of reflexes of PR *e in *Haedong chegukki*

Hangul letter(s)	Transcription	Frequency
ㅡ	uj	24
	i	15
ㅍ	jəj	15
ㅍ	jə	5
ㅍ	uj	1
·	ʌj	1
ㅍ	ai	1

The most frequent letter in Table 1 is $-|uj$, which does not transcribe any Japanese vowels in *Irop'a* or *Chōphae sinō*. Its absence from Korean transcriptions of Japanese indicates that it represents a vowel present in HCO that was not present in Japanese [tab. 1].

That vowel could have been the [ɪ] reconstructed by Serafim and Shinzato (2021). [ɪ] is slightly backer than front [i]. To Korean ears, HCO [ɪ] could have sounded like a high vowel between Korean high back $-|w/$ and high front $|/i/$, whose letters combine to form the composite letter $-|uj$.

The second most frequent letter is $|i$, which must represent [ɪ] rather than [i] as a reflex of PR *e. (H $|i$ also represents [i] as a reflex of PR *i, but such cases are outside the scope of this paper.) I do not regard the H spelling $|i$ as evidence for [i] as an HCO reflex of PR *e because the reflexes of the PR subordinative converb *-te were transcribed with $||jəj$ (8) and $||jə$ (9) as well as $|i$ (10), indicating that its HCO reflex could not have simply ended in [i].

(8) H 타제 $t^hatsjəj$ ‘leave-CON-SUB’: PR *tat-i-te (HC8)

(9) H 왜쳐 $wajts^hjə$ ‘be-CON-SUB’: PR *wor-i-te (HC24)⁶

(10) H 랐디 $ratt^7$ ‘become-CON-SUB’: PR *nar-i-te (HC23)

The merger of the Okinawan reflexes of PR *e and PR *i (i.e. [ɪ] and [i]) did not occur until “just before the arrival of Westerners in Okinawa around 1800” (Serafim 2008, 87).

The next two most frequent letters are H $||jəj$ and $||jə$, which both represent Japanese /e/ in *Irop'a* and *Chōphae sinō*. They probably similarly represent an [e]-like vowel in HCO. The fact that they can be used interchangeably with H $|i$ to write the HCO reflex of the suffix *-te in (8) and (9) suggests that they stood for a raised [ɛ] nearly as high as [ɪ] if not [ɪ] itself.

All of the evidence so far indicates that the HCO reflex of PR *e was a front vowel between [e] and [ɪ] in height: i.e. [ɛ] and/or [ɪ]. The exact height of the vowel may have varied by dialect and/or generation: e.g. older speakers could have pronounced it lower than younger speakers. For phonemic purposes, all that matters is that the vowel was lower than high /i/.

⁶ The identification of this item is from Lin (2015, 106), though the PR form is mine.

⁷ The HCO reflexes of PR *n and *r are frequently confused in the H transcription. That is not evidence for a merger of those phonemes in HCO because their Okinawan reflexes /n/ and /r/ are distinct to this day. The compiler(s) of the HC vocabulary must have had difficulty distinguishing between allophones of HCO /n/ and /r/.

I will symbolize that vowel phoneme as /ɪ/. Although HCO /ɪ/ may have been pronounced as low as [e̞], /e̞/ is difficult to type and easily confused with /e/ without a raising diacritic. Moreover, the symbol /ɪ/ reminds the reader that HCO /ɪ/ was higher than PR *e. Writing the HCO vowel as /e/ would give the false impression that PR *e had remained unchanged for centuries.

And I could end the story of PR *e in HCO there if not for several inconvenient facts.

First, there is a strong correlation between PJ *aj and H -ɪ *uj*. Nearly all reflexes of PJ *aj in HC were transcribed with H -ɪ *uj*.

- (11) H 아긔 *akuj* ‘to raise’: PJ *aNka-j- (HC13)
- (12) H 사긔 *sakuj* ‘wine’: PJ *sakaj⁸ (HC17)
- (13) H 아르 *aruj* ‘that (distal)’: PJ *araj (HC21)
- (14) H 구르 *kuruj* ‘this’: PJ *kəraj (HC28)
- (15) H 아므 *amuj* ‘rain’: PJ *amaj (HC34)
- (16) H 칸찌 *k^hantsuj* ‘wind’: PJ *kaNsaj (HC41)
- (17) the second syllable of H 쏜므디 *stomujti* ‘morning’: PJ *tuto-ma-j-taj (HC43)⁹
- (18) H 고므 *komuj* ‘rice’: PJ *kəmaj (HC83)
- (19) H 나브 *napuj* ‘pot’: PJ *naNraj (HC130)

Citations are not exhaustive: e.g. (12) occurs ten times in HC. Each of the three exceptions (20-22) appears only once in HC.

- (20) the third syllable of H 쏜므디 *stomujti* ‘morning’: PJ *tuto-ma-j-taj (HC43)
- (21) H 코메 *k^homjəj* ‘rice’: PJ *kəmaj (HC80)
- (22) H E| *t^hi* ‘hand’: PJ *taj (HC148)

8 PJ nouns ending in *-aj are often analyzed as *-a-final roots with *-i suffixes, but Frellesvig (2021) has called that assumption into question by proposing that some *-aj nouns in fact originally ended in *-a followed by a consonant that may not have been *-j. Although I believe Frellesvig is correct, I will continue to reconstruct these nouns with *-aj since their original consonantal codas, if any, are not relevant to the question of what H -ɪ *uj* represents in HC. One could regard Frellesvig’s *-aC (with *C representing a consonant) reconstructions as early PJ and the conventional *-aj reconstructions as late PJ.

9 The structure of this word is opaque. I follow Martin’s (1987, 558) reconstruction but convert his *-i to *-j and delete his intervocalic PJ *-C- which is unattested in any later Japonic language.

(20) may not be an exception if *-ti* is not from PJ **taj*. (21) is a variant spelling of (18) which is not an exception. (22) is definitely from PJ **taj*, so I cannot potentially dismiss it in the same manner as (20). It may be significant that *uj* is not attested after *t* in HC, though I cannot formulate a general constraint against *uj* after coronals, since H ㄹ *ruj* (13, 14) and H ㅈ *tsuj* (16) are attested. The lack of H ㅌ *tuuj* in HC may be accidental.

I will examine two other isolated exceptions (26 and 28) later.

Second, H ㄴ *uj* almost never corresponds to PR **e* from sources other than **aj*. The only exceptions I have found so far are (23)-(25).

(23) H 아라비란 *arjapujran* ‘exist-CONV-POL-NEG’: < **ar-i* + loan of Middle Japanese /
 φaNper/ + **-an* (HC16)

The polite auxiliary in (23) is not a verb inherited from PR but rather a borrowing of a Japanese innovation, an irregular fusion of **pap-i-ni-ar-* (Martin 1987, 682).

(24) H 피루 *p^hujru* ‘garlic’: PR **peru* (Thorpe 1983, 290) < PJ **peru* (HC98)

(25) H 외브 *ojp^huj* ‘finger’: PR **UjUbe* (Thorpe 1983, 285) < PJ **ajonpe* (HC151)

I will return to the problems of (23)-(25) later in my discussion of (36)-(38) below.

Given that the compiler(s) of the HCO phrasebook did not know PJ, their ability to use H ㄴ *uj* almost exclusively for reflexes of PJ **aj* long after it should have monophthongized to PR **e* is difficult to explain within the TSS framework. At the end of this section, I will present an alternate framework that will account for the correlation between H ㄴ *uj* and PJ **aj*.

Third, the HCO reflex of PR **me* (Thorpe 1983, 284) is (26), the only instance of H ㅁ *uj* corresponding to PR **e*.

(26) H 뭉 *muj* ‘eye’: PR **me* < PJ **maj* (HC143)

The TSS framework would lead me to expect H ㅁ *mjə*, ㅁ *mjəj*, or ㅁ *mi* for HCO [mɛ] and/or [mi], not H ㅁ *muj*. I am hesitant to explain the H ㅁ *-u-* by proposing a subphonemic [w] between HCO labials and /e/ since this is the only instance of H ㅁ *uj* in a labial plus /e/ syllable. H ㅁ *muj* may simply originate from a scribal error for H ㅁ *muj*. I will propose an alternate explanation for the anomalous H ㅁ *-u-* later in my discussion of (47).

Fourth, the HCO reflex of PR **ane* is (27), the only instance of H ㄴ *aj* corresponding to PR **e*.

- (27) ㅅ아^ㅅ | *araj* ‘older sister’: PR *ane < PJ *ani-me ‘older brother-female’ (Martin 1987, 382) (Hc6)

H ㅅ *r* is a common misperception of HCO /n/. See fn. 6.

The TSS framework would lead me to expect H ㅅ러 *rjə*, ㅅ레 *rjəj*, or ㅅ리 *ri* for HCO [nɛ̃] and/or [ni], not H ㅅ^ㅅ | *raj*. I will return to this word in my discussion of (54) below.

Fifth, the HCO reflex of PR *ke is (28), the only instance of H ㅅ이 *aj* corresponding to PR *e.

- (28) ㅅ카이 *k^hai* ‘box’: PR *ke < PJ *kaj (Martin 1987, 448) (Hc128)

The TSS framework would lead me to expect H ㅅ켜 *k^hjə*, ㅅ케 *k^hjəj*, or ㅅ키 *k^hi* for HCO [k^hɛ̃] and/or [k^hi], not H ㅅ카이 *k^hai*. See (48) below for a different expectation according to another framework.

H ㅅ이 *ai* is reminiscent of the ㅅ *aj* used to transcribe fifteenth century Japanese /fe/ and /re/ as ㅅ궤 *faj* and ㅅ래 *raj* in *Irop’a*. H ㅅ이 *ai* could have originated from a scribal error for H ㅅ궤 *aj*. However, H ㅅ *aj* is used elsewhere in HC for reflexes of earlier *apəj and *api and borrowings of Chinese *-a:j and *-əj, not reflexes of PR *e (29-32).

- (29) ㅅ궤 *p^haj* ‘bow’: Late Middle Chinese 拜 *pà:j¹⁰ (Hc63)

- (30) ㅅ소내 *sonaj* ‘vinegared dish’:¹¹ pre-HCO *so no apəj¹² (Hc99)

- (31) ㅅ궤 *k^haj* ‘spoon’: PJ *kapi (Martin 1987, 433) (Hc122)

- (32) ㅅ대 *taj* ‘table’: Early Middle Chinese 臺 *dəj¹³ (Hc138)

10 Chinese reconstructions in this paper are from Pulleyblank (1991). These loans from Middle Chinese were probably borrowed through Japanese.

11 The HCO gloss is 菜蔬 ‘vegetables’, which seems to be an error since the word is literally ‘vinegar GEN mix’ and corresponds to modern Okinawan /sune:/ or /su:ne:/ ‘vinegared dish’.

12 I only reconstruct this collocation at the pre-HCO level because I do not know if it is attested outside Okinawan. The final element of the collocation would be *ape in the TSS model. However, I reconstruct *əj instead of *e because that element corresponds to ㅅ /apəj/ < PJ *apaj. I explain my decision to distinguish between *əj from PJ *aj and *e from other PJ sources below.

13 The corresponding Sino-Japanese reading is *dai* < *ndai /Ntai/. The HCO word was probably [ndaj] /Ntaj/. There are two ways to explain the unexpected correspondence between /a/ in the Japonic forms and Early Middle Chinese *ə. The latter may have been pronounced [ʌ] as reconstructed by Starostin (1989). The lower mid vowel [ʌ] may have sounded more like low /a/ than mid /ə/ to Japonic ears. Alternately, the Japonic forms could reflect a Chinese pronunciation like *daj that was transitional between Early Middle Chinese *dəj and Late Middle Chinese *tʰaj.

I interpret $\text{H } \text{ㄱ} \text{ } aj$ as a transcription of $\text{HCO } /aj/$ except in (30) where it may have represented $\text{HCO } /ai/$ with an $/i/$ from $\text{PR } *e$. It is unclear whether $/aj/$ and $/ai/$ were distinct in HCO . A difference between $\text{HCO } /aj/$ and $/ai/$ may have been too subtle for the compiler(s) of the HC phrasebook to detect. In any case, $\text{H } \text{ㄱ} \text{ } ai$ transcribes HCO segmental sequences of relatively recent origin postdating the monophthongization of $\text{PJ } *ai$ to $\text{PR } *e$, whereas $\text{H } \text{ㄱ} \text{ } ai$ in (27) corresponds to a $\text{PJ } *aj$ that should have monophthongized to $\text{PR } *e$ long ago.

What if that monophthongization had not occurred in PR ? What if it had yet to occur in HCO , long after the breakup of PR ?

Suppose that $\text{PJ } *aj$ had raised to $*əj$ in PR . Such a raising had also occurred in Japanese.

It is possible that $*aj$ -to- $*əj$ raising had occurred in late PJ , just prior to the breakup of Ryukyuan and Japanese. In that scenario, $\text{PJ } *e$ and $*o$ then similarly raised to $/i/$ and $/u/$ in OJ ,¹⁴ whereas $\text{PR } *e$ and $*o$ remained mid.

It is also possible that the raising may have independently occurred in Ryukyuan and Japanese. In that scenario, the raising of $\text{PJ } *aj$ to $\text{PR } *əj$ was initially an isolated event in early Ryukyuan, whereas the raising of $\text{PJ } *aj$ to $\text{OJ } /əj/$ may have been part of a general trend in Japanese that raised $\text{PJ } *e$ and $*o$ to $\text{OJ } /i/$ and $/u/$.

I use the word ‘initially’ because there is no doubt that there were later waves of raising in Ryukyuan. $\text{PR } *e$ and $*o$ eventually did become modern Okinawan $/i/$ and $/u/$, but that shift occurred long after the raising of $\text{PJ } *e$ and $*o$ in Western Old Japanese.

I propose that $\text{PR } *əj$ then remained unchanged for centuries until mid vowels began to rise in the years prior to HCO circa 1500. $*e$ became a front vowel between $[e]$ and $[i]$ in height: i.e. $[e̞]$ and/or $[i]$. I will demonstrate in the next section that $*o$ became a back vowel between $[o]$ and $[u]$ in height: i.e. $[o]$ and/or $[o̞]$. The schwa component of $*əj$ became a vowel between $[ə]$ and $[i]$ in height: i.e. $[ə]$ and/or $[i̞]$. Ideally I would like to write that vowel with a letter for a central vowel that is near-high $[ɪ]$ and $[ʊ]$, but the IPA has no such letter. I will hereafter refer to $\text{HCO } [ə]$ as a near-high vowel even though its IPA symbol is for an upper mid vowel.

$\text{PR } *əj$ cannot have remained unchanged (i.e. retaining a mid vowel) in HCO because if it were still $[əj]$ at the end of the fifteenth century CE, the compiler(s) of HC could have written it with $\text{H } \text{ㄱ} \text{ } əj$, a letter absent from the text. In reality, they generally wrote the HCO reflex

14 The similarity did not extend to final position. PJ final $*aj$ rose to $\text{OJ } /əj/$, whereas PJ final $*e$ and $*o$ did not raise and remained mid $/e/$ and $/o/$ in OJ (Frellesvig, Whitman 2008, 22). Unless specified otherwise, the term ‘ OJ ’ in this paper refers only to Western Old Japanese, the most documented variety of OJ . See Kupchik (2011) for the details of vowel raising in Eastern Old Japanese dialects.

of PR *əj as H –| *ujj*. I will write that reflex as /əj/ with /ə/ to indicate that its vowel is higher than the schwa of PR *əj.

Spellings like (33)-(35) for HCO reflexes of PJ forms with *aj indicate that HCO /əj/ had begun to merge with /e/.

(33) the third syllable of H ㅅ뜨므디 *stomujti* ‘morning’: HCO /tsitoməjtɪ/ < /tsitoməjtəj/ < PR *tutoməjtəj < PJ *tuto-ma-j-taj (HC43)

(34) H 코메 *k^homjəj* ‘rice’: HCO /komɪ/ < /koməj/ < PR *koməj < PJ *kəmaj (HC80)

(35) H ㅓ *t^hi* ‘hand’: HCO /tɪ/ < /təj/ < PR *təj < PJ *taj (HC148)

(33) may not be evidence for the merger of HCO /əj/ and /e/ if its final syllable was from PJ *te rather than PJ *taj.

The PR *əj > HCO /əj/ scenario above accounts for all instances of H –| *ujj* but (36)-(38).

(36) H 아라비란 *arjapujran* ‘exist-CONV-POL-NEG’: HCO /ʔar-j-aNpəjr-an/ < *ar-i + loan of Middle Japanese /ʔaNper/ + *-an (HC16)

(37) H 피루 *p^hujru* ‘garlic’: PR *peru (Thorpe 1983, 290) < PJ *peru (HC98)

(38) (3H 오이브 *ojpuj* ‘finger’: PR *UjUbe (Thorpe 1983, 285) < PJ *əjoNpe (HC151)

As I noted in my discussion of (23), the auxiliary in (36) is probably a borrowing from Japanese. I would expect it to have been transcribed as H ㅏ-ㅏ비ㄹ- *-apir-*, ㅏ-ㅏ벼ㄹ- *-apjər-*, or ㅏ-ㅏ베ㄹ- *-apjəjr-* reflecting HCO †/aNpɪr-/.¹⁵ The H –| *ujj* of the actual transcription is either an error of the Korean transcriber or evidence for the confusion of /əj/ and /ɪ/ in HCO. If HCO /əj/ was beginning to shift to /ɪ/, /-aNpəjr-/ with /əj/ might be a hypercorrect pronunciation of †/aNpɪr-/ with †/ɪ/. See (54) below for another potential example of hypercorrection.

(37), (38) have H –| *ujj* instead of | *i*, † *jə*, and/or † *jəj* for HCO /ɪ/ from PR and PJ *e. If H –| *ujj* in (37), (38) does not reflect a hypercorrect HCO /əj/ for HCO /ɪ/, it could represent an etymological HCO /əj/. But

15 H has a single letter ㅏ for *ja* that transcribes the syllable containing HCO /-j-/ ‘CONV’ and the initial vowel of /-aNpəjr-/ ‘POL’. I use H ㅏ *a* as the transcription of the initial vowel of the auxiliary in isolation: i.e. without a preceding /-j-/. I supply prenasalization /N/ in HCO /-aNpɪr-/ on the basis of prenasalization in Middle Japanese /-ʔaNper-/. Prenasalization was inconsistently indicated in HC: e.g. /ʔaNkəj-/ ‘to raise, give’ was transcribed as both H 아과- *akuj-* without a nasal and H 앙과- *anjukj-* with a nasal. Transcriptions without nasal letters may indicate nasalized vowels: e.g. H 아과- *akuj-* may represent a pronunciation like [ʔəgəj-] with voicing of /k/ after a nasalized vowel. The core subset of H letters used in HC lacked the special letters for voiced obstruents used for the prescriptive Sino-Korean readings in *Tongguk chŏngun* 東國正韻 (Correct Rhymes of the Eastern Country; 1448).

how could that be possible if the Japanese cognates (39), (40) have an /i/ which cannot be from PJ *aj, the source of HCO /əj/?

If I were unaware of the HCO forms in (37), (38), I would derive the /i/ of the Japanese forms in (39), (40) from a PJ *e preserved in Thorpe's (1983, 285, 290) PR forms.

(39) OJ /piru/ < PJ *peru (not OJ */pəjru/¹⁶ < PJ *pajru) 'garlic'

(40) Middle Japanese /ojoNpi/ < OJ *əjoNpi¹⁷ < PJ *əjoNpe¹⁸ (not Middle Japanese */ojoNpe/ < OJ *əjoNpəj < PJ *əjoNpaj) 'finger'

However, I am aware of the HCO forms (37), (38), so I have to somehow reconcile them with the Japanese forms (39), (40). How can I explain the anomalous correspondence of HCO /əj/ to Japanese /i/ in 'garlic' and 'finger'? Perhaps HCO /əj/ and OJ /i/ are reflexes of a PJ *ej. In the Ryukyuan branch of Japonic, PJ *ej merged with *əj which then became HCO /əj/. On the other hand, in the Japanese branch of Japonic, PJ *ej became OJ /i/, possibly merging with pre-OJ *e along the way. I contrast these two paths of development in Figure 1:

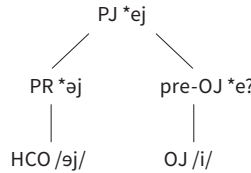


Figure 1 The development of Proto-Japonic *ej in Haedong chegukki Okinawan and Old Japanese

Normally pre-OJ *e should remain /e/ in OJ in word-final position (Frellesvig, Whitman 2008, 22). If PJ *ej became pre-OJ *e, I cannot explain why that *e raised to */i/ at the end of 'finger'. Perhaps PJ *ej became OJ /i/ in all positions without a transitional pre-OJ *e phase in final position. Whether PJ *ej also became pre-OJ *e in medial position is unclear.

I rewrite (37), (38) as (41), (42), incorporating the sound changes in Figure 1.

16 I follow Miyake's (2003) interpretation of OJ B-type e but rewrite his non-IPA 'əy' as /əj/. Other interpretations of OJ B-type e are possible. What matters is not the precise phonemic or phonetic value of OJ B-type e but the fact that OJ *piru* 'garlic' has /i/ rather than B-type e.

17 This word is not attested phonographically in Old Japanese.

18 Middle Japanese /i/ can also be derived from OJ /i/, a merger of PJ *i, *uj, and *oj, but I rule out those sources since none of them correspond to Thorpe's PR *e in 'finger' [tab. 2].

(41) H 피루 *p^hujru* ‘garlic’: HCO /Fəjru/ < PR *pəjru < PJ *pejru (HC98)

(42) H 외브 *ojpɔw* ‘finger’: HCO /ʔɔjɔNpəj/ < PR *ojoNpəj < PJ *əjoNpej (HC151)

Although the H transcription of (42) could be taken at face value to represent an HCO †/ʔɔjɔpəj/, I interpret it as HCO /ɔjɔNpəj/ for two reasons.

First, (42) is the only instance of H ㅝ *oj* in HC. There is no other evidence to suggest that HCO had syllables ending in /ɔj/. It is more likely that HCO /ɔjɔ/ was misheard as */ɔj/. The long vowel /i:/ in the modern Okinawan form /ʔi:bi/ may be a compression of H /ɔjɔ/ that combines the palatality of /j/ with the length of two /ɔ/.

Second, the modern Okinawan form /ʔi:bi/ has a /b/ from PR *Np. Ideally the intermediate HCO stage between /b/ and *Np should have been transcribed in H as †-ㅁㅂ- *-mp-*. However, the H transcription of HCO does not consistently indicate prenasalization, so (42) is probably an instance of unwritten prenasalization.

I am hesitant to reconstruct PJ *ej to account for only two items, (41) and (42). Unfortunately, it is unlikely that I will ever find other examples of pre-*Omoro sōshi* 〇〇 */əj/* corresponding to OJ /i/ because HC is the sole known source of potential evidence for /əj/, and it only contains transcriptions of a small fraction of the 〇〇 lexicon.

I could be adventurous and reconstruct OJ *ej in (43) in which OJ has a word-final /i/ rather than /e/ corresponding to Thorpe’s PR *e.

(43) OJ /kiri/ (not */kire/) ‘fog’: PR *kire (Thorpe 1983, 288) < PJ *kujre¹⁹

I would rewrite (43) as (44), reconstructing the PR form with an *əj from PJ *ej.

(44) OJ /kiri/ ‘fog’: PR *kirəj < PJ *kujrej

I predict that the unattested HCO cognate of OJ /kiri/ would be (45).

(45) H †ㄱ|ㄹ *kiruj* ‘fog’: HCO †/kirəj/ < PR *kirəj < PJ *kujrej

The scenario above cannot account for Thorpe’s (1983, 288) two other reconstructions of PR words for ‘fog’: PR *ki and *kiro ‘fog’.

If PR *ki is from a PJ root *kuj, what is the function of the suffix *-rej?

I was tempted to reconstruct PJ *kujro-j which would regularly become OJ /kiri/. PR *kiro would be from *kujro sans *-j. The trouble is that PJ *kujro-j with *-j should become PR *kiri which would then become modern Okinawan */tɕi:/ since *r was lost before *i (Thorpe

¹⁹ I reconstruct PJ *u following Martin (1987, 451): “the /u/ is confirmed by Hachijō *kuri*”.

1983, 98). The actual Okinawan form is /tɕiri/ with a /ri/ from a PR *re or *rəj, not *ri.

Going beyond native Japonic words, I am aware of only a single Sino-Japanese form which might reflect a direct shift from pre-OJ *ej to /i/ in final position (46).

- (46) 高句麗 *Kōkuri* < OJ */kaukuri/ < pre-OJ *kaukorej? < Early Middle Chinese *kaw kəw lɛj^h ‘Koguryo’

The absence of other Sino-Japanese forms with /i/ corresponding to Middle Chinese *ej-like rhymes may imply that all Sino-Japanese forms other than (46) were borrowed after the raising of PJ *ej in pre-OJ.

I will conclude this section by returning to the three anomalous transcriptions with unique H vowel letters (26-28) and reexamining them through the lens of my new framework.

I would expect the HCO word for ‘eye’ to be †/mɔj/, transcribed as H †ㅁ| *muj*. But the actual transcription of ‘eye’ is (47).

- (47) H ㅁ| *muj* ‘eye’: PR *məj < PJ *maj (HC143)

If H †|uj is not an error for H –| *uj*, it may represent [ɔj] or [ɯj] with a rounded allophone of the vowel of /ɔj/ after a labial onset.

I would expect the HCO word for ‘box’ to be †/kɔj/, transcribed as H †ㄱ| *kuj*. But the actual transcription of ‘box’ is (48).

- (48) H ㅋ| *k^hai* ‘box’: PR *kəj < PJ *kaj (Martin 1987, 448) (HC128)

The aspiration of H ㅋ| *k^hai* is not surprising since the TSS model predicts aspiration before HCO nonhigh vowels. What is surprising is H †| *ai* instead of H –| *uj* H †| *ai* cannot be explained away as a slip of the brush because it bears no graphic resemblance to H –| *uj* apart from the shared grapheme H | *i*. H ㅋ| *k^hai* appears to represent HCO /kaj/ [k^haj] which on a phonemic level looks exactly like PJ *kaj, even though PJ *aj should not have been preserved in HCO or even in PR.

The modern Okinawan descendant of (48) is /ke:/ ‘chest for clothes’ with /e:/ which is usually from secondary *aj or borrowed *aj that postdate the raising of PJ *aj to PR *əj, not primary *aj.

If ‘box’ had primary *aj, it would have been †/kɔj/ in HCO which would then have become †/ki:/ in modern Okinawan like (49), a word that is unfortunately not attested in HC.

- (49) Okinawan /ki:/ ‘hair’ < HCO †/kɔj/ < PR *kəj < PJ *kaj (Martin 1987, 447)

Is ‘box’ a *sui generis* instance of the retention of PJ *aj as late as HCO? Or could it be a borrowing from an otherwise unknown Japonic

Table 2 Some sources of Okinawan front vowels with Japanese correspondences

PJ	PR	HCO	Okinawan	Pre-OJ	OJ	Japanese
*i				*i	/i/	
*uj	*i	/i/		*uj	/i/, /i/ ²	i
*oj ³			/i(:)/ ¹	*oj? ⁴		
*əj	*e	/ɪ/ [e] ~ [ɪ]		*əj	/i/, /i/, /əj/, /e/ ⁵	i, e
*e				*e	/i/, /e/ ⁶	
*aj				*aj	/əj/, /e/ ⁷	e
*ej	*əj	/əj/	/i/ ⁸	*i, *e? ⁹	/i/	i
(none) ¹⁰	(none)	/aj/		(none)	/ai/	ai
*api ¹¹	*api		/e:/	*api	/api/	
*a:j	*a(:)j	/a(:)j/		*aj	/əj/, /e/ ¹²	e

1 /i:/ at the end of monosyllabic words. One could regard that length as the result of a phonological rule and phonologize monosyllables with short /i/: e.g. Okinawan /ki/ [ki:] < PR *ke < PJ *kəj ‘tree’.

2 Late pre-OJ *i fronted to OJ /i/ except after /k Nk p Np m/.

3 A clear-cut example of PJ *oj is Serafim’s (2008, 92) PJ *sungoi- or *songoi- ‘to exceed’, which I reconstruct in my notation as *suNko-j-. The second vowel of the root is preserved in Middle Japanese /suNko-s-/ ‘to spend (time)’ which appears to be a borrowed eastern archaism without the regular *o-raising in Western Old Japanese /suNku-r-/ ‘to exceed’. The Western OJ cognate of modern *sugo-s-* may be attested in *Man’yōshū* 4318 as 須...之 呂 /su ... site/. The missing second man’yōgana has been assumed to be 具 /Nku/, presumably on the basis of Western OJ /suNku-r-/ and Middle Japanese /suNku-s-/, but in theory the lost character could have also represented /Nko/. Igarashi (1969) excludes /su ... site/ from his dictionary of OJ phonographic spellings.

4 It is unclear whether */oj/ was still distinct from */uj/ in pre-OJ.

5 Late pre-OJ *i and *əj respectively fronted to OJ /i/ and /e/ except after /k Nk p Np m/. Frellesvig and Whitman (2008) reconstruct PJ *ii (= *ij in my notation) as a source of OJ /i i/ and PJ *ai (= *əj in my notation) as a source of OJ /əj e/. The Frellesvig-Whitman hypothesis neatly accounts for a split in OJ reflexes but at the price of other complications that are beyond the scope of this paper which is concerned primarily with HCO and secondarily with PR, not PJ. A non-Frellesvig-Whitman account of the different reflexes could involve dialects: e.g. PJ *kəj ‘tree’ became /ki/ in Western OJ but /kəj/ in Eastern OJ with a mid vowel like PR *ke in the southwest. I suspect /i i/ are the regular Western OJ reflexes of PJ *əj, whereas Western OJ forms with /əj e/ from PJ *əj may be borrowings.

6 PJ *e remained mid in word-final position in OJ (Frellesvig, Whitman 2008, 22).

7 Late pre-OJ *əj fronted to OJ /e/ except after /k Nk p Np m/.

8 In theory, a monosyllabic word ending in PJ *ej might end in long [i:] in Okinawan, but no such word is known.

9 It is unclear whether PJ *ej became pre-OJ *e in medial position.

10 This row is for Sino-Japanese loans in HCO and OJ. There were no such loans in PJ and PR. See other rows for Sino-Japanese loans in pre-OJ: e.g. if one wants to see the development of *aj in sixth century Sino-Japanese loans, find the row with native pre-OJ *aj which became /əj/ or /e/ in eighth century OJ.

11 I provide only a single example of the PJ and PR *VCV sequences that merged as /e:/ in Okinawan. Some of those sequences merged in HCO as a secondary /aj/ (51, 52) not to be confused with the primary *aj of PJ that became HCO /əj/.

12 Late pre-OJ *əj fronted to OJ /e/ except after /k Nk p Np m/.

language that retained PJ *aj? I would rather not posit an isolated irregularity or an entire lost variety of Japonic if I can come up with a solution that involves a regular sound change within a known Japonic lineage. The final row of Table 2 contains such a solution [tab. 2].

Given that vowel length has been reconstructed in PJ (e.g. by Serafim 2008), it would not be a stretch to speculate that PJ could also have long vowels before *-j. If PJ *aj had a long vowel counterpart *a:j, an earlier length distinction between *aj and *a:j may have become a quality distinction between /əj/ and /aj/ in HCO, whereas *aj and *a:j merged in Japanese [tab. 3].

Table 3 A Proto-Japonic *aj: *a:j minimal pair

Gloss	PJ	PR	HCO	Okinawan	Pre-OJ	OJ	Japanese
'hair'	*kaj	*kəj	†/kəj/	/ki:/	*kaj	/kəj/	ke
'box'	*ka:j	*ka(:)j	/ka(:)j/	/ke:/	*kaj	/kəj/	(ke)*

* This word is now obsolete in Japanese, but the OJ word can be pronounced in modern Japanese as *ke*.

I write vowel length in parentheses in PR and HCO /ka(:)j/ in Tables 3 and 4 since I do not know if vowel length was phonemic before the coda /j/ in PR or HCO.²⁰ The fact that 'box' was transcribed with two syllabic letter blocks as ㅏ ㅓ 이 *k^hai* may suggest that to Korean ears, the word sounded as long as two Korean syllables, unlike HCO /aj/-syllables transcribed with single syllable letter blocks (50-53).

- (50) ㅏ ㅓ *p^haj* 'bow': HCO /Faj/ < Late Middle Chinese 拜 *pà:j (HC63)
- (51) ㅏ ㅓ *sonaj* 'vinegared dish': HCO /sunaj/ < pre-HCO *so-no-apəj (HC99)
- (52) ㅏ ㅓ *k^haj* 'spoon': HCO /kaj/ < PJ *kapi (Martin 1987, 433) (HC122)
- (53) ㅏ ㅓ *taj* 'table': HCO /Ntaj/ < Early Middle Chinese 臺 *dəj (HC138)

The last remaining anomaly is (54).

- (54) ㅏ ㅓ *araj* 'older sister': PR *ane < PJ *ani-me 'older brother-female' (Martin 1987, 382) (HC6)

²⁰ Vowel length was certainly phonemic in open syllables: e.g. Okinawan /mu:ku/ 'bridegroom' retains the long vowel of PJ *mo:ko (Serafim 2008, 86).

I hypothesize that (54) may be an error for ㅍ아ㄹ *aruŋ* representing a hypercorrect pronunciation ㅍ[ʔanəj] of HCO /ʔane/.²¹ The short horizontal stroke of ㅍ-| *uj* could have been miscopied as the dot of ㅍ·| *ʌj*.

It is also possible that Martin's etymology requiring an irregular reduction of PJ *-ime- to PR *-e is incorrect. The HCO form could have been /ʔanəj/ from PR *ʔanəj going back to a PJ *anaj. The resemblance between PJ *anaj 'older sister' and PJ *ani 'older brother' would then be coincidental or the result of analogical alteration of one form to resemble the other.

4 Reflexes of PR *o in *Haedong chegukki*

A three-way contrast between high labial *u and mid labial *o and non-labial *ə in PJ was reduced to a two-way contrast between high labial *u and mid labial *o in PR. PR *o then raised to HCO /ʊ/, eventually merging with HCO /u/ [tab. 4]. I will explain my choice of the symbol /ʊ/ later.

Table 4 Major native sources of Okinawan /u/

PJ	PR	HCO	Okinawan	Pre-OJ	OJ	Japanese
*u	*u	/u/ [u] ~ [z] ¹	/u(:)/ ² , /i/	*u	/u/	u
*o	*o	/ʊ/ [ʊ] ~ [ʊ]	/u(:)/	*o	/u/, /o/ ³	u, o
*ə				*ə	/ə/, /o/ ⁴	o

1 HCO /tu Ntu su Nsu/ were pronounced [tsz n(d)z sz n(d)z]. /N/ may also have surfaced as nasalization of a preceding vowel. Pulleyblank's (1991) Late Middle Chinese *z was borrowed into Korean as /ʌ/, so it is likely that ㅍ· ʌ after sibilants transcribes HCO [z]. HCO [z] later merged with [i]. A similar shift of *z to [i] occurred after Cantonese sibilants. I could reconstruct HCO [i] or [u] instead of [z], but I would expect an HCO [i] or [u] to be transcribed with the ㅍ high vowel letter — u, not the ㅍ low vowel letter · ʌ.

2 /u:/ at the end of monosyllabic words. One could regard that length as the result of a phonological rule and phonologize monosyllables with /u/: e.g. Okinawan /mu/ [mu:] < PR *mo < PJ *mə 'seaweed'.

3 PJ *o remained mid in word-final position in OJ (Frellesvig, Whitman 2008, 22).

4 Pre-OJ *ə rounded to /o/ after labials in most OJ texts. *Kojiki* 古事記 (Records of Ancient Matters) (710 CE) is the only OJ text retaining a distinction between /ə/ and /o/ after /m/.

21 I tentatively project the initial glottal stop of modern Okinawan back into HCO. Although the ㅍ transcription lacks the special glottal stop letter ㅍ ʔ, that does not necessarily mean HCO lacked a glottal stop. That ㅍ letter was only rarely used in early ㅍ texts in Korean and became obsolete by the late fifteenth century, so the transcriber may not have been aware of its existence. However, the fact that *k- in Chinese transcriptions of ㅍok occasionally corresponds to a zero initial in ㅍC transcriptions led Lin (2015, 147) to reconstruct a glottal stop /ʔ/ in ㅍok. Could the Chinese *k-transcriptions represent a uvular allophone [q] of /ʔ/? Could [q] be an archaic pronunciation of /ʔ/? Could the Japanese doublet *are* ~ *kare* 'that' contain two reflexes of an earlier *q in different dialects: zero and /k/?

Lin (2015, 190) reconstructs /o/ for $\text{oo}\kappa$, but I prefer to write that vowel as / υ / to remind the reader that it was higher than PR * o .

I do not reconstruct / υ / as a mid / o / because it was transcribed with $\text{H} \top u$ as well as $\text{H} \perp \text{o}$ [tab. 5].

Table 5 Frequencies of transcriptions of Old Okinawan reflexes of PR * o

PR	HCO	H	H transcription	Tokens	Percentage
* o	/ υ /	\top	u	33	33.7%
		Π	<i>ju</i> ¹	5	5.1%
		\perp	o	50	51.0%
		$\perp\perp$	<i>jo</i> ²	9	9.2%
		$\perp\parallel$	waj	1	1.0%

1 This letter transcribes the HCO glide-vowel sequence / $j\upsilon$ /. There is no H letter for / j /.

2 This letter transcribes the HCO glide-vowel sequence / $j\upsilon$ /. There is no H letter for / j /.

The sole example of H $\perp\parallel$ *waj* is (55). H $\perp\parallel$ *waj* may either be an error for H \perp *oj* or a transcription of HCO [w ɔ] with an unusually low allophone [ɔ] of / υ /, perhaps due to dissimilation before / j /, a glide resembling the high vowel / i /.

(55) H 왜^쳐 *wajts^hjə* ‘be-CON-SUB’: HCO /w ɔ ice/ < PR *wor-i-te (HC24)

The same morpheme can appear in HC with both H $\top u$ and H $\perp \text{o}$ (56-7):

(56) H 피^쥬 *p^hits^hju* (HC1) ~ 피^쥬 *p^hitsjo* (HC29) ‘person’: HCO /Fit υ / < PR *pito < PJ *pita

(57) H 누 *nu* (HC112) ~ 루 *ru* (HC86) ~ 노 *no* (HC63) ~ 로 *ro* (HC80) ‘genitive marker’: HCO /n υ / < PR *no < PJ *nə

The inability to settle upon a single vowel symbol indicates that neither symbol was a perfect match for the HCO vowel which may have been between Korean /u/ and /o/. I symbolize that vowel phoneme as / υ /. Although HCO / υ / may have been pronounced as low as [ɔ], / υ / is difficult to type and easily confused with / o / without a raising diacritic. Moreover, the symbol / υ / reminds the reader that HCO / υ / was higher than PR * o . Writing the HCO vowel as / o / would give the false impression that PR * o had remained unchanged for centuries. An unchanged mid vowel would not have been transcribed with H $\top u$, which is also the default transcription of the HCO reflex of PR * u : e.g. (58).

(58) H 파^무 *p^hamu* ‘snake’: HCO /FaNp υ / < PR *paNp υ (cf. Thorpe 1983, 332) (HC165)

PR *u has a special transcription as H · ɰ after the coronal obstruents /s Ns t Nt/: e.g. (59).

(59) H 아슴비 *asɰmpi* ‘play-IMP’: HCO /ʔasuNpɪ/ [ʔasɰmbɪ] < PR *asuNpe (cf. Thorpe 1983, 317)²² < PJ *asoNpe (HC24)

(60) is the only form in HC containing both H · ɰ and H ɰ u.

(60) H ㅎ우 *sɰu* ‘vinegar’: Okinawan /si:/ ~ /su:/, Japanese *su*, OJ */su/ (HC92)²³

I could mechanically interpret (60) as HCO /suu/ or /suʊ/ with two vowels in different syllables following regular transcription conventions, but I suspect it is either a composite of (61) and (62) or an error for (62).

(61) H †ㅎ *sɰ* ‘vinegar’: HCO /su/ [sɰ] < Japanese /su/ < PJ *so

(62) H †수우 *suu* ‘vinegar’: HCO /su/ < PR *so < PJ *so

(61), the ancestor of modern Okinawan /si:/, is a borrowing from Japanese that underwent both the *o > /u/ shift in Japanese and the *u > [ɰ] shift in Okinawan.

(62), the ancestor of modern Okinawan /su:/, is the native word for ‘vinegar’. It could not have had *u in pre-HCO because it did not undergo the *u > [ɰ] shift.

The use of two syllabic blocks to transcribe (60) may have indicated a phonetic long vowel [ʊ:] in HCO. Nonetheless, I do not reconstruct a phonemic long vowel in HCO or its ancestors since I am uncertain whether vowel length was distinctive in HCO monosyllabic words.

One final anomalous form is (63) which contains the only instance of H — u in HC.

(63) H ㅋ지 *kʰutsi* ‘mouth’: HCO /kuti/ < PR *kuti (Thorpe 1983, 308) < PJ *kutuj (HC145)

H — u happens to match the phonetic value [u] of modern Japanese /u/, but that fact is of no relevance for the reconstruction of OOK circa 1500.

Initially I regarded H — u in (63) as an error for H †ɰ u transcribing HCO †/u/ from PR and PJ *u. However, if the word had /u/ in HCO,

²² Thorpe’s PR *u for PJ *o is irregular. Serafim (2008, 84) reconstructs PJ ‘to play’ with an *o that raised to *u prior to what I reconstruct as a shift of *u to HCO [ɰ] after coronal obstruents.

²³ Although the OJ word for ‘vinegar’ is not attested phonographically, the fact that the *kanji* 酢 for ‘vinegar’ is a phonogram for OJ /su/ implies that ‘vinegar’ was also /su/ in OJ.

I would not expect the preceding consonant to be aspirated. The TSS model predicts aspiration only before nonhigh²⁴ vowels: i.e. /a ɪ ʊ/ which are lower than high /i u/. $H \Rightarrow k^h$ may then represent an HCO aspirated [k^h] before a nonhigh vowel resembling $H \uparrow \uparrow u$: i.e. HCO /ʊ/ from PR and PJ mid *o. Serafim (2008, 84) reconstructs PJ ?*kotoj ‘mouth’²⁵ which would regularly become HCO /koti/ according to the correspondences in Table 6. $H \uparrow \uparrow \text{쿠지}$ $k^h\text{utsi}$ ‘mouth’ would be a phonetic transcription of HCO /koti/ [k^hʊtɕi]. Accidentally omitting the vertical stroke of $H \uparrow \uparrow u$ from the first letter block would result in $H \text{쿠지}$ $k^h\text{utsi}$, the transcription attested in HC. If Serafim and I are correct,²⁶ I can rewrite (63) as (64) with a revised PR form that is transitional between my HCO phonemicization and Serafim’s PJ reconstruction.

(64) $H \text{쿠지}$ | $k^h\text{utsi}$ ‘mouth’: HCO /koti/ < PR *koti < PJ *kotoj (Serafim 2008, 84) (HC145)

The first *o of PJ *kotoj matches the mid vowel of 古次 Early Middle Chinese *ko’ ts^hi^h,²⁷ a transcription of a toponym element widely regarded to be the word for ‘mouth’ in a Para-Japonic language of Koguryō.²⁸ The common ancestor of PJ and that Para-Japonic language (Proto-Macro-Japonic?) may have had a mid vowel like *o in its word for ‘mouth’.

Unfortunately, my PR *koti does not predict the forms of ‘mouth’ in Table 7 which point to Thorpe’s PR *kuti. Compare those forms with those for ‘egg’ from Thorpe’s (1983, 62) PR *koga.

²⁴ Although HCO /ɪ ʊ/ are near-high vowels, they could condition aspiration like the low vowel /a/. I place all three of those HCO vowels into a ‘nonhigh’ category. I reserve the term ‘high’ for the true high vowels /i u/.

²⁵ I have rewritten Serafim’s *y as IPA *j for consistency with other forms in this paper. I do not know why Serafim writes a question mark before his *kotoj.

²⁶ Here I only refer to Serafim’s (2008) PJ reconstruction. Serafim (2008, 84-5) also proposes a “First Vowel-Raising” of “many” PJ *o in words such as ‘mouth’ long before his “Second Vowel Raising” of “all remaining mid vowels”. (It is unclear why he hyphenates “First Vowel-Raising” but not “Second Vowel Raising”.) Serafim (2008, 84) reconstructs ‘mouth’ as *kutuy after First-Vowel Raising. That form would become HCO †/kuti/ with a high vowel /u/ that should have blocked aspiration of the preceding /k/. On the other hand, I propose a single gradual raising of mid vowels corresponding to Serafim’s Second Vowel Raising.

²⁷ I cite Pulleyblank’s (1991) Early Middle Chinese readings in lieu of the unknown local (Sino-Koguryō?) readings which I presume were similar.

²⁸ The Koguryō toponym 甲比古次 is a phonetic transcription of a non-Chinese name later replaced by 穴口郡 ‘cave mouth prefecture’, a Chinese-style name that may be a translation of the earlier name. I use the term ‘Para-Japonic’ to refer to relative(s) of Japonic once spoken on the Korean peninsula. The choice of the phonogram 次 *ts^hi^h indicates that a syllable corresponding to Serafim’s PJ *toj had shifted to something like *tsi in a Para-Japonic language long before pre-HCO */ti/ became HCO /ti/ [tɕi] and Middle Japanese /ti/ became modern Japanese [tɕi].

Table 6 Nonmatching onsets for ‘mouth’ and ‘egg’ in Ryukyuan varieties as recorded in Thorpe (1983)

Ryukyuan variety	‘mouth’	‘egg’
Aden	/kuci/	/huãã/
Yamatoma		/xoga/
Shodon	/ku·cj/	/k’uga/
Taketomi	/huci/	/kuNga/

If ‘mouth’ were PR *koti, I would expect ‘mouth’ to have the same onsets as ‘egg’.

On the other hand, the aspiration in HCO is not the only potential evidence for a mid vowel in PR *koti. Naze and Yuwan have /k/ in ‘mouth’ as well as ‘egg’, implying that ‘mouth’ and ‘egg’ both once began with *ko [tab. 7].

Table 7 Matching onsets for ‘mouth’ and ‘egg’ in Ryukyuan varieties as recorded in Thorpe (1983)

Ryukyuan variety	‘mouth’	‘egg’
Naze		
Yuwan	/k’uci/	/k’uga/

I could try to explain the different onsets for ‘mouth’ by reconstructing a PR *kowti that became *koti in some Ryukyuan varieties and *kuti in others. I would then have to project PR *ow back into PJ. This *ow would be the back counterpart of the *ej that I reconstructed for PJ. However, there may also be less drastic solutions: e.g. borrowing within Ryukyuan.

Aside from the troubling case of ‘mouth’, aspiration was clearly associated with the nonhigh vowels /a ɪ ʊ/. However, that association was not absolute.

Medial voiceless stops before HCO /a/ were almost always unaspirated in H transcription: e.g. medial /k/ in (65) and medial /t/ in (66).

(65) ㄸ 사가나 *sakana*: HCO /sakana/ ‘fish’ < loan of Middle Japanese /sakana/ (HC16)

(66) ㄸ 카다나 *k^hatana*: HCO /katana/ ‘sword’ < loan of Middle Japanese /katana/ (HC129)

(67) is an exceptional case of a medial aspirated stop before /a/.

(67) ㄸ 취타지 *ts^hujt^hatsi*: HCO /tuitati/ ‘first day’ < loan of Middle Japanese /tuitati/ (HC11)

HCO morphemes with voiceless stops before /ɪ ʊ/ were not consistently transcribed with H aspirated consonant letters (68-73).

(68-70) share the subordinative converb /-ɪɪ/.

(68) H 타제 *t^hatsjəj* ‘leave-CON-SUB’: HCO /tat-i-tɪ/ ²⁹ < PR *tat-i-te < PJ *tat-i-te (HC8)

(69) H 왜쳐 *wajts^hjə* ‘be-CON-SUB’: HCO /wʊ-i-tɪ/ < PR *wor-i-te < PJ *wəɾ-i-te (HC24)

(70) H 란디 *ratti* ‘become-CON-SUB’: HCO /nat-tɪ/ < PR *nar-i-te < PJ *nar-i-te (HC23)

(71) is a more conservative pronunciation of ‘rice’ than (72). The former lacks the aspiration and nonetymological /ɪ/ of the latter.

(71) H 고미 *komuj* ‘rice’: HCO /koməj/ < PR *koməj < PJ *kəmaj (HC83)

(72) H 코메 *k^homjəj* ‘rice’: HCO /komɪ/ < /koməj/ < PR *koməj < PJ *kəmaj (HC80)

The H transcription of (75) has aspiration even before a high vowel /i/.

(73) H 피쭈 *p^hits^hju* (HC1) ~ 피쭈 *p^hitsjo* (HC29) ‘person’: HCO /Fitʊ/ < PR *pito < PJ *pitə

That aspiration is not evidence for reconstructing ‘person’ with a non-high /ɪ/ in HCO or *e in PR. The HCO reflex of PR *p was generally transcribed with aspiration as H ㅍ *p^h* regardless of the following vowel, though exceptional cases of H ㅍ *p* also exist: e.g. (74-5).

(74) H 비즈자 *pitsɯtsja* ‘sheep-TOP’: HCO /FitʊNci-ja/ [pʰitsɯndzija] < PJ *pituNsi-pa (HC163)

(75) H 오부시 *opusi* ‘many-FIN’: HCO /ʊpʊ-si/ < PJ *əpə-si (HC14)

Clearly the aspiration of H ㅍ *p^h* reflects a phenomenon of a different nature than that of other H aspirated letters. What is not so clear is what H ㅍ *p^h* represented. Ming Mandarin (MM) transcriptions of the 00K voiceless bilabial obstruent have *p-, *p^h-, *f-, and even *xu³⁰ corresponding to H ㅍ *p^h* (Lin 2015, 141) (76-7).

29 I interpret H 타제 *t^hatsjəj* as a disyllabic transcription of a trisyllabic [t^hatɕitɕɛ]. Although the second vowel /i/ was omitted from the transcription, I assume it was present to condition the palatalization of the following /t/ indicated by H ㅈ *ts*. The Korean transcriber may have heard a sequence of two similar syllables [tɕitɕɛ] as a single syllable [tɕɛ]. Compare (68) with palatalized /t/ to (70) in which the second /t/ was not palatalized because /i/ was lost.

30 Lin (2015) writes only *x-, but I regard the following *-u- as part of the transcription of the 00K voiceless bilabial obstruent.

- (76) MM 扒 *pa? ~ 華 *xua ‘tooth’: 𠵼 𠵼 $p^h\alpha$: HCO /Fa/ (HC153) < PR *pa < PJ *pa (Martin 1987, 394)
- (77) MM 必祿 *pilu? ~ 皮祿 *p^hilu? ~ 非祿 *fuilu? ‘day’: 𠵼 𠵼 $p^h i r u$: HCO /Firu/ (HC47) < PR *piru < PJ *piru (Martin 1987, 409)

There is also a strange instance of a word-initial velar stop *k- in one MM transcription of (80), a word absent from HC.

- (78) MM 谷古里 *ku?kuli ‘rejoice-INF’:³¹ 𠵼 𠵼 /Fukur-i/ < PR *pokor-i < PJ *pokər-i ‘take.pride.in-INF’ (Martin 1987, 692)

I would have expected MM †xu?kuli with *x-. The first syllable may have been confused with the similar-sounding second syllable.

Lin (2015, 142) reconstructs 𠵼 𠵼 /ϕ/, but I do not think a fricative would be transcribed with an unaspirated stop in both Korean and Chinese. I prefer to write the HCO phoneme as /F/ with a capitalized non-IPA symbol to indicate that I do not know its precise pronunciation. /F/ may have had an allophone like [pϕ] resembling MM *p, *p^h, and *f- and Korean /p^h/ but lacking a precise match in either language. Another allophone may have resembled the ‘obsolescent’ Shuri Okinawan onset that Serafim (2008, 81) writes as [ϕ(w)]. MM 華 *xua (77) may have been the closest available match for an HCO mora like [ϕwa] since there was no MM syllable *fua.

There is no need to reconstruct exotic consonant clusters like [pϕ] or [ϕw] in HCO at other points of articulation. Most of the allophones of 𠵼 𠵼 /k t/ had exact counterparts in MM and Korean with the exception of [tɕ] and [tɕ^h], the palatalized allophones of /t/, which could only be approximated with alveolar fricatives. I list the frequencies of H transcriptions of HCO /k t/ before /ɪ əj ʊ/ in [tab. 9].

31 This verb appears in several Chinese glossaries (Lin 2015, 222) before MM 烏鴉沒 *uiamu? or 烏牙沒 *uiamu?, possibly 𠵼 𠵼 /ʔɔja-mʊ/ ‘parent-FP’. The Chinese gloss for the phrase is 給賞 ‘to give an award’, so the 𠵼 𠵼 phrase may have meant something like ‘even parents rejoice (at their child receiving an award)’. The meaning ‘rejoice’ is literary and archaic in Shuri Okinawan (Martin 1987, 692). Here I have projected ‘rejoice’ back into 𠵼 𠵼, but I am not sure if /Fokor-/ already had that meaning when the transcription first appeared in the 1561 edition *Shi Liuqiu lu* 使琉球錄 (Record of Ambassadors to the Ryukyus).

Table 9 Frequencies of hangul transcriptions of HCO /k t/ before /ɪ əj ʊ/

H	/ɪ/	/əj/	/ʊ/
ㄱ- <i>k-</i>	0	0	9
ㄱ- <i>-k-</i>	1	11	0
ㅋ- <i>k^h-</i>	0	0	1
ㅌ- <i>-ts-</i>	3	0	2
ㅌ- <i>-ts^h-</i>	1	0	2
ㅊ- <i>t-</i>	0	0	1
ㅊ- <i>-t-</i>	11	0	3
ㅊ- <i>t^h-</i>	4	0	2

It is hazardous to draw hard conclusions from a small number of tokens.

The absence of H aspirated letters before /əj/ may simply be an artifact of a limited sample. A larger sample might have revealed that aspiration could also have occurred before /əj/. I would expect the near-high vowel /ə/ to condition aspiration like the other near-high vowels /ɪ ʊ/.

It is most likely that aspiration was not obligatory before near-high /ɪ ə ʊ/, contrary to the TSS model. However, I should also point out that aspiration is not binary. Perhaps HCO aspiration was not as strong as Korean aspiration and thus was not always salient to Korean ears. But that hypothesis would not explain the consistent use of H aspirated letters for the word-initial stops /k t/ before /a/.

I propose that such stops were the first to be aspirated and that aspiration gradually spread to voiceless obstruents before nonhigh vowels other than /a/. In HCO, medial /k t/ were unaspirated before /ɪ əj ʊ/ with the exception of palatalized /t/ which was transcribed both with and without aspiration: e.g. (79).

(79) H ㅍㅈ쵸 *p^hits^hju* (HC1) ~ ㅍㅈ쵸 *p^hitsjo* (HC29) ‘person’: HCO /Fitu/ [pʰitɕ^hʊ] ~ [pʰitɕʌ]
 < PR *pito < PJ *pitə

Aspiration may have spread not only within ook but also from Shuri as a prestigious trait, taking root and persisting in the periphery but eventually perishing in Okinawan itself.

5 Conclusions

What began as a survey of H transcriptions of PR mid vowel reflexes in HCO led to my proposals of PR *əj and *a(:)j and a much later date for aspiration before nonlow vowels. Although those proposals may appear plausible within the limited context of HC, they remain to be tested against the evidence of Chinese transcriptions of OOK, the native OOK orthography of the *Omoro sōshi*, and modern Ryukyuan varieties. Until such testing occurs, my even more radical proposals of PJ *ej and * a:j can only be extremely tentative.

In the course of this study, I have also made more moderate discoveries of words that should be reconstructed with mid vowels in PR and PJ. However, limitations of space prevent me from discussing those words here. I hope to delve into them in a future publication.

Abbreviations and Symbols

*	erroneous form
†	expected form
*	reconstruction
ATTR	attribute marker
CONV	converb
GEN	genitive
FIN	final verbal form
FP	focus particle
H	hangul
HC	<i>Haedong chegukki</i> 海東諸國紀
HCO	<i>Haedong chegukki</i> Okinawan
INF	infinitive
IPA	International Phonetic Alphabet
MM	Ming Mandarin
NEG	negative
OJ	Old Japanese (Western unless otherwise specified)
OOK	Old Okinawan of <i>Omoro sōshi</i>
PJ	Proto-Japonic
POL	polite
PR	Proto-Ryukyuan
SUB	subordinative converb
TOP	topic
TSS	Thorpe/Serafim/Shinzato

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