Notes on the Diachronic Phonology of Nauruan

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This paper investigates the Nauruan reflexes of Proto-Micronesian phonemes. Nauruan participates in most reductive sound changes found elsewhere in Micronesian. The attrition patterns of *t and *k in Nauruan resemble similar developments in Eastern Chuukic. An unusual developments are shifts of major place of articulation, from coronal to velar, and from velar to labial. This paper contains a discussion of the reflexes of Proto-Oceanic palatals in Micronesian. A list of Kiribati loans in Nauruan is supplied.

Keywords: Nauruan; Kiribati; Micronesian; Sound Change; Lenition

1. INTRODUCTION.[1]

1.1. OVERVIEW. This paper investigates the internal phonological developments in Nauruan (NAU), a Micronesian spoken by just under 10,000 people in the Republic of Nauru and diaspora (Eberhard, Simons, and Fennig 2021). The status of NAU as a Micronesian language was established by Hughes (2020a,b). Building on that work, this paper investigates the reflexes of Proto-Micronesian (PMC) phonemes in NAU.

The phonemic inventory of NAU is given in table 1, following the proposals in the synchronic description in Blumenfeld (2022). Closely related proposals are found in Hughes (2020b); see discussion in Blumenfeld (2022) on the differences between the two proposals. The rhotic *ɾ̌* is distinguished from *r* by a higher degree of constriction and frication (Hughes 2020b:92ff.). Distinct from the glides /j,w/ are semivowels /i̯,u̯/, which in turn are in complementary distribution with corresponding vowels /i,u/; see Blumenfeld (2022) for details.

The vowel inventory is shown in table 2. In addition, the symbol [a] is used as a disjunction of [ʌ] and [ɑ] where the identity of the vowel is uncertain (see details in Blumenfeld 2022).

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TABLE 1. NAU CONSONANT INVENTORY.

p^w	p	t			k	k^w
b^w	b	d			g	
m^w	m	n			ŋ	
		ř		r		
			j, i̯		w, u̯	

TABLE 2. NAU VOWEL INVENTORY.

i	ɨ	u
e	ʌ	o
æ		ɑ

TABLE 3. NAU REFLEXES OF POC AND PMC CONSONANTS.

POC	*b	*b^w,*b	*p	*m	*m^w, *m		*k	*t	*g,*y,*w	
PMC	*p	*p^w	*f	*m	*m^w		*k	*t	*x,*y,*w	
NAU	b	b^w	∅	m	m^w		k,t,w,∅	t,j,∅	∅	
POC	*s,*c	(*z),*j	*j	*d,*dr	*r	*R	*l	*ŋ	*n	*ñ
PMC	*s	*S	*Z	*c	*r	*r,∅	*l	*ŋ	*n	*ñ
NAU	d, g		?	ř	r	r,∅	j,ŋ,n,∅	ŋ,m^w	n,ŋ	n

This paper sets up the correspondences for consonants in table 3 (vowels are discussed separately in section 2.9). The symbol *z in this table refers to the post Proto-Oceanic (POC) lenis counterpart of *s (Ross 1988:71ff.; Geraghty 1983, 1986). The updated picture of POC palatal reflexes in Micronesian is discussed in section 2.5. For the origins of NAU /p/ and /k^w/, see below.

Conditioned changes are described in table 4. Note the commonality in the environments of the major place shifts (velar outcomes of *n, *l, *s, *S, labial outcome of *ŋ). The degree of regularity of each of these changes will be illustrated in relevant sections below. I will start with some highlights of the findings.

TABLE 4. CONDITIONED CHANGES.

Sound	Change	Environment	Notes
*k	*k > w	adjacent to *u*	almost regular
	*k > t	__i	rare; *t* → *ts* before *i*
	*k > k, ∅		irregular; see section 2.2
*t	*t > t, j, ∅		irregular; see section 2.2
*s, *S	*s, *S > g	{#,a,o}__{a,o}	almost regular
*l	*l > j	adjacent to *{i,u}	
	*l > ŋ	{#,a,o}__{a,o}	almost regular
	*l > n, ∅		irregular; rare
*ŋ	*ŋ > m^w	{#,a,o}__{a,o}	almost regular
*n	*n > ŋ	{#,a,o}__{a,o}	almost regular

1.1.1. General features. Two general features in NAU diachrony are noteworthy. First, cognates are not abundant. Fewer than 200 NAU items are given etymologies in this work, not all of which are unproblematic (just over half of these are given the same analysis in Hughes [2020b]). Second, many changes are not fully regular. Together, the high rate of lexical loss and the variable and irregular developments are consistent with a previous population bottleneck. A similar situation holds in Kosraean (KSR) (Jackson 1983:324); cf. Bromham et al. (2015) for general discussion of the effects of population size on vocabulary.

1.1.2. Reductive changes. A striking fact is that, with the exception of the loss of PMC *r in Kiribati (KIR), NAU participates in *all* reductive changes found elsewhere in Micronesian: loss of *f, *x, *y, *w, and lenition and loss of both *t and *k, and loss of final short vowels.

1.1.3. *t, *k. The somewhat irregular patterns of lenition of *t and *k most closely resemble the attrition patterns in the Eastern Chuukic languages. Subgrouping NAU with Chuukic is not a likely candidate for explanation of this puzzling fact, not only on geographic grounds, but also for lexical reasons: NAU shows no tendency to share well-established Chuukic lexical innovations. There are a small number of items where an NAU cognate for an otherwise Chuukic-only item has been found, but these are likely due to previously unidentified PMC items which were are not reflected in other languages. These attritions might be part of a broader Oceanic pattern of voiceless stop lenition.

1.1.4. Place shifts. An unusual feature of the data are the shifts in major place of articulation: the velar outcomes of *n, *l, *s, *S, and the labial outcome of *ŋ. These shifts appear conditioned by the (bidirectional) adjacency to *a, *o, but the facts are not fully regular.

1.1.5. Palatals. Micronesian "palatals" (*s, *S, *Z) are discussed in their Oceanic context. A slight revision to the reconstructions in Bender et al. (2003a) for the Micronesian reflexes of *c, *j is proposed.

1.1.6. KIR loans. A significant portion of the vocabulary consists of KIR loans, widely distributed in semantic domains such as the natural world, material culture, and general vocabulary. Identifying the phonological characteristics of KIR loans is essential to establishing the sound correspondences.

This paper has a narrow focus: it is only concerned with the *phonological* history of NAU, that is, the developments of PMC phonemes. I make no attempt to etymologize grammatical morphemes, pronominal sets, classifiers, and so on. Some proposals in that area have been made by Hughes (2020b). The paper is also somewhat limited in coverage, in that I have relied heavily on the PMC reconstructions in Bender et al. (2003a,b), and did not systematically search lexica of Micronesian languages for new cognate sets. Thus, no new PMC forms are proposed here, with the exception of a few cases where I was able

to identify NAU reflexes of POC forms not otherwise attested in Micronesian, and a few more where a Proto-Chuukic (PCK) or Proto-Pohnpeic–Chuukic (PPC) form has an NAU cognate. Thus, on the evidence discussed here, claims about subgrouping and the place of NAU in Micronesian are premature. One strategy in the state of limited knowledge is to avoid constructing arboreal diagrams, and instead summarize shared innovations in wave diagrams, which is done at the end of this paper in section 4.

1.2. DATA SOURCES. This paper draws on both original field material and published sources. My field notes and recordings were collected over several visits to Nauru between 2014 and 2018 (four months total time on site), with five speakers aged between thirty-five and seventy, with the majority of data coming from two speakers in their forties and fifties. The recordings include word lists, stories, and morphosyntactic elicitation. Written sources are: Jacob et al. (1996), Thaman et al. (1994), Kayser (2002 [1934]), Kayser (1993 [1937]), Hambruch (1914–1915). The materials from Kayser and Hambruch include much vocabulary that has fallen out of use, especially concerning material culture, and present a valuable source of information. The reliability of Hambruch's descriptions may be questioned, as in Kayser's (1917) critical review. However, the work does contain some clearly inherited vocabulary not found in other sources. I will use the data from Hambruch with caution.

1.3. PREVIOUS WORK. Nathan (1973) was the first to investigate NAU diachrony; his findings are discussed and interpreted in Jackson (1983, 1986). More recently, synchronic work on NAU has appeared (Johnson 1999, 2002). The most extensive recent investigation of the language appears in Hughes (2020b), covering in great detail both synchronic and diachronic phonology.

Hughes' central result was the classification of NAU as a Micronesian language, and the resulting elimination of the nuclear/nonnuclear distinction within the family as unnecessary. The prior view in the literature was the one proposed by Jackson (1986), in which NAU /ř/ directly continues POC *dr but not POC *d, thus excluding NAU from the so-called nuclear Micronesian group as the sole Micronesian language that fails to merge *dr and *d. Hughes argues convincingly that this view is incorrect, and that NAU, like other Micronesian languages, merges *dr and *d in PMC *c and NAU /ř/. Following this insight, this paper assumes that NAU is a Micronesian language descending from PMC.

The present work is much indebted to Hughes (2020b), and agrees with its results with respect to uncontroversial changes, namely the outcomes of PMC *p(ʷ), *m(ʷ), *r, *c, and *f. In most other cases, such as the developments of PMC *t, *k, *n, *l, *s, *S, *ŋ, my claims overlap in some aspects with those of Hughes but diverge in many details. These different conclusions are due to differences in our methodologies. I pursue a less-is-more approach, where a high tolerance for failure to establish an etymology for any given NAU word ensures

the reliability of etymologies that are in fact established. Any device that adds degrees of freedom to the reconstruction by growing the set of potential cognates is treated with suspicion. This includes sporadic changes like metathesis, and unmotivated segmentation of forms (the so-called benign slash; Geraghty 1983; Blust 2014). I believe caution at the early stages of sorting out a complex pattern may bring long-term dividends. I will not systematically discuss differences in analysis of specific items with Hughes, but will give the citation from Hughes for any correspondence set also present in his work, where our analyses are approximately the same.

A complication in the data is the significant layer of KIR loans in NAU, which is also the basis of many differences between the present analysis and that of Hughes (2020b). Certain sound correspondences are only found in these loans, and a systematic attention to them is essential to working out the correct developments from PMC.

1.4. MORPHOLOGICAL PRELIMINARIES. Special care is taken in this work with segmentation of forms, to avoid the use of the "benign slash," which is especially dangerous in a situation where so many changes are reductive and the resulting daughter language forms are very short, sometimes consisting of one or two phonemes. For this reason, I will explicitly list all the morphemes that are well-motivated synchronically and thus admitted without comment in the NAU data; these are shown in table 5. Data that are presented in tabular form in the rest of this paper contain no other segmentations, except for some minor cases commented in the text of this paper. Anything beyond these morphemes is treated as problematic and discussed in comments under the tables.

The noun prefix, used in absolute (unpossessed) forms of nouns, generally *i-* occurs when a high vowel follows in the next syllable, *e* occurs elsewhere. There are some exceptions, like *e-dij* 'paddle'. At least in some of these exceptions, the initial vowel is historically from the stem; 'paddle' comes from PMC *fa(s,S)ula, where the outcome of the initial vowel is *e*. A similar reanalysis of the initial stem vowel happened in *fiSiko > *duwɨ-n*, where *fi- should have resulted in *i-* (the rest of the sounds, *duw-*, are a regular development from *-Sik-).

TABLE 5. AFFIXES.

Affix	Gloss	Notes
e-, i-, i̱-	noun prefix	can be ‹a-, ü-› in older sources
æ-	locative	
ʌ-, u̱-	causative	
ka-	causative, nominalizer	
-(i̱)ow	directional, 'towards'	
-da	directional, 'up'	see comment below
-n	3SG, construct state	see comment below
-i	transitive	
-j	transitive	

The item listed as *-n* reflects both PMC *-ni 'of, pertaining to' and PMC *-ña '3SG'. There is a vowel before the suffix that may alternate with zero, for example, *e-bod* 'nose', *bodi-n* 'nose-3SG'. As suggested in section 2.10, this pre-suffix vowel is the recovered historical stem-final vowel which deletes word-finally. Whether this vowel is also synchronically present as part of the stem, or at least in some cases epenthetic, is immaterial in this paper (see Hughes 2020b:116, 131, 249). For consistency, the morpheme boundary will be placed before the *-n* in all the examples. The same comment applies to the directional *-da*, from PMC *-Sake (where *S > *d*).

1.5. NOTATION AND DATA PRESENTATION CONVENTIONS. Language name abbreviations follow the conventions of Bender et al. (2003a,b), and are listed in this footnote.[2]

The following abbreviations are used for citations in this work.

- 1:192 = Volume and page number from Ross, Pawley, and Osmond (1998 and ff.)
- H1:251 = Volume and page number from Hambruch (1914–1915).
- T141 = Page number from Thaman et al. (1994)
- K1:21 = Volume and page number from Kayser (2002 [1934])
- A113 = Numbered correspondence set from Hughes (2020b:293–373).

All KIR words are cited from the Combined Kiribati-English Dictionary (Trussel and Groves 1978, available online), unless otherwise noted.

The presentation of PMC forms is harmonized with the bracketing conventions of Ross, Pawley, and Osmond (e.g., 5:34). Parentheses (*x,y*) indicate insufficient evidence to determine the reconstruction as *x* or *y*. Brackets [*x,y*] indicate doublet protoforms, where both *x* and *y* are reconstructible. (*x*) and [x] are synonyms of (*x*, ∅) and [x, ∅], respectively.

If only the graphic form of a word is known to me, it is enclosed in single angled quotes, for example, ‹e̲-mạ› 'garfish' (H1:152). This most often happens with words from Hambruch and Kayser, and occasionally in some other cases where I was not able to verify the pronunciation of a word. The orthography of Hambruch and Kayser is not especially systematic, particularly for vowels.

All other NAU data are presented in *surface* forms, except that the following are not shown: (i) stress information, (ii) the effects of allophonic *t, d > ts, dz*/__i, and (iii) gemination of sonorants; on gemination see Hughes (2020b: 253–55). A phonemic analysis of the system, including the role of stress and gemination, is presented in Blumenfeld (2022).

2. Chk, Chuukese; KIR, Kiribati; KSR, Kosraean; Mok, Mokilese; MRS, Marshallese; Mrt, Mortlockese; NAU, Nauruan; P(C,W)MC, Proto-(Central, Western) Micronesian; PCK, Proto-Chuukic; PMC, Proto-Micronesian; Png, Pingelapese; POC, Proto-Oceanic; Pon, Pohnpeian; PPC, Proto-Pohnpeic–Chuukic; PuA, Pulo Annan; Pul, Puluwatese; SCr(T), Saipan Carolinian (Tanapag); Sns, Sonsorolese; Stw, Satawalese; Wol, Woleaian.

Particularly for vowels, surface and underlying forms can differ, and the differences are analysis-dependent. Presenting data in surface forms ensures that the diachronic claims made here are not intertwined with any specific synchronic theory of NAU phonology and are robust to analytical revisions on the synchronic side. This choice also comes from the understanding that it is surface forms, not underlying forms, which are the input to acquisition and thus language change. Underlying forms are constructed anew by each learner, and thus no expectation of diachronic continuity holds for them.

Morphologically, directly possessed forms are given in the 3SG when possible, with the suffix *-n*. Nouns are usually given with the noun prefix, *e-*, *i-*.

Examples presented in table format are regular according to sound changes proposed in this paper, and contain no unmotivated segmentation except for some minor cases commented in the text of the article. Some allowance is made for occasional vowel irregularities, in which case Ⓥ marks the NAU form. Material cited from written sources is held to a lower standard of regularity for vowels and for voicing of stops.

Forms in the "PMC" columns marked with ⊕ are not found in Bender et al. (2003a) or the online version (Trussel, ongoing). In that case, their basis (POC, PPC, PCK) is given in the "Notes" column. Whenever a form is reconstructed to the Proto-Central Micronesian (PCMC) or Proto-Western Micronesian (PWMC) level in Bender et al. (2003a,b), this fact is marked in the "Notes" column.

2. NAU DEVELOPMENTS.

2.1. UNPROBLEMATIC CORRESPONDENCES. I will start with presenting developments that are not difficult to establish. To aid comparison of PMC and NAU forms, I show them in table 6 and the rest of this paper in adjacent middle columns, and their glosses peripherally. Comments in the text of the article offer information additional to the tables.

Word-finally, the contrast between the two labial series is neutralized, and thus I just show them as *-m*, with the understanding that they can reflect either *m^{w} or *m, and likewise for *-p*, *-b* below.

PMC *m^{w}(o,u)a 'ahead, going before' is probably the source of NAU *æ-m^{w}o* 'ahead, first' with an unknown accretion, possibly the locative morpheme *æ-*, cf. *æ-ted* 'into, on the sea' (cf. A146). Hughes (A144) derives NAU *m^{w}id* from PMC *m^{w}otu-Si. The vowel change here would be irregular in this analysis (see table 40).

Table 7 shows the outcomes of PMC *m.

All numerals (the counting series is given here) include a prefix that results in what appears to be irregular vowel development at the left edge; I will simply mark it as *V- in the reconstructions (see Hughes [2020b:270] for more details). The numerals also appear to reflect the general classifier *-ua. The pattern is partly parallel to other Micronesian languages, though the counting numerals tend not to contain classifiers; see Jackson (1983:49ff.). It is possible that the final vowel in NAU results from some other element.

TABLE 6. *mʷ > mʷ.

PMc gloss	P(C,W)Mc	Nau	Nau gloss	Notes
'behind'	*mʷuri-	mʷiri-n	'later; stern'	
good, healthy	*mʷaau	mʷo	good	A147
man, male	*mʷaane	e-mʷæn	man; male	A152
shoulder garland	*mʷare	e-mʷʌr	necklace; lei	A149
worm	*mʷata	e-mʷe	maggot; tapeworm	A150
flying fish	*mʷaxaru ⊕	e-mʷor	flying fish	POc *mʷagaRut
snap, cut	*mʷu(s,S,Z)u ⊕	mʷid	snap, cut, separate	POc *muju (1:248)
'forehead'	*camʷa	řʌmʷʌ-n	'forehead'	A40
house	*imʷa	imʷʌ-n	hut	imʷ-ʌ-n-ekʷo 'hut, canoe shed'
hermit crab	*wumʷa	e-om	hermit crab	
earth oven	*wumʷu	e-om	earth oven	A289
bunch or cluster of nuts	*amʷii	æmʷi-n; mʷV-	bunch; classifier for bunches	PCMc
squirrel fish	*mʷonu	‹é-muen›	blood-red fish with large scales	K2:52
needlefish	*mʷaki	‹e̱-ma̱›	garfish (young)	PWMc; H1:152

TABLE 7. *m > m.

PMc gloss	P(C,W)Mc	Nau	Nau gloss	Notes
very ripe, rotten	*maca	e-mʌř	ripe, mature	
eye, face	*mata	me-n	eye, face	A135
die	*mate	mæ	die	A137
thing	*meña	i-min	thing	A141
countable base for animates	*-manu	-men	countable base for animates	cf. Hughes (2020b:273)
be painful, hurt	*masaki	mʌgʌ	painful, hurting	
be low tide, dry	*masa, *mamasa	mʌg	dry, arid	
thick	*ma-tolu	e-mej Ⓥ	thick	A139
fear, be afraid	*ma-taku	miʌw	fear	A136
deep sea, open sea	*ma-Sawa	i-mʌgo	sea, ocean	A133
soft	*ma-caucau, ma-cau	meřo, meřořo	soft, pliable	A143
dream	*mifi ⊕	mi-, mijimij	dream; sleep	POc *mipi
fold	*lumi	jim	fold	
drink	*[i]nu-mi, -ma	nim-	drink; classifier for drinkables	A66
five	*V-lima-ua	ejimʌ	five	A116
outrigger float	*Sama	‹e-gem›	outrigger	H1:151

Two items show *mʷ* in place of expected *m*: PMc *mauri 'alive', Nau *timʷor* 'alive' (with an unidentified accretion *ti-*, also plausibly found in *ti-min-e* 'exist', cf. *i-min* 'thing', cf. A141; the item could also be a Kir loan from *mauri* 'be alive', itself from Polynesian [Pn]); PMc *ma-rama 'moon', Nau *mʷʌrʌm-* 'moon'. PMc *ma-lie 'dream, forget' appears to be reflected in Nau *meij* 'forget', with unexplained loss of both final Vs.

Nau *etʌŋ-* 'father' is probably not a reflex of PMc *tama, due to two problems: (1) there is no support for *m > ŋ* otherwise, or even assuming a variant

PMC *tam^{w}a, as Hughes does (A249), there is no support for *m^{w}* > *ŋ* either, cf. *cam^{w}a 'forehead' > NAU *řʌm^{w}ʌ-n*, and cf. the well-established *opposite* change *ŋ* > *m^{w}*; cf *toŋo 'mangrove' > NAU *e-tʌm*; (2) the initial vowel is part of the stem, not a noun prefix, cf. *etʌŋ-ʌ* 1SG, *etʌŋʌ-m* 2SG, and so on.

Turning to the stops *p^{w}, *p in Tables 8 and 9, NAU regularly reflects them as *b^{w}*, *b*. Occasional voiceless reflexes *p^{w}*, *p* can be attributed to the well-established effect of syncope between like consonants and resulting geminates (Jackson 1983:65; Blust 1990; see discussion in Hughes 2020b). Such geminate reflexes are expected to result from reduplicated forms, but reduplication is externally motivated only in a subset of cases.

TABLE 8. *p^{w} > b^{w}, pp^{w} > p^{w}.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
nose	*p^{w}auSu	b^{w}odi-n	nose	A28
odor, smell	*p^{w}oi, *p^{w}oa	b^{w}o	smell	A23
night	*p^{w}oŋi	b^{w}im	night	A24
ditch, hole (in the ground)	*lip^{w}a	jib	pit, hole, hollow	A117
be born, bear young	*t[i,u]p^{w}u	ib^{w}i-n	grandparent, grandchild	A271
no	*aap^{w}a	eʌb	will not be	PWMC
feces	*p^{w}uta[e,i]	i-b^{w}ijæ	feces	A207; PCMC
k round basket	*p^{w}aca	e-b^{w}ʌř	basket	A189; PCMC
split sth open	*p^{w}[a,e]la	b^{w}æ-	break	
dirt, soil	*p^{w}elu	b^{w}ijib^{w}ij	sandy, dusty	PCMC
triggerfish; Southern Cross	*p^{w}up^{w}u	‹ü-po›	pinktail triggerfish	K2:53
flame, flare	*p^{w}ula, *p^{w}up^{w}ula	p^{w}ij	shine, flash	A30
swelling	*p^{w}oto	p^{w}e Ⓥ	swell	A184; PCMC
foolish, stupid, crazy	*p^{w}uce	p^{w}ʌř Ⓥ	false, wrong	PCMC

TABLE 9. *p > b, pp > p.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
shark	*pakewa	e-bæwʌ	shark	A17
hand, arm, wing	*pau	be-n	hand, arm	A20
oil for skin or hair; anoint	*kapi-sa, -si	ʌ-bid	anoint, daub	A86; PCMC
wide	*cau-lapa	e-řeḽeb	wide	A35
leaf and stalk, frond	*paa	-be- Ⓥ	leaf	
bottom, end	*kapi	o-eb-, a-keb-	bottom; depth	A85
placenta	*pati	‹ī-bi› Ⓥ	placenta	H1:155
a fish	*parapara	‹eabõrbõr›	whitespotted surgeonfish	
cough	*kopekope, *bekobeko ⊕	bobo	cough	MRS pek^{w}pek^{w}; PCMC
big, main	*lapa	ŋʌb	fat, plump; grow bigger	
stone structure	*pei[†]	e-pe	stone	PCMC; A175
float	*peti, pepeti	pi	float	A176

[†] PMC *pei may be a loan from a PN source, cf. Proto-PN (PPN) *pae 'heap of stones, stone structure' (POLLEX; Geraghty 2010:244).

Recall that word-final *b*ʷ is neutralized with *b* and transcribed as such, for example, *lipʷa > *jɨb*.

Also, PMc *tapʷu 'taboo' could be related to Nau *ebʷi* 'sacred, holy', with an unknown final vowel, and possibly PMc *pʷaa 'say' > Nau *pʷan* 'say, state, report' with a unique vowel change and unexplained final C. Among the geminate reflexes, reduplication is not well motivated in *pʷaa and *pʷuce. For *pʷoto, cf. Marshallse (Mrs) *bʷbʷej* 'swollen, swell, lump'.

The item *be* 'leaf, frond' occurs in *e-be-n-ni* 'coconut leaf'. The vowel may be a recent development; Hambruch lists it as ‹e bān› (H1:181), distinct from ‹e̱ be̱› *e-be* < *pau 'hand' (H1:150). Again, the Hambruch data should be taken with caution.

In addition, there is some possibility that *-apa yields *-ow*; cf. *sapa 'able, prepared', Nau *gʌ-dow* 'prepare', *tapa 'be cut', Nau *tow* 'cut' (though the latter form also can also derive from *toka 'chop'). However, this effect does not happen in *cau-lapa and *lapa. The reflex of *lapa could also be *i̱-eb* 'land', though *i̱-eb* is more likely a loan from Kir *aba* 'land', or at least a cognate of *aba* (the Kir reflex of *lapa is *napa*, regularly).

Table 10 shows the development of PMc *c.

PMc *cia 'give voice' probably underlies Nau *řiæŋ* 'sing', but the final *-ŋ* is unexplained. PPC *lec(a,e) 'strike' could be related to Nau *ei̱ræ* 'thrash, cane', with an unexplained final V. The element ‹er-› occurs in 36 pandanus variety names listed in K1[3] (cf. the 194 Kir pandanus variety names beginning with *ara-* listed in Sabatier [1971]).

TABLE 10. *c > ř.

PMc gloss	P(C,W)Mc	Nau	Nau gloss	Notes
forehead	*camʷa	řʌmʷʌ-n	forehead	A40
blood	*caa, *cacaa	e-řæ	blood	A41
fresh water	*canu	řen	drink	A33
leaf	*cau	ře-n	leaf	A220
heavy	*cawu	řoi̱	heavy	A36
bone	*cuyi-	řʌ-n Ⓥ	bone	A226
very ripe, rotten	*maca	e-mʌř	ripe, mature	
coral reef	*woca	e-oř	reef	A286; PCMc
soft	*ma-cau, *ma-caucau	meřo, meřořo	soft, pliable	A143
wide	*cau-lapa	e-řei̱eb	wide	A35
k round basket	*pʷaca	e-bʷʌř	basket	A189; PCMc
cloud, rain	*kacawu	u̱-eřo	rainy, damp	A74
pandanus	*faca	‹er-›	pandanus, in variety names	K1

3. These are ‹erabaite, erabao, eragatibao, eraijorar, eramereir, eranarania, erbuetenauno, erebar, erebaried, erebaurua, erebedebedeb, erebeidan, erebija, erebiter, erebuike, eredauwadowa, erededuna, eremeinugu, eremiditi, eremuijob, erenenuwo, erepe, ereropawa, erikibur, erikumum, erinenora, eroburobur, erogadauw, erogogo, erogomegom, erokow, eronubue, eroquoe, erowuro, erukdoa, erurabitune›.

TABLE 11. *f > ∅.

PMc gloss	P(C,W)Mc	Nau	Nau gloss	Notes
choose	*fili	ij	choose	A53
flesh	*fiSiko	duwʌ-n	flesh	A180
four (prefixed to classifier)	*faa-, *fa-	æ-	four (prefixed to classifier)	cf. Hughes (2020b:271)
woman	*faifine	i-en	woman	A173
k needlefish	*fanaa	‹éna›	k fish living deep on the seabed	PCMc; K2:100
canoe paddle	*fa(s,S)ula ⊕	edij	paddle	PPC *fadúla, POc *paluca
pandanus	*faca	‹er-›	pandanus, in variety names	K1
seven	*V-fitu-ua	e̱ju	seven	A183
k wind, windy season	*(a)farata ⊕	‹are›	short but strong wind	POc *apaRat, PPC *parata
swim	*afe	e-ʌw	swim	A3; PCMc
fire	*afi	i-e̱i	fire	A10
dream	*mifi ⊕	mi-, mijimij	dream; sleep	POc *mipi

Table 11 shows the outcomes of PMc *f.

In *fa(s,S)ula > *edij*, the first syllable is reanalyzed as a prefix. The metathesis in the PMc form relative to POc *paluca is paralleled by POc *palici 'grass' > PPC *fadili 'any grass, sedge, or fern'. As noted by Bender et al. (2003b), PPC *parata is problematic and may represent a series of loans. The Nau form cannot derive from PMc **afara, the expected reflex of the POc form. The form can also plausibly reflect a completely different etymon: POc *karak(a) '(strong?) southeast trade' (2:138).

Table 12 shows the development of PMc *r.

*uri, *uruuru 'drag, haul, tow' is related to Nau *ure, urure*, with an extra final vowel. The semantic development of *roŋo 'hear' > Nau *erʌm* 'ask permission' is a stretch, but Pul and Kir forms are also glossed 'obey', and the Gela cognate 'listen, feel, obey, inquire about' (5:500).

Tables 13 and 14 show the outcome of PMc *w.

In *pakewa, *wuko, *woki-si, and *wakara, the Nau form contains the segment *w*, but it is a reflex of *k, not *w. In *wuko there is some irregularity in the vowel, **uw is expected; possibly *i-* is the noun prefix and *u* gets absorbed to the *w*. In *e-ŋo-pe* the final syllable is the word for 'stone', *e-pe* 'stone'. Cf. Kir *nou-atibu* 'stonefish', *atibu* 'general word for stone', and Pukapukan *nou* (*watu*) 'Synaceia verrucosa', *watu* 'stone' (4:120). PMc *kautiwa 'east' possibly appears in Nau *ijuw* 'easternmost point of the island', and *pʷiju* 'toward east', though the identity of *pʷ-*, which is also found in other geographic directionals, is unclear (see Kayser [1993 [1937]:222] for a description of the directionals).

In three items, *w seems to be reflected by *kʷ*. All are initial. Hughes (2020b:200) suggests Nau *kʷ* derives from geminate *w, though gemination

TABLE 12. *r > r.[4]

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
branch	*rae	ræ-n	branch	
hear, listen	*roŋo	e-rʌm	ask permission, approval	
day	*raani	ræn, -ræn	ray of the sun, day	A219
bright, luminous	*rama	e-rʌm	fishing on the reef at night with flares	
behind	*mʷuri-	mʷɨri-n	back; stern of canoe	
shoulder garland	*mʷare	e-mʷʌr	necklace; lei	A149
langusta, lobster	*ura	e-or	lobster	A216
house post	*tura	jor	post, column	A273
barracuda	*tarawa	e-taro	great barracuda	PCMC
wall, fence	*woro	oror	fence, barricade	
root	*waka, *wakara	æwʌrʌ-n	root	A277
pot	*kuro ⊕	wɨr	pot, coconut shell, cup	POC *kuron
come	*oro ⊕	or	come	A170; POC oRo
sea urchin	*laar(i,u) ⊕	e-nʌr	urchin	PCK
Carangid fish, pompano, skipjack	*aroŋo	‹áröm›	k fish	K2:61
gills	*woro	‹o̧re-n›	gills	PCMC; H1:173
white sand crab or ghost crab	*karuki	‹a-körö›	k crab	K2: 98
be warmed	*raŋi	ræŋ-i	warm, heat up	A218

from reduplication with syncope is not motivated externally in any of the examples in table 14.

2.2. LENITION AND LOSS OF *t AND *k. The behaviors of *t and *k in NAU are not fully systematic. In this respect the facts resemble similar developments in Chuukic and, in part, Pohnpeic languages, and possibly can be seen in the broader context of the development of lenis reflexes of voiceless stops throughout Oceanic (Ross 1988), in which case the regular change from POC *p to PMC *f (and to ∅ in many languages thereafter) can be understood as lenition carried to completion. I leave a full investigation of the Oceanic parallels for another day, and now turn to a detailed description of the NAU facts in the Micronesian context.

There are four outcomes of *t: retention as *t* (table 15), *t > *j* (table 16), *t > *i̯* (table 17) and loss (tables 18 and 19). There are some subregularities despite the apparent messiness: all retentions are initial before *a, o*; almost all cases of *t > *j* are adjacent to high vowels, and all cases of *t > *i̯* are adjacent to *u*, but none of

4. An anonymous reviewer suggests breaking up the table into reflexes of POC *r, which gives PMC *r, versus POC *R, which splits irregularly into ∅ and *r in PMC (e.g., Jackson 1986). Since NAU agrees with the rest of the Micronesian languages in the split of *R (Hughes 2020b:213), the question of *R refexes falls outside of the scope of this paper.

TABLE 13. *w > ∅.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
hermit crab	*wumʷa	e-om	hermit crab	
earth oven	*wumʷu	e-om	earth oven	A289
shark	*pakewa	e-bæwʌ	shark	A17
heavy	*cawu	řoi̯	heavy	A36
coral reef	*woca	e-oř	reef	A286
barracuda	*tarawa	e-taro	great barracuda	
banyan tree	*[ay]awa	e-æi̯o	native banyan tree	
eight	*V-walu-ua	oju	eight	A279
change	*w[e,o]li	ij	change	
deep sea, open sea	*ma-Sawa	i-mʌgo	sea, ocean	A133
remainder, remnant	*luuwa	i-ju	remainder, balance	
tongue	*lewe	e-o	tongue	A115
reef pass, channel	*sawa	e-gɑ	fissures at the edge of the reef	
fishnet	*wuko	iw	net	
wall, fence	*woro	oror	fence, barricade	
six	*V-wono-ua	aŋo	six	A168
nine	*V-Siwa-ua	ado	nine	A236
turn something over, reverse direction	*woki, -si	iwid	change, turn	
root	*waka, *wakara	æwʌrʌ-n	root	A277
cloud, rain	*kacawu	u̯-eřo	rainy, damp	A74
count	*waSe, -ki	adu	count, number, enumerate	A280
stonefish	*nowu	e-ŋo-pe	false stonefish	
gills	*woro	‹o̯re-n›	gills	PCMC; H1:173
triton or trumpet shell	*tawui	‹teŭ›	Triton's trumpet	H1:163

TABLE 14. *w > kʷ.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
wicker fish trap	*wuu	i-kʷo Ⓥ	fish trap	
fruit	*wuaa	kʷæ	bear, produce	A185
canoe	*waxa	e-kʷo	canoe	

TABLE 15. *t > t.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
mangrove	*toŋo	e-tʌm	fruit from mangrove trees	
salt water	*taSi	-ted	ocean	A112
barracuda	*tarawa	e-taro	great barracuda	PCMC
chop	*toka	tow	cut, sever	A266
triton or trumpet shell	*tawui	‹teŭ›	Triton's trumpet	H1:163
ground, low	*tano	e-tʌŋ	place, site, area, ground	
bowl, constellation Delphinus	*tapia	‹tĕpi›	wooden bowl	H1:163

TABLE 16. *t > j.

PMc gloss	P(C,W)Mc	Nau	Nau gloss	Notes
C. inophyllum	*itau	ijo	C. inophyllum	
house post	*tura	jor	post, column	A273
feces	*pʷuta[e,i]	i-bʷijæ	feces	A207
stomach, belly, abdomen	*tia	je-n, ‹e-› Ⓥ	stomach, belly	A262
side dish of meat, fish or sauce	*talia	jeji	eat	A246

TABLE 17. *t > i̯.

PMc gloss	P(C,W)Mc	Nau	Nau gloss	Notes
tuna, bonito	*atu	e-æi̯	skipjack tuna, bonito	A212
inland	*uta	oi̯ Ⓥ	bushland; inland	
weave	*fatu	ei̯-e	weave	
child	*natu	ŋei̯-n	child	A157
seven	*V-fitu-ua	ei̯u	seven	A183

TABLE 18. *t > ∅ IN FINAL CV.

PMc gloss	P(C,W)Mc	Nau	Nau gloss	Notes
worm	*mʷata	e-mʷe	maggot; tapeworm	A150
eye, face	*mata	me-n	eye, face	A135
die	*mate	mæ	die	A137
god, spirit	*anitu	e-æni	soul, spirit, god	
octopus	*kuyita	‹a-kui›	octopus	H1:146
louse	*kutu	i-wi	louse	A104
k wind, windy season	*(a)farata ⊕	‹are›	short but strong wind	POc *apaRat, PPC *parata
float	*peti, pepeti	pi	float	A176
swelling	*pʷoto	pʷe Ⓥ	swell	A184; PCMc
property, estate	*pʷukota ⊕	bʷiʌ-n[6]	home	PCk *pʷukota
navel	*pʷuto	(men-i-)bʷi	navel	A26

the developments are regular in those environments. Otherwise, loss is regular in the onset of a final CV syllable.[5]

The form ‹e-› for 'stomach' is inferred from ‹etemaga› 'stomach ache' (H1:154). *talia is cautiously included, though it would be the only example where *t > *j* not next to a high vowel. Perhaps this form results from *t > ∅, regular *l > *l*, and reduplication. Nau *woj-e* 'cover' could be a reflex of

5. There may be synchronic traces of the deleted *-*t* in construct states formed with *-t* rather than regular *-n*, for example, *me-t eu̯æg* 'door; eye of house', but the pattern is complicated and warrants a separate investigation.
6. In some realizations this item can be pronounced as *bʷi-n* (see Hughes 2020b:45). However, in at least some tokens in my data it is distinct from *bʷin* 'for, because'.

TABLE 19. *t > ∅ MORPHEME-INITIALLY.

PMc gloss	P(C,W)Mc	Nau	Nau gloss	Notes
ear, mushroom, fungus	*taliŋa	ijiŋ-	ear	
back (of body)	*takuru	iruwɨ-n	after, later, behind	A244
cry, weep	*taŋi	eɨ̲-ʌŋ	cry, weep; to sound	A251
taboo, ritual restriction	*tapʷu	ebʷi	sacred, holy	
three	*V-telu-ua	eju	three	A267
be born, bear young	*t[i,u]pʷu	ibʷɨ-n	grandparent, -child	A271
ask	*tiSaki	ɨdʌ Ⓥ	ask	A264
mother	*tina	ine-n	mother	A263
fear, be afraid	*ma-taku	miʌw	fear	A136
thick	*ma-tolu	e-mej Ⓥ	thick	A139
younger sibling	*ta(s,S)i	edi-n	sibling	

*k(a,o)ut(a,e) 'blanket, coverlet', but it is suspect. Not only is *-e* unexplained, but it would be the only case where *t* is not lost in the onset of a final CV syllable (unless, of course, *-e* represents an early-enough addition). *kautiwa > *ijuw* may also belong here (see comment above, under table 13).

The final vowel of 'weave' is problematic; this could be reduplication, cf. PMc *fatufatu. In addition, *ate 'liver' appears in *æi̯e-* 'liver', also with an unclear final V (*-ɨ* would be expected).

In 'navel', the first element means 'eye of'.

It is tempting to interpret the changes *t > *j, i̯* as t-deletion followed by glide formation (Regh, p.c.), but such a development would not be regular. Cf. PMc *tura 'post' > Nau *jor* alongside PMc *ura 'lobster' > Nau *e-or*; PMc *anitu > Nau *e-æni* 'spirit' alongside PMc *V-fitu-ua > Nau *ei̯u* 'seven'.

*taliŋa 'ear' shows a doublet in Nau: inherited *ijiŋ-*, and a Kir loan, *denʌŋ*. Likewsie *kuyita 'octopus', inherited ‹a-kui›, Kir loan *dʌgiga*. The metathesis in *takuru 'back' > *iruwɨ-n* is paralleled in PuA *talúkú*.

Let us now place these facts in the context of *t*-attrition in Pohnpeic and Chuukic, where it is also irregular (see Jackson [1983:188ff.] for details). Table 20 lists the reflexes of PMc *t in Nau, Pohnpeic, and Chuukic languages, excluding those with *t in the onset of a final CV syllable, where its loss is regular in Nau. To save space, Pohnpeic languages are labeled A, B, C, and Chuukic languages 1 through 9. See the bottom of the table for label explanations.

The table shows that the Nau reflexes, while not identical to those in Western Micronesian, show some resemblance in patterning. Of the fourteen Nau items with loss or near-loss (*i̯*), six show mostly loss in Pohnpeic and Chuukic languages. On the other hand, of the twelve Nau items with retention as *j* or *t*, only two show mostly loss in Pohnpeic and Chuukic. Those two are *toŋo and *tura, retained in Nau as *t and *j, respectively, and lost in Ponpeic and Chuukic, except in the westernmost languages, where loss is uncommon. These are the only items with initial *t before *u,*o (though of course we

TABLE 20. *t REFLEXES IN MICRONESIAN.

PMC	N	A	B	C	1	2	3	4	5	6	7	8	9
*tina	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	s	d	
*matolu	∅	s			∅	∅	∅	∅	∅	∅	∅	d	
*tiSaki	∅	∅	∅	∅									
*t[i,u]pwu	∅	∅	∅		∅	∅	∅	∅		∅	s		
*telu	∅	s	j		∅	∅	∅	∅	∅	∅	s	d	
*ta(s,S)i	∅					s							
*taŋi	∅	s	j	s	s		h	s	h		t	t	t
*takuru	∅				s	s	h	s	h	s	t	t	
*taliŋa	∅	s	j		s	s	h	s	h	s	t	t	t
*mataku	∅	s	j		s	s	h	s		s	t	t	
*fitu	i̱	s	j		s	s	h	s		s	s	d	d
*natu	i̱	∅	∅		∅	∅		∅	∅	∅	∅	∅	
*fatu	i̱	∅	∅		∅	∅	∅	∅	∅	∅	∅		
*atu	i̱				∅	∅		s		s	∅		
*toŋo	t				∅	∅		∅		∅	s		
*tura	j	∅			∅	∅	∅	∅		∅	s	d	d
*talia	j	s				s	h	s					
*tano	t	s					h	s		s	t	t	
*tarawa	t	s	j		s	s	h	s		s	s	t	
*taSi	t	s	j	s		s	h	s	h	s	t	t	t
*tawui	t	s	j		s	s	h	s	h	s	t	t	
*tapi	t		j		s	s	h	s	h		t	t	
*itau	j	s	j										
*kautiwa	j					t	t				t	t	
*tia	j											d	
*pʷuta(e,i)	j	s				s	h	s	h				

N = NAU; A = Pon, B = Mok, C = Png;1 = Mrt, 2 = Chk, 3 = Pul, 4 = SCr, 5 = SCrT, 6 = Stw, 7 = Wol, 8 = PuA, 9 = Sns.

cannot generalize from two examples). Conversely, the cases with NAU loss alongside Pohnpeic–Chuukic retention mostly have *t before *a. A possible interpretation of these facts is that NAU is further along the lenition process than the other languages, even the most extreme leniters at the Eastern edge of the Chuukic continuum.

Turning now to *k, its outcomes also show irregularity in NAU. The possibilities are loss (table 21), *k > *w* (table 22), or retention as *k*, *kʷ*, or *ts* (synchronic underlying /t/) (table 23). The *w* outcome is nearly regular when adjacent to *u*, but also occurs sporadically in other environments (cf. Hughes [2020b:192], where an intermediate *g stage is suggested).

PMC *waSe-ki ‘count’, NAU *adu* may also belong here (A280), though the final vowel is unclear. The initial vowel of *o-aŋ-* ‘food’, probably from *kaŋi ‘eat, feed’, is not entirely clear. Comments on *kautiwa are found under table 13. PCMC *luuka ‘center, middle’ could underlie *i-ju-gægæ* ‘middle, waist’ (cf. A65). The final *-gægæ* is possibly one of the intensive particles listed by Kayser (1993 [1937]:17), cf. ‹oe-gaga› ‘very far inland’. The form has a variant *i-wu-gægæ*. *kapi, listed in the table, seems to show two

TABLE 21. *k > ∅.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
fish	*ika	i-i̵	fish	cf.A182
ask	*tiSaki	i̵dʌ ⓥ	ask	A264
be painful, hurt	*masaki	mʌgʌ	painful, hurting	
oil for skin or hair; anoint	*kapi-sa, -si	ʌ-bid	anoint, daub	A86
cloud, rain	*kacawu	u̱-eřo	rainy, damp	A74
food, eat (something)	*kana, *kani	an	eat, feed	A83
cough	*kopekope, *bekobeko ⊕	bobo	cough	MRS pekʷpekʷ; PCMC
property, estate	*pʷukota ⊕	bʷiʌ-n	home	PCK
pierce, stab	*(s,S)oka	e-ka-do	spear	
go, proceed (in a directional way)	*lako	ŋow	go, depart, move to	A106
bottom, end	*kapi	u̱-eb-, æ-keb-	bottom; depth	A85
needlefish	*mʷaki	‹e̱-ma̱›	garfish (young)	PWMC; H1:152
bite	*kai	‹ãeãe›	biting, wounding with the teeth	
white sand crab or ghost crab	*karuki	‹a-körö›	k crab	K2: 98

TABLE 22. *k > w.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
flesh	*fiSiko	duwʌ-n	flesh	A180
tail	*iku	iwi-n	tail	A64
skin, bark	*kuli	witi-n	skin, bark	A101
chop	*toka	tow	cut, sever	A266
fear, be afraid	*ma-taku	miʌw	fear	A136
louse	*kutu	i-wi	louse	A104
midrib of coconut frond or leaf	*noko	e-ŋow	coconut leaf mid-rib	
fishnet	*wuko	iw	net	
turn something over, reverse direction	*woki, -si	iwid	change, turn	cf.A285
root	*waka, *wakara	æwʌrʌ-n	root	A277
pot	*kuro	wi̵r	pot, coconut shell, cup	
k tuna	*(s,S)akua	‹dowodowa›	smallest tuna, mackerel tuna	
back (of body)	*takuru	iruwi-n	after, later, behind	A244
bivalve shell, knife or grater	*koyi	wiwi	grate	A99
hit, strike	*suku	i-dow	fist fight, punch	

reflexes, one without *k* (*u̱-eb-* ‘bottom’), one with (*æ-keb-* ‘depth’), where *æ-* is the locative prefix.

In addition, PWMC *kinia ‘coarse mat’ may correspond to NAU ‹uīnī› ‘mat’ (H1:164), but *k > *w* before *i* is otherwise not attested, assuming that

‹u› spells *w* here. The change is also observed in this environment in at least one loan, ‹te-wuiw› 'mallet for beating pandanus' (K1:11, K2:75, Kayser 1993 [1937]:14,172), KIR. *ikuku* (also the source of a later loan, the name *Eigigu*, taking place after *k* > *w* was active).

An assortment of other developments is shown in table 23. In three cases, *k is retained as *k*; in *kakaŋi* > *eʌ-kʌŋ* it is plausibly the reflex of a geminate *kk (the analysis in A80). However, the extra vowel *ʌ-* is unexplained, so it is also possible that the first *k is lost and the second retained as *k*. Likewise in 'nail' *k^{w} could represent a geminate reflex before *u*, perhaps parallel with the occasional development of *w > *k^{w}*, though with only four examples in total it is hard to generalize.

Finally, as suggested by Hughes (2020b:190), *ki palatalizes to *ti* (> *tsi*) in NAU. The evidence for this change is not particularly strong: only *kini > *tsi*(*n*) is a clean example, and even here the optional loss of *n* is a special development. The final consonant of *tiʌt* 'know' requires explanation, for example, as a reflex of geminate *l (A93), but there is no good independent evidence for how geminate *l behaves either. However, a strong indirect piece of evidence for *ki > *ti* comes from NAU *i-tirir* 'Nauruan canary; plover; Nauruan red warbler (Buden 2008)'. It cannot directly descend from PRO *kVlili, PMC *k(i,u)lili (4:361) 'wandering tattler', because *l regularly becomes *j* in this environment. The *k* > *t* change may be fairly recent, suggested by the form *akirer* found in K3:73. A loan source is available in KIR *kiriri* 'long-legged plover; wandering tattler', itself a PN loan. The loan into NAU must have taken place before final vowel loss and before *ki > *ti*. (MRS *kiṛiṛ* is also a loan (*l* expected); Chuukic and KSR forms cited in 4:361 show regular reflexes of *k(i,u)lili).

Finally, let us compare the developments of *k to those in Chuukic (unlike for *t, the Pohnpeic developments are regular). There, *k is generally retained in the westernmost languages and lost sporadically eslewhere (see Jackson [1983:175ff.] for details). Table 24 sorts the outcomes by the NAU reflexes. There is a tendency for NAU to agree with Eastern Chuukic. There are four cases where at least some Chuukic languages (the Eastern ones) lose *k where NAU retains it: *wakara, *pakewa, *kausaa, *k(a,o)ut(a,e). Of these, *kausaa and *k(a,o)ut(a,e) are independently problematic. The reverse situation is more

TABLE 23. *k > k, k^{w}, t.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
octopus	*kuyita	‹a-kui›	octopus	H1:146
white sand crab or ghost crab	*karuki	‹a-körö›	k crab	K2: 98
sharp	*kakaŋi	eʌ-kʌŋ	sharp	A80; PCMC
fingernail, toenail, claw	*kuku	k^{w}i-	nail	A100
a pelagic fish	*kausaa	k^{w}idædæ	bluefin trevally (growth stage 2)	A91
sign, symbol	*kilala	tiʌt	know	A93
pick, pinch off	*kini, -ti, -ta	ti, tin	pick, gather	A95

TABLE 24. *k REFLEXES IN MICRONESIAN.

PMC	NAU	Mrt	Chk	Pul	SCr	SCrT	Stw	Wol	PuA
*(s,S)oka	∅							g	
*kacawu	∅	∅	k	∅	∅		∅	g	k
*kai	∅				gh			g	
*kana	∅		∅	∅	∅	∅		g	k
*kaŋi	∅	∅	∅	∅	∅		∅	g	k
*kapi	∅	∅	∅	∅	∅		∅	g	k
*kapi-sa	∅	∅	kk	∅	kk			g	
*kapi-sa, -si	∅	∅	∅	∅	∅			g	
*karuki	∅	kk			∅	∅		g	
*kautiwa	∅		∅	k				g	
*luuka	∅		k	k	gh		k	g	k
*masaki	∅		k	k	gh	g	k	g	k
*mwaki	∅							g	k
*pwukota	∅		k		gh	g			
*ika	∅	k	k	k	gh	g	k	g	k
*pwukua	∅	k	k	k	gh	g	k	g	
*karuki	k	k			k	g			
*kuyita	k		k	k	gh	g	k	g	k
*kausaa	kw		∅		∅				
*kuku	kw	k	k	k	kk		kk	kk	kk
*kila	ts	k	s	k	kk	g	k	g	
*kini	ts		k	k	gh	g		g	k
*(s,S)akua	w		k	k	g			g	k
*fiSiko	w	k	k	k	g	g	k	g	k
*iku	w	k	k	k	gh	g	k	g	k
*k(a,o)ut(a,e)	w		k	∅	∅	∅		g	
*koyi	w		k						
*kuli	w	k	s	k	gh	g	k	g	k
*kutu	w	k	k	k	gh	g	k	g	k
*mataku	w	k	k	k	gh		k	g	k
*noko	w								k
*pakewa	w		k	∅	∅		∅	g	k
*suku	w	k	k	k	gh	g		g	
*takuru	w	k	k	k	gh	g	k	g	k
*wakara	w	∅		∅	∅		∅	g	k
*woki-si	w				gh			g	k
*wuko	w	k	k	k			k	g	k

common. As for *t, the NAU facts give the impression of the same diffusion of loss as takes place in Chuukic, only carried to a more extreme degree.

2.3. REFLEXES OF *n AND *l. The phonemes *n and *l show partly parallel behavior. *n can be either retained, or become velar when adjacent to *o or *a, the latter change nearly regular but not exceptionless, as shown in tables 25 and 26.

PWMC *niŋi ‘small, little, tiny’ could be the source of NAU *oniŋ* ‘small, child’, but the initial vowel is unexplained; it could be a loan from KIR *uangingi* ‘very small’, but then the consonant is problematic. NAU *gonæ* ‘be able; catch’

TABLE 25. *n > n.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
man, male	*mʷaane	e-mʷæn	man; male	A152
fresh water	*canu	řen	drink	A33
woman	*faifine	i̱-en	woman	A173
k needlefish	*fanaa	‹éna›	k fish living deep on the seabed	PCMC; K2:100
mother	*tina	ine-n	mother	A263
countable base for animates	*-manu	-men	countable base for animates	cf. Hughes (2020b:273)
god, spirit	*anitu	e-æni	soul, spirit, god	
drink	*[i]nu-mi, -ma	nim-	drink; classifier for drinkables	A66
squirrel fish	*mʷonu	‹é-muen›	blood-red fish with large scales	K2:52
coconut	*niu	i-ni	coconut	A161
day	*raani	ræn, -ræn	ray of the sun, day	A219
food, eat (something)	*kana, *kani	ɑn	eat, feed	A83
pick, pinch off	*kini, -ti, -ta	ti, tin	pick, gather	A95
leg	*ney(a,e)	nænæ-n Ⓥ	leg	A158

TABLE 26. *n > ŋ.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
ground, low	*tano	e-tʌŋ	place, site, area, ground	
perspiration	*ma-wono	eæ-mʌŋ	sweat, perspiration	A140; PCMC
midrib of coconut frond or leaf	*noko	e-ŋow	coconut leaf mid-rib	
six	*V-wono-ua	aŋo	six	A168
child	*natu	ŋei̱-n	child	A157
stonefish	*nowu	e-ŋo-pe	false stonefish	
kou tree	*kanawa	‹e-ongo›	kou tree	T106

is a KIR loan, not a reflex of PMC *kona ‘catch (as of fish), to catch’ (cf. A98): it retains final V, shows *k > *g*, otherwise unsupported in NAU but common in KIR loans, and fails to reflect **n* as a velar in an environment where such a shift is nearly regular. The expected outcome of *kona would be NAU **(*k*)ʌŋ.

NAU *eæ-mʌŋ* ‘sweat’, cautiously listed in the table, is problematic due to an unknown initial element. Regarding the *-pe* of ‘stonefish’, see comment under table 13.

Turning to *l, it has the outcome *j* when adjacent to a high vowel, as shown in table 27. Uncharacteristically of NAU, this outcome is exceptionless. *l is lost in three words, in two of them next to *e, and in the remaining environments, adjacent to *a, *o (table 28), it mostly shows up as *ŋ*, and as *n* in two items (table 29).

Although shown in the table, *faa-i-laŋi > *ijʌŋ* is suspect, because *faa should have left more of a trace at the left periphery, such as *æ-*. Conversely, *ibijæ* ‘milk-fish’, possibly from *apili ‘a fish’, shows an unknown *-æ* at the right periphery,

TABLE 27. *l > j.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
ditch, hole (in the ground)	*lipʷa	jɨbʷ	pit, hole, hollow	A117
choose	*fili	ij	choose	A53
fold	*lumi	jim	fold	
canoe paddle	*fa(s,S)ula ⊕	e-dij	paddle	PPC
torch	*sulu	i-dij	torch	A239
louse egg	*sili	i-dij	louse (at pupa stage)	A118; PWMC
change	*w[e,o]li	ij	change	
three	*V-telu-ua	eju	three	A267
flame, flare	*pʷula, *pʷupʷula	pʷij	shine, flash	A30
thick	*ma-tolu	e-mej ⓥ	thick	A139
remainder, remnant	*luuwa	i-ju	remainder, balance	
five	*V-lima-ua	ejimʌ	five	A116
lower region of the sky	*faa-i-laŋi	ijʌŋ	low, near the ground, below	A44, PCMC
dirt, soil	*pʷelu	bʷijɨbʷij	sandy, dusty	PCMC
ear, mushroom, fungus	*taliŋa	ijɨŋ-	ear	
forget	*ma-lie	me̯ij	dream, forget	A126

TABLE 28. *l > ∅.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
tongue	*lewe	e-o	tongue	A115
wide	*cau-lapa	e-ře̯eb	wide	A35
split sth open	*pʷ[a,e]la	bʷæ-	break	

TABLE 29. *l > n,ŋ.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
go, proceed (as directional) away	*lako, *laa	ŋow	go, depart, move to	A106
fly (insect)	*laŋo	e-ŋʌm	Fly	A110
big, main	*lapa	ŋʌb	fat, plump; grow bigger	
seat in a canoe	*loo(w)a, lo(w)a-	‹e-ńo›	rowing bench	H1:153
sea urchin	*laar(i,u) ⊕	e-nʌr	urchin	PCK
take, get	*ala	ʌn-i	get, acquire, fetch	

and is semantically problematic, glossed as ‘goatfish’ in Pon, Mok. Cf. also *pali ‘a fish’, ‘a kind of triggerfish’ in Chk, ‘boxfish’ in MRS.

Also possible is PMC *faSale ‘walk move around’, NAU *ad* ‘walk, travel’ (cf. A48), but a vowel would be expected at the end of the NAU form. Also, PPC *lec(a,e) ‘strike’ could be related to NAU *e̯iřœ* ‘thrash, cane’, with an unexplained final V.

Finally, in the remaining cases, *l becomes *ŋ*, not entirely regularly, with two items showing *n. It appears that when adjacent to *a, *o, it behaves similarly to *n. I will turn to the parallelism between these and other shifts in major place of articulation after the discussion of the palatals. Note that Hambruch regularly uses ‹ṅ› to spell the velar nasal.

PMC *lama ‘thought, be in mind’ could yield NAU *nim-en* ‘think, reckon’, but the vowel is irregular (cf. A108).

2.4. REFLEXES OF *ŋ. PMC *ŋ can either be retained as *ŋ* or become *m*ʷ, as shown in tables 30 and 31. The environment of the latter change is usually bidirectional adjacency to *o, *a, and all cases but one result in final *-m* in NAU (recall that secondary articulation is neutralized word-finally). Initial *ŋ is rare, in general, however.

The case of PCMC *ŋii ‘tooth’, NAU *mʷi-* ‘mouth, tooth’ is unclear. Hughes (A165) suggests PMC *ŋio, and a rounding assimilation of *ŋ to *ŋʷ to *mʷ*. This case may also be another erratic labial outcome alongside *aSiŋi > *eædim*.

TABLE 30. *ŋ > ŋ.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
dorsal fin	*iŋi	iŋ-	tail fin	
wind	*aŋi, *aŋiaŋi	eŋi-n	wind	A7
be tired	*ŋixo	ŋi-j	bore; weary	
sharp	PCMC *kakaŋi	eʌ-kʌŋ	sharp	A80
eat, feed	*kaŋi	o-aŋ	food	cf. Hughes (2020b:238)
lower region of the sky	PCMC *faa-i-laŋi	ijʌŋ	low, near the ground, below	A44
ear, mushroom, fungus	*taliŋa	ijiŋ-	ear	
cry, weep	*taŋi	eį̂-ʌŋ	cry, weep; to sound	A251
be warmed	*raŋi	ræŋ-i	warm, heat up	A218

TABLE 31. *ŋ > mʷ.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
night	*pʷoŋi	bʷim	night	A24
Carangid fish, pompano, skipjack	*aroŋo	‹árörm›	k fish	K2:61
k crab	*aSiŋi	e-ædim	crab	
mangrove	*toŋo	e-tʌm	fruit from mangrove trees	
hear, listen	*roŋo	e-rʌm	ask permission, approval	
fly (insect)	*laŋo	e-ŋʌm	fly	A110
to smart, sting	*soŋosoŋo	gʌmʷʌgʌm	itch, tingle	
tooth	*ŋii	mʷi-n	mouth, tooth	A165; PCMC

Another puzzle is *dʌ-mʷow* ‘left hand, left’, possibly from *ma(i,u)ŋi. Here, PMc deviates from POc *mauRi- ‘left hand’ (5:164). The prefix strongly signals a loan, possibly from a Pn source reflecting *mauRi. The origin of *dʌ-mʷʌrɨm* ‘right’ is equally puzzling.

2.5. REFLEXES OF POc PALATALS IN MICRONESIAN. Before turning to the Nau facts, it is useful to digress for a broader look at the Micronesian reflexes of the POc palatal phonemes, using updated PMc and POc reconstructions that were not available to Jackson (1983). The facts show that the outcomes of POc *c and *j may need to be revisited.[7]

First, some background. There are three correspondence patterns established in Micronesian, reconstructed in Bender et al. (2003a) as *s, *S, *Z. Ksr is the only language that distinguishes *s from *S, by deleting the latter but not the former. *Z is distinct by retention in Ksr and Kir and deletion elsewhere, but the only item where this pattern is clearly attested is *kiaZo ‘outrigger boom’. It is also used in *laZe ‘k.o. coral’ in Bender et al. (2003a), but the only reflex is Ksr *læs*, and thus *lase is also a possible reconstruction. Table 32 shows the Micronesian reflexes of the palatals. The Nau facts will be established below. The first column lists the most typical sources of the PMc phonemes in a Post-POc inventory, which includes lenis *z (formerly known as *ns) alongside fortis *s. The evidence for the outcomes of *c, *j is discussed in the rest of this section.

As argued in Geraghty (1983) and Ross (1988), POc *s unpredictably split into fortis *s and lenis *z in Post-POc. The Micronesian *s ~ *S distinction tends to correlate with the PEO *s ~ *z (Jackson 1983:343ff.), though the pattern is not exceptionless.[8]

TABLE 32. PALATALS IN MICRONESIAN.

<table>
<tr><th>Post-POc</th><th>PMc</th><th>Ksr</th><th>Kir</th><th>Nau</th><th>elsewhere</th></tr>
<tr><td>*j</td><td>*Z</td><td rowspan="2">t,s</td><td rowspan="3">r</td><td>?</td><td>∅</td></tr>
<tr><td>*s, *c</td><td>*s</td><td rowspan="2">d,g</td><td rowspan="2">t,d</td></tr>
<tr><td>*z, *j</td><td>*S</td><td>∅</td></tr>
</table>

7. The diachrony of naming conventions of POc palatal phonemes is not straightforward. Here, I use the modern orthography from Ross (1988), which includes *s, *c, *j in POc, and a lenis palatal in Post-POc or PEO, the *z of Geraghty (1983). Jackson (1983), following an earlier orthography (Grace 1969), used *j for modern *c, *nj for modern *j, and *ns for the lenis palatal. Some works use a mix of the two orthographies, even for the same character, for example, the table in Bender et al. (2003a:5) uses *j in two different senses: it stands for the modern *c in the column for PMc *S, but it stands for modern *j in the column for PMc *Z, which leads Hughes (2020b:177) to mislabel the column for *Z in his correspondence table. The correct labeling (in the updated analysis proposed in this paper) is given in tables 3 and 32. All the POc forms below are respelled in the modern orthography.

8. Here are some correspondences that go the opposite way: PEO *zulu ‘torch’ (Geraghty 1983:145), PMc *sulu, Ksr *sulu*; PEO *mazu ‘sated’ (1983:134), PMc *masu, Ksr *mʌt*; but on the other hand PEO *wase (1983:141) ‘divide’, PMc *waSe, Ksr *oe-k*.

Turning to *c and *j, the facts appear to be somewhat different from the concept developed in Jackson (1983). I identified all reconstructions in Ross, Pawley, and Osmond (1998 and ff.) and the Austronesian comparative dictionary (Blust and Trussel ongoing) that (i) are unambiguous with respect to the palatal, and (ii) show reflexes in Micronesian. There are not many such items. The ones for *c are shown in table 33. The first column shows the PMc palatal reflex necessitated by the facts in Micronesian languages. Recall that only Ksr forms can distinguish between *s and *S, and thus in absence of a Ksr witness, *(s,S) is reconstructed. *Z can only be evidenced by loss outside of Ksr and Kir; no items with *c show such loss. There is only one unambiguous case, and it has *s. Only three items have Nau reflexes.

Jackson (1983:344ff.) includes four forms with *c: *ŋaica (see comment in table), *aca 'name' (has a doublet *i(s,c)an, 5:207, and Ksr *e* could come from either); *taŋi-c is reconstructed as *taŋis- in 5:321, and *taci is included in table 33, but Bender et al. (2003a) no longer consider the Ksr form Jackson cites as cognate.

The reflexes of *j, shown in table 34, are more random, at least at first glance. Recall that *Z can be identified by loss outside of Ksr and Kir. There is one of each unambiguous *s, *S, *Z, and ∅, and a mix of other ambiguous cases. However, with the exception of the *s outcome of *kojom[-i], and

TABLE 33. POc *c IN MICRONESIAN.

PMc	POc form	Notes	Ksr
*s	*[ma]maca 'dry up'	Nau *mʌg*	mʷes
*(s,S)	*palici 'grass'	PPC *fadili	
*(s,S)	*paluca 'paddle'	PPC *fadúla, Nau *edij*	
*(s,S)	*pʷaca 'swamp'	2:56	
*(s,S)	*qaco 'sun, daytime'		
*(s,S)	*ŋai-can 'when'	Ksr *ŋɛ* may reflect only *ŋai	ŋɛ
*(s,S)	*laci 'Scombroides spp.'	4:71	
*(s,S)	*taci 'younger sibling'	Nau *ed-in* 'sibling'	
*(s,S)	*pica 'how many'		

TABLE 34. POc *j IN MICRONESIAN.

PMc	POc form	Notes	Ksr
*s	*kojom[-i] 'pierce, husk'		kɔtkɔt
*S	*pajale 'walk about'		ɛl
*Z	*kiajo 'outrigger boom'	Kir *kiaro*, PCk *kiao	kiyɛs
∅	*tajim 'sharpen'	All reflexes show ∅	twe-twe
*(s,Z)	*laje 'k.o. coral'	Ksr is the only reflex	læs
*(s,S)	*jiRi 'Cordyline, Dracaena'	Kir *riri* 'grass skirt', Chk *tī-n* 'C.'	
*(s,S)	*ujan 'cargo'		
*(s,S)	*mʷajar 'bandicoot'	Pon (*keli*)*mʷet* 'k.o. bat'	
*(s,S,Z)	*muju 'clip off'	Nau *mʷid* 'snap, cut, separate'	

the loss in *tajim, all outcomes are consistent with either *S or *Z. I was not able to find unproblematic NAU reflexes for any of these items except *muju.

Also cf. POC *k(i,e)ju 'nape', PPC *-kú-, compatible with PMC *kiZu. POC *joŋas 'move quickly' may also belong here, but the Micronesian developments are irregular (see 5:396).

Jackson (1983:345) includes five items with *j: *ujan 'load', *muju 'clip off' *jojon(a) 'plug, stop', *ŋuju 'mouth', *kaja 'kava stem'; the updated analysis of KSR forms in Bender et al. (2003a) does not support unambiguous *S or *Z in any of these.

There are not many unambiguous examples, and *c and *j may simply not be distinguished in Micronesian. If they are distinguished, the simplest analysis is that POC *c tends to correspond to PMC *s, while POC *j tends to correspond to *S or *Z. This picture is opposite from the proposals in Jackson (1983) (there, POC *c > PMC *S, POC *j > PMC *s). However, the updated picture makes more sense phonetically, because the sources of *s and *S now form natural classes: PMC *s reflects the voiceless and fortis items (*s, *c); PMC *S and *Z reflect the voiced and lenis items (*z, *j).

Finally, the necessity of PMC *Z is not entirely clear. It is a convenient placeholder for a correspondence set that shows the opposite of the normal outcome for *S: retention in KSR, loss elsewhere, but it is so rare that we might avoid multiplying PMC phonemes by treating the developments as not fully systematic. Suppose there are only two PMC "palatal" phonemes, *s and its lenis counterpart, call it *S, the latter roughly corresponding to PEO *z and POC *j. The fortis phoneme is always retained; the lenis phoneme can be lost sporadically: everywhere in POC *jalan, *tajim; everywhere except KSR and KIR in POC *kiajo; regularly in KSR except in *laje. Otherwise where not lost it merges with *s. To keep continuity with Bender et al. (2003a), I will keep *Z in the correspondence tables in this paper, with the understanding that its status is different from the other members of the PMC inventory.

2.6. REFLEXES OF PMC PALATALS IN NAU. Turning now to the NAU palatal outocmes, Hughes suggests that PMC *S is reflected as a velar in the environment adjacent to *o*. The velar reflexes of palatals are indeed well supported in NAU, though perhaps not in that exact environment; as will be seen, they form one piece of a bigger picture, together with the velar developments of PMC *n, *l and the labial development of *ŋ. Hughes left the question of merger of *s, *S open; with the data given here, it is clear that there are no differences between the outcomes of *s and *S in NAU. NAU thus shares the merger that takes place in all Micronesian languages except KSR. The outcomes of *s, *S are shown in tables 35 and 36.

The environment for the change is bidirectional adjacency to *o, a*, parallel with the place shifts in *n and *l. There is one loan word that appears to reflect the shift from *s,*S > d > g: NAU *to-mʷʌgœge* 'desert, cleared spot is likely a loan from KIR *matata* 'open, cleared (as land)'.

TABLE 35. *s, *S > d.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
nose	*pʷauSu	bʷodi-n	nose	A28
flesh	*fiSiko	duwʌ-n	flesh	A180
gallbladder, gall	*asi	ædi-n	bile	
spathe, unopened bud	*asi	e-æd	spathe of coconut tree	PCMC
k crab	*aSiŋi	e-ædim	crab	
ask	*tiSaki	idʌ Ⓥ	ask	A264
salt water	*taSi	-ted	ocean	A112
dive, bathe	*SuuSuu	dudu	soak, wash, wet	A234
torch	*sulu	i-dij	torch	A239
louse egg	*sili	i-dij	louse (at pupa stage)	A118
snap, cut	*mʷu(s,S,Z)u ⊕	mʷid	snap, cut, separate	POC *muju
canoe paddle	*fa(s,S)ula	e-dij	paddle	PCK
oil for skin or hair; anoint	*kapi-sa, -si	ʌ-bid	anoint, daub	A86
turn something over, reverse direction	*woki, -si	iwid	change, turn	
count	*waSe, -ki	adu	count	A280
a pelagic fish	*kausaa	kʷidædæ	bluefin trevally (growth stage 2)	A91
nine	*V-Siwa-ua	ado	nine	A236
canoe paddle	*wo(s,S)e ⊕	‹e-ot›	paddle	POC *pose; H1:153
k tuna	*(s,S)akua	‹dowodowa›	smallest tuna, mackerel tuna	
pierce, stab	*(s,S)oka	e-ka-do	spear	
a tree	*us[i,u]	‹i-ut›	Guettarda speciosa	T187

TABLE 36. *s, *S > g.

PMC gloss	P(C,W)MC	NAU	NAU gloss	Notes
outrigger float	*Sama	‹e-gem›	outrigger	H1:151
name	*aSa, *iSa	eg-ʌn	name	A251
be painful, hurt	*masaki	mʌgʌ	painful, hurting	
be low tide, dry	*masa, *mamasa	mʌg	dry, arid	
deep sea, open sea	*ma-Sawa	i-mʌgo	sea, ocean	A133
reef pass, channel	*sawa	e-gɑ	fissures at the edge of the reef	
spouse	*a(s,S)awa	æge-n Ⓥ	spouse	A209
sit	*maaso, *masoso	megʌ-da Ⓥ	sit, stay	
far, distant	*soa	go-i̱ʌw	far	PCMC
to smart, sting	*soŋosoŋo	gʌmʷʌgʌm	itch, tingle	
kiss	*a(s,S)o-ki ⊕	ægu Ⓥ	kiss	A2; POC *asok-i- 5:505

If *Z is included in the PMc inventory, its Nau reflex remains unknown. PMc *laZe 'coral' is not reflected in Nau.[9] Regarding *kiaZo, the word for 'outrigger boom' ('Auslegergabel') is spelled ‹e teu› in Hambruch (H1:154), but then makes an appearance as ‹e tĕn› in H2:162. It is unclear what to make of these forms. There is also ‹i kā› 'Auslegerquerholz, outrigger crossbeam' (H1:156, H2:162). None of these regularly reflect the initial syllable of *kiaZo, though ‹i kā› could plausibly derive form *ikaZo, with metathesis and loss of the palatal (Geraghty 1983; cf. 1:192; Ross 1988, who link it to POc *kaso 'rafter'), and the develoment from 'outrigger boom' to 'outrigger crossbeam' may be less likely than it seems. More far-fetchedly, ‹i kā› could derive from POc *katiR (1:180), which is attested in the meaning 'outrigger boom' only in Western Oceanic, or even from POc *katae, *katea (1:193) 'free side of canoe, opposite of outrigger', the latter form present in Kir as a Pn loan (Harrison 2010). Confusingly, Hambruch also lists ‹e koī› 'Binder am Ausleger, outrigger boom' (H1:152), which could be a loan from Kir *kiaro* 'outrigger boom', itself a regular reflex of *kiaZo.

2.7. CORONAL > VELAR > LABIAL CHAIN SHIFT. The velar outcomes of *l, *n, *(s,S) are clearly a unified change. All of the velar reflexes occur in the environment {a,o,#}__{a,o}, though there are six items in the tables above where this place shift does not occur, collected in table 37 (there are nineteen examples with velar outcomes in the same environment). Some of the examples in table 37 are suspect anyway: *an*, *e-ka-do* and *ʌn-i* have short enough stems that accidental similarity is not excluded; the other items are from written sources and may have been misetymologized.

Likewise, in the development *ŋ > *m*, there is a tendency for the labial outcomes to be adjacent to *a,*o, with two exceptions (*aSiŋi, *pʷoŋi). In all of the cases where *ŋ does not become labial, it is adjacent to *i. It is tempting to see the velar > labial shift in the context of the coronal > velar shift of *l, *n, *(s,S) in a similar environment, as part of a coronal > velar > labial chain shift.

2.8. REMAINING PHONEMES: *x, *y, *ñ, *T (TABLE 38). The phoneme *x and *y are lost in Nau, with only a few examples each. PMc *ñ, also uncommon, is reflected in Nau *n*; cf *meña 'thing' > *i-min*. The example

TABLE 37. NO VELAR OUTCOME OF *l,*n,*(s,S) IN {a,o,#}__{a,o}.

PMc gloss	P(C,W)Mc	Nau	Nau gloss
k needlefish	*fanaa	‹éna›	k of fish living deep on the seabed
food, eat (something)	*kana, *kani	ɑn	eat, feed
sea urchin	*laar(i,u)	e-nʌr	urchin
take, get	*ala	ʌn-i	get, acquire, fetch
k tuna	*(s,S)akua	‹dowodowa›	smallest tuna, mackerel tuna
pierce, stab	*(s,S)oka	e-ka-do	spear

9. The word for 'coral' in the Nau Bible is *korallen.*

TABLE 38. *x, *y, *ñ.

PMc gloss	P(C,W)Mc	Nau	Nau gloss	Notes
be tired	*ŋixo	ŋi-j	bore	
canoe	*waxa	e-k^{w}o	canoe	
flying fish	*m^{w}axaru ⊕	e-mor	flying fish	
bone	*cuyi	řʌ-n Ⓥ	bone	A226
octopus	*kuyita	‹a-kui›	octopus	H1:146
leg	*ney(a,e)	nænæ-n Ⓥ	leg	A158
bivalve shell, knife, scraper	*koyi	wiwi	scrape, grate	A99
thing	*meña	i-min	thing	A141
yesterday	*ñañoa	nene	yesterday	A156

*ñañoa ‘yesterday’ > *nene* shows that *ñ may not participate in the *n > *ŋ* sound change. There are two more Nau words with two plausible PMc sources: *ñaña ‘taste, flavor’, *ñañau ‘delicious, taste good’; Nau *nenʌ* ‘taste (both good and bad)’, *tæ* ‘delicious’. The latter form, according to Hughes, derives from a geminate reflex of *ñ (A155).

The phoneme *T, possibly not reconstructable outside PPC, does not appear to be reflected in Nau. There are a few items where formal similarity is suggestive, but not a single recurring correspondence pattern. PCk *Tooŋa ‘be angry’ could be related to Nau *dʌm^{w}ʌdʌm* ‘angry’, though the vowel is irregular. PCk *maaTiaTi ‘treeless place’ seems similar to Nau *eamagœge* ‘clearing, open space’; PCMc *m^{w}aTie ‘sneeze’ to Nau *m^{w}ʌř*, and PCMc *Towa ‘edge, side’ to Nau ‹i dúe› ‘rim of the reef’. Hambruch (H1:157) lists a strange-looking form ‹i ű́ijk› ‘penis’, which could be from *Tika. Needless to say, there is not enough evidence to establish any sound changes.

2.9. VOWELS. In the outcomes for vowels, patterns are hard to discover, especially for *a. No doubt some of the etymologies in this paper are wrong, but probably not enough of them are wrong to cause this much trouble for vowels. I will present the facts as they appear, with the hope that more data and more insight will simplify the picture in the future. It could also be the case, however, that the developments really are irregular because the lexicon as it is currently available to us restulted from dialect mixture.

Any examples in the rest of the paper that do not follow these vowel changes are marked with Ⓥ.

First, I will list some changes that appear only partly systematic in table 39, then turn to systematic changes in table 40, and then simply list the examples for *a.

TABLE 39. PARTLY SYSTEMATIC VOWEL CHANGES.

Change	Environment	Examples
*u > o	w__	*wum^{w}a, *wum^{w}u, but not *wuka
*u > o	__r	*tura, *ura, but not *takuru, *m^{w}uri
*uu > u		*luuka, *luuwa, *SuuSuu, but not in *wuu

TABLE 40. SYSTEMATIC VOWEL CHANGES.

Change	Environment	Examples	Chronology
V > ∅	__#	fully regular	
*i > i	#__	*iku, *imʷa, *iŋi, *t[i,u]pʷu	
*a, *e > o	__w	*lewe, *lako, *tarawa, *(s,S)akua, *cawu	after *k > w
*i, *u > u	__w	*fiSiko, *takuru	after *k > w
*o > {i, ɨ}	__Ci	*koyi, *pʷoŋi, *woki-si, *w[e,o]li	before V > ∅
*o > ʌ	__[nas]	*roŋo, *soŋosoŋo, *toŋo, *ma-wono	
*i,*u,*e > {i, ɨ}		many examples	
*axa > o		*mʷaxaru, *waxa	
*aa > ʌ	__back Cs	*aapʷa, *laar(i,u)	
*aa > æ	elsewhere	*caa, *faa-, *mʷaane, *raani, *wuaa	
*o > o		many examples	
*a > ɑ, æ, ʌ, e		see lists below	
*au > o, e		see lists below	

The next table lists changes that appear regular. The expression {i, ɨ} refers to a distribution of vowels by quality of the following consonant. *Back consonants* are [pʷ,bʷ,mʷ,k,g,ŋ,r]. Whenver {i, ɨ} is listed as the outcome, *ɨ* occurs before back consonants and *i* elsewhere (such effects may have already been present in PMC; see Jackson [1983:323]). A few cases of crucial chronology are noted in the table. Where supporting examples are few, they are listed in their entirety.

Finally, for the outcomes of *a, I am unable to find any clean generalization, and will simply list the cases. There is some tendency for *e* to occur in front consonant environments and ʌ in back consonant environments, but there are too many exceptions. Low vowel dissimilation (*a* > *e*/__C*a*) found in many other Micronesian languages (e.g., Bender 1973; Rehg 1981, 2001; Hughes 2020b:252) does not operate regularly in NAU.

Change	Examples
*a > æ	*amʷii, *asi, *asi, *anitu, *aSiŋi, *a(s,S)awa, *atu, *[ay]awa, *faa-, *fa-, *raŋi, *mate, *pʷuta[e,i], *pʷ[a,e]la, *pakewa
*a > ʌ, ɑ	*camʷa, *maca, *pʷaca, *tano, *lapa, *ala, *kakaŋi, *laŋo, *kapi-sa, -si, *mʷare, *masaki, *masa, *mamasa, *ma-Sawa, *rama, *taŋi, *kana, *kani, *kaŋi, *sawa, *tarawa
*a > e	*aŋi, *aŋiaŋi, *mʷata, *afi, *afe, *faca, *fanaa, *kapi, *mata, *Sama, *canu, *cau-lapa, *fa(s,S)ula, *fatu, *kacawu, *natu, *-manu, *taSi, *ta(s,S)i, *ñañoa, *tapia, *talia
*au > o	*itau, *mʷaau, *ma-cau, *pʷauSu
*au > e	*cau, *pau

2.10. RECOVERED VOWELS. Micronesian languages that have undergone final short vowel loss can display synchronic alternations where the vowel is recovered under suffixation. This is the case in, for example, Pohnpeian,

TABLE 41. RECOVERED VOWELS IN POSSESSIVE PARADIGMS.

1SG, 2SG, 3SG	Representatives
-i, -i-m, -(i,i)-n	*natu, *pwauSu, *takuru, *ta(s,S)i, *kuli
-ʌ, -ʌ-m, -(ʌ,e)-n	*tina, *fiSiko, *aSa, *lapa, *wakara

Marshallese, and Chuukese (Rehg 1991), and NAU can now be added to this list.

There are two patterns in possessive paradigms in terms of the vowel preceding the consonantal suffix, listed in the first column in table 41 for the singular suffixes. (The choice between the vowel options listed in parentheses is synchronically made on the basis of surrounding consonants; see Blumenfeld [2022].) The second column of the table lists the PMC sources for all examples whose etymology is known to me. Clearly, high vowels are recovered as *i̵*, *i*, and other vowels as *ʌ, e*.

The 3SG forms can be seen in various tables in the rest of this paper; the 1SG forms of the words from the first row are *ŋei̵i̵, bodi̵, iruwi̵, edi̵, witi̵*; the 1SG forms from the second row are *innʌ*, *duwʌ, egʌ, ŋʌbʌ, æwʌrʌ* (the form *ŋʌb-* < *lapa when directly possessed is glossed 'leader').

Two KIR loans recover vowels from the source: *ařʌgi̵-n* 'sickness' from KIR *aoraki* is inflected like the items in the first row; *rʌbʷʌde-n* 'body' from KIR *rabata* is inflected like those in the second row. Both forms show C-final versions, *ařʌg* 'sick', *dʌ-rʌbʷʌd* 'body'.

3. KIR LOANS. A significant portion of the NAU vocabulary consists of loans from KIR. Loans usually, but not always, have the noun prefix *dʌ-*, *do-* (or possibly *tʌ-, te-*) in place of the usual *e-*. This prefix itself is a loan from KIR, extended also to English loans: *dʌ-banana*, *dʌ-bot* 'boat', *dʌ-rot* 'rose', *dʌ-badʌr* 'bottle', *dʌ-maŋko* 'mango', *dʌ-batsi* 'box', *dʌ-wip* 'whip', (*tʌ-*)*winnʌr* 'window', *dʌ-bamakin* 'pumpkin', *dʌ-bibʌr* 'Bible', *do-bonara* '(bow and) arrow', *dʌ-bereak* 'shack, hut' (Eng. *barrack*). The prefix is by no means obligatory, and the native *e-* is sometimes used with loans, cf. *terpon* 'telephone', *kuwawa* 'guava', *e-reit* 'rice', *e-pat* 'fat', *e-dorepin* 'dolphin', *burumkow* 'corned beef'. The prefix is regularly absent in German loans, such as those found in the Bible (*ficus*, *firmament*, *harfe*, *insel*, *kamel*, *lampe*, *leon*, *palme*, *pferde*, *schafe*, *ziegel*), and others (*buch*, *mak* 'money'). The prefix is not a fossilized part of the root, as it is absent in verbal derivation, for example, *bonara-j* 'shoot (with an arrow)', or in construct state, for example, *badʌri-n* 'bottle'.

The prefix is a reliable indicator of a word's status as a loan; it is never found in clearly inherited vocabulary.[10] This is supported by the fact that *dʌ-* tends to coocur with certain phonological features that signal loans, such as the retention of final vowels, normally lost in NAU but retained in KIR except for high vowels

10. Hughes (2020b:278) suggests otherwise, but of the twelve words he lists in support of inherited *dʌ-*, eight have plausible sources in KIR, and the other four do not have clear inherited etymologies.

after nasals. Another loan diagnostic is the voicing of the stops: KIR *k, t* are often (though not always) borrowed as voiced *g, d* in NAU, and there is otherwise no support for *k > *g* or *t > *d*. Loans also show the KIR development is *l > *n* in all environments, found only occasionally in NAU, and by the *r* outcome of *s, *S, *c (typically KIR *r* is borrowed as NAU *ř*).

The clustering of these phonological features indicates that we are dealing with a layer of loans, not inheritance via regular sound change. In addition, although the vocabulary with these features is widely distributed in the lexicon, they dominate certain domains, such as plant names, which is normal for loans but not for regular sound change.

At the same time, contact between Nauru and KIR has been long-standing and profound, and thus many loans are of such antiquity that they have undergone some NAU developments, in particular final vowel loss. For example, KIR *makuri* 'work' < PCMC *mʷakusu 'be in motion' is borrowed in NAU as *mʷʌgiř* 'work' (*contra* A125), with the consonantal developments typical of loans but final vowel loss. Furthermore, some lexical commonalities between NAU and KIR are equally compatible with loans and shared inheritance, for example, *i̯-eb* 'land', KIR *aba*, *NAU bʷo* 'fight', KIR *bo*.

I will list below items that appear to be likely loans, grouped semantically. This is not a complete list, in particular for plant names, which are very abundant and well documented in Thaman et al. (1994), where most of the plant examples in table 42 come from.

Likewise, for animals (table 43), many words are of KIR origins, including for apparently native species, and including some doublets: inherited ‹a kui› 'octopus' alongside the borrowing, inherited *e-bʌke* 'turtle', possibly from a variant *pʷakea (Bender et al. 2003a; cf. A252), alongside the KIR word which itself inherits *tapʷakea. Not many fish names appear to be borrowed; instead, many make an appearance in the inherited etymologies above.

Cultural vocabulary also contains many loans, including central concepts like 'chief' (table 44). Notably absent is canoe vocabulary, and fishing

TABLE 42. PLANTS.

NAU gloss	NAU	KIR	KIR gloss	Src
flower	kowe	kaue	necklace of flowers	
giant swamp taro	‹da-babai›	babai	giant swamp taro	T41
spider lily	dʌ-giebu	kiebu	spider lily	T56
Polynesian arrowroot	‹da-magmag›	makemake	Polynesian arrowroot	T75
cerbera	‹de-reiongo›	reiango	a tree	T91
plumeria	de-meria	meria	plumeria	T93
beach mulberry	de-neno	non	beach mulberry	T188
sword fern	dʌ-keaŋ	keang	sword fern	T34
breadfruit	de-me	mai	breadfruit	T170
Mauna Loa bean	e-rekogo	kitoko	Mauna Loa bean	T139
beach heliotrope	i-rin	ren	beach heliotrope	T107
blue vitex	dʌ-gaidu	te kaitu? T207	blue vitex	T207

TABLE 43. ANIMALS.

NAU gloss	NAU	KIR	KIR gloss
mosquito	di-mininnǐř	maninnara	mosquito
large garfish	t-enauror	anaroro	garfish
Nauruan canary	i-tirir	kiriri	long-legged plover
eagle	‹da māninap›	mannaba	bird (myth.)
white dove	dʌ-gigiæ	kiakia	black naped tern
octopus	dʌ-giga	kika	octopus
turtle	te-dʌbʌge	tabakea	turtle
sea turtle	‹da-un›	on	turtle
rat	i-kumudodo	kimoatoto (PN)	small rat
whale, dolphin	e-dagua	takua	dolphin
spider	æřeʌw	areau	spider, cobweb
jellyfish	e-bariet	baitari	jellyfish
ruddy turnstone	‹dugudubwa› (Buden 2008)	kitiba	turnstone
chicken	do-mo	moa (PN)	foul
chicken egg	e-bʷitamo	bunnimoa	chicken egg

TABLE 44. (MATERIAL) CULTURE.

NAU gloss	NAU	KIR	KIR gloss
beam (long)	‹de daṅaṅ›	tatanga	large horizontal beam
meeting house	dʌ-maneb	maneaba	meeting house
village	te-kawa	kawa	village
perfume	dʌ-gare	karea	ingredients to give perfume to oil
long scooping net	i-kibʌŋ	kibena (PN?)	big scoop net
breast plate	uba	uba	upper breast; ornament hung over upper breast
fence, enclosure	do-rogi	roki	curtain, screen, partition
platform	de-bae	bao	house with elevated floor; platform; cf. *buia* 'platform'
mallet for beating pandanus	‹te-wuiw›	ikuku	mallet for beating pandanus
coconut shell used as water container	de-ibu	ibu	coconut shell bottle
grass skirt	ridi	riri	grass skirt
shell	dʌ-bu	bu (PN)	conch shell
mast, flagpole	de-neʌŋ	aneang	mast
knife	(ti-)bidi	biti	iron, knife
toddy	e-karewe	karewe	toddy
intoxicating liquor	dʌ-mæŋi	manging	drunkenness
children's outdoors game	‹de birinōk›	ka-burinako	game resembling quoits
chief	te-monibæ	moaniba	excelling, perfect; famous person
pray	tetaro	tataro (PN)	pray
war dance	‹de-darū›	teru	dance
story	toroŋab	torongabu	story, narrative, myth, folkore
worship	taramawir	taromauri	worship
chant	ruwo	ruoia	chant
god, idol	aduw-in	atua (PN)	god
ancestors	bʌgædugu	bakatibu	ancestors
tax	e-aŋabaj	angabai	tax, duty

vocabulary with the exception of 'scooping net' (on which see below). An interesting additional example is the name Eigigu, the hero of a well-known NAU folktale about a girl who climbed a tree and found an old blind lady living there and drank her toddy. It comes from the KIR name Nei Ikuku *ikuku* 'mallet', and a similar story is told in KIR (Flett 2016). This word is also probably the source for an earlier loan ‹te-wuiw› 'mallet for beating pandanus', prior to *k* > *w*.

Loans are also well represented in the vocabulary concerning the body and health (table 45).

Finally, loans are broadly distributed in the general lexicon, including some very basic lexical items (table 46).

Direct borrowing from PN is sporadically attested in other Micronesian languages (see Geraghty 2010), but is unlikely in NAU given presently known

TABLE 45. THE BODY, HEALTH.

NAU gloss	NAU	KIR	KIR gloss
body	rʌbʷʌd-en	rabata	body
sick	ɑřʌg	aoraki	sick
ear	de-nʌŋ	taninga	ear
swollen; lump	bia	bia	tumor
urine	‹i mim›	mim (PN)	urine
suckle, breast	kimʷamʷa	kamamma	suckle
belly	bʷereto-n	bareto	abdomen, uterus
brain	e-kaburoro	kaburoro	brain, intelligence
wound, sore	dʌ-ginʌga	kinaka	disease of the skin
dwarf	‹i kubạnŭ›	kaobunang	an anti, dwarf, or child
mad, lunatic	di-kʌrʌŋ	karang-a	make foolish; cf. *karang* 'engage in flattery'

TABLE 46. OTHER VOCABULARY.

NAU gloss	NAU	KIR	KIR gloss
can; catch	gonæ	kona	can, be able
work	mʷʌgiř	makuri	work
help	buʌg	buoka	help
end	dogi	toki	end
stranger	iřuwa	irua	stranger
friend	dæŋ-	atanga	mutual friendship
friend, pet	řʌwʌ-	rao	friend, pet
bastard	de-adinimara	nati ni marae	bastard
rainbow	dʌ-wiræræ	wirara	rainbow
thunder	dʌ-bæo	ba	thunder
cloud	de-nʌŋ	nang	cloud
a star	‹mederik› (K3:54)	matiriki	constallation of three stars in Eagle
world, Earth	aonab	aonaba	the Earth, world, universe
hole	tʌ-bʌŋʌbʌŋ	bangabanga	hole
share, divide	dibʷʌŋe-j	tibanga	share, portion
burden	uwada	uota	something carried

facts. Apart from *dʌ-mʷow* discussed above (see comments under table), NAU *i-kibʌŋ* 'long scooping net' is the best candidate for such borrowing. The NAU word seems to show the consonant of PPN *kupenga, a sporadic innovation relative to POC *kup(ʷ)ena (1:213). It is noteworthy that the KIR form *kibena* has *-n-*. This could mean that KIR in fact inherits the POC form. The NAU word fails to show other signs of a KIR loan: there is no prefix *dʌ-*, and the *k* is voiceless. Neither is *ikibʌŋ* likely to be inherited in NAU, from a form like PMC *kupena, because *k nearly regularly becomes *w* in this environment, or PMC *kipena, because it would become *ts*. Also, *e__a* is not a typical environment where **n* becomes velar. The remaining possibility is that NAU borrowed directly from PN.

Another item with a clear PN source is *demeriki* 'child, baby', cf. PPN *tamariki (Pollex). I cannot find a KIR intermediary for this loan.

A third candidate is *mʷoŋoŋ-eda* 'reek, smell', cf. PPN. *manongi (Pollex). However, this could also be an inherited item (cf. A128): *n* > *ŋ* is expected here, though *m* is expected for *mʷ*, and the first vowel is wrong. There is no clear KIR source here, though cf. *mangongo* 'passage between nose and throat'.

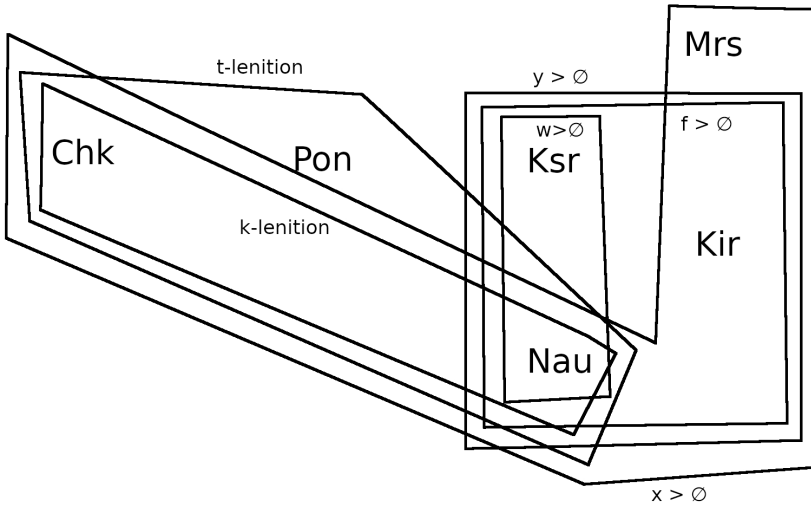
Direct borrowing from other Micronesian sources is also not well supported. The item *dirikoṷ-n* 'heart, nutritive tissue of sprouting coconut' (H1:219) is a possible candidate for a loan from Chuukese, cf. *eyirúk* 'heart of palm' (A261), or could represent an inheritance, though *d-* is unexplained.

Finally, let us turn to some problematic and uncertain items. Some words have the appearance of loans, but no source could be located, for example, *dedemaro* 'youth'. The word *bækæ* 'bad' could plausibly be a loan from *baka* 'fall, die, be beaten, dupe, be scandalized', and *teřʌ* 'look, see, inspect' from *tiro* 'look, stare'. *dʌbʷike* 'stick' seems related to *kai* 'stick' and PMC **kai* 'wood', but the middle syllable is unexplained.

4. IMPLICATIONS AND CONCLUSIONS. I conclude with some brief remarks on the implications of the findings. General conclusions about the placement of NAU in Micronesian are somewhat premature and will require a broader look at the data beyond phonological change. See discussion in Hughes (2020a, b), who examines NAU in the context of Micronesian-defining innovations of Jackson (1986). I will limit the comments to the facts covered in this paper. Note, first, that NAU appears to subgroup with the Central Micronesian languages on the basis of the merger of *s and *S, shared with all other languages except KSR. Second, it is noteworthy that NAU participates in all of the reductive changes found elsewhere in Micronesian, with the exception of *r-loss in KIR. The wave diagram in figure 1 illustrates the shared innovations with other members of the family.

Second, this picture visualizes the claim that NAU shares certain features with languages to its east, but two important developments, the lenition of *t and of *k, are shared with languages to the west. Subgrouping NAU with Chuukic and/or Pohnpeic does not appear likely on lexical and geographic

FIGURE 1. WAVE DIAGRAM.



grounds, though lexical data in particular could stand a closer examination. Phonologically, the material covered in this paper does not give an empirical basis to determine whether these stop lenitions are a shared innovation between Chuukic and NAU, or whether the preconditions for drift were inherited from PMC. Deciding between these possibilities will require looking at material outside of Micronesian.

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