The Story of *ô in the Cariban Family

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1. Introduction: The role of field work in comparative work[1]

This paper is one in a recent series of steps forward in comparative phonological work in the Cariban family, in this case focusing on the reconstruction of central vowels. While comparative work is not usually the first thing one thinks of when opening a volume on field work, all comparative work is predicated on the ability of the comparativist to compare reliable data, and for most language families of the world, reliable data only exists as a result of good field work. In South America, all early comparative work—and even some relatively modern comparative work—is weakened by the absence of reliable data. Many early materials are simply lists of words and phrases collected by untrained explorers; some apparently could not hear important phonological distinctions in the new languages they encountered and even those who had reasonably good ears did not have good orthographic tools to consistently write down the distinctions they were hearing. This paper illustrates the importance of good modern field work in two ways: first, after collecting reliable modern data, many inconsistencies in cognate sets disappear and previously unseen patterns become clear; second, reliable modern data can provide insight into previously opaque transcription systems used by older sources, thereby enabling us to make better use of language data recorded several hundred years ago. In section 2, we review previous comparative treatments of mid vowels in the Cariban family, highlighting problems in the data that led to the earlier reconstruction of 2 instead of 3 mid vowels. In section 3, we present the improved correspondences that appear when comparing cognates from a modern, reliable lexical database. These correspondences clearly justify reconstruction of a third Proto-Cariban mid-vowel, *ô.[2] In section 4, we show how the combination of modern field work and examination of correspondences for *ô combine to cast light on a vexing problem with early work on Island Carib/Garifuna, which in turn cements our reconstruction of the third mid vowel. Finally, in section 5 we summarize our conclusions about this third mid vowel, along with a call for more instrumental acoustic analyses of modern field data.

2. Previous comparative work on Cariban mid vowels

Modern, reliable comparative work on the Cariban family began with the Berkeley dissertation of Victor Girard in 1971. In the preceding century, several dedicated philologists

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[2] Meira (2002) originally proposed *o_2, which is appropriately neutral with regard to phonetic interpretation, but which, as a digraph, is inconvenient to work with in reconstructed morphology and lexicon. Thus, for aesthetic reasons, we adopt Meira and Franchetto's (2005) shift from *o_2 to *ô. The reader who wants to pronounce *ô may jump to §5, where we offer arguments in favor of a phonetic value of [ə] or [ɤ].

(especially Adam 1893 and de Goeje 1909/1946) collected extensive databases, but, as expounded by Girard (1971), they suffered from so many methodological flaws that none of their conclusions could be sustained. However, Girard's generally sound methodology and careful collation of data were in turn confounded by the low quality of the sources available to him. In section 2.1, we review Girard's contribution to the reconstruction of mid vowels. In recent years, tremendous advances have been made in the quality of descriptive data available for comparison, especially in the transcription of central vowels. Thanks to these advances, a series of recent papers has advanced the strong hypothesis that a third mid vowel must be reconstructed to Proto-Cariban. In section 2.2, we review these studies.

2.1 Problems with mid vowels in early comparative work

Early sources of data from Cariban languages were vexed with poor transcription, especially of vowels. As a result, early attempts to compare Cariban wordlists resulted in inconsistent correspondences. In our own field work, we have found that old word lists are rarely confirmed by our modern transcriptions, and that even the more modern sources consistently mistranscribe vowel quality and length. In particular, the central vowels [ɨ] and [ə] are often mistranscribed as front rounded vowels (*ü*, *ö*, *y*, *ø*) diphthongs (*ui*, *ue*), or collapsed with any one of the existing vowels (especially *e, o*, *a*, but also sometimes also *i*, *ɨ*, *u*). In part as a result of this morass of mistranscription, Girard (1971:77) saw evidence for reconstructing only 6 vowels, *i, *ɨ, *u, *e *o, and *a. Girard did make it clear that he recognized some of the limitations of his database: "There was an inability on the part of the grammarians, both native Spanish and Italian speakers, to distinguish between the mid-front e and the high- or mid-central ɨ... In general ɨ is written <e> or, when occurring after bilabials, particularly p, <ue>" (p. 45). We have seen many examples of such mistranscription in Girard's sources for languages on which we have worked; in this paper, we illustrate such problems by adding cognates for †Tamanaku and †Kumana to the tables in Appendix 2, where the correspondences of *a* : *ə* and *e* : *ə* are almost certainly due to mistranscription.

Even though Girard was aware of these problems, especially with the colonial sources, it is also apparent from his prose that he chose to disregard some sources that indicated modern seven-vowel systems, adding to the six a mid-central vowel: "***ɨ** appears to have represented a phonemic area rather than a point. Even modern, and one hopes, more accurate phonetic transcriptions show both [ɨ] and [ə] (see Makiritare, Tiriyó, etc.). Some linguists have analyzed these phones as phonemes. There is no evidence however from other sister languages that Proto-Carib contained three central vowels." (78-9). Interestingly, he does not present the problem as one of what to do with the correspondences containing these "extra" phonemes, but rather he asserts their irrelevance without careful argumentation.

The problem with these mid-central vowels was exacerbated by the problem of synchronic ablaut, in which nouns, verbs, and postpositions present an alternation between stem-initial *e* (the front grade form) and either *o* or *ə* (the back-grade form). Since the unrounded back-grade form *ə* was often mistranscribed, ablaut was not particularly straightforward to see in many of the languages. This meant that Girard primarily saw the half of ablaut that involved the rounded back-grade form: "Alternating *e ~ *o and *e ~ *a Many languages manifest these alternating vowels when they occur word-initially. This is a vexing problem for a synchronic as well as a diachronic analysis..." (p. 83). As a result, Girard (1971:83-6) reconstructed an initial alternation to many Proto-Cariban lexical items, and got used to seeing *e* : *o* correspondences as the outcome of a "vexing" alternation.

Overall, the many cases of *ə : o* correspondences in the older data also generally involved either real *e*, or mistranscribed *e, ue*, *a*, etc., and hence Girard reconstructs them as either the *e ~ *o alternation, as *e, or as *ɨ. But in fact, Girard did not address most of the cognates we

will present in this paper, possibly because their vowel correspondences were simply too chaotic given the poorly-transcribed data available to him at that time. His conclusions stood unchallenged for 30 years, while we awaited sufficient descriptive data to allow us to ask the right questions.

2.2 The contribution of Modern data and recent comparative work

Primarily over the last 10 years, at least some reliably transcribed data have become available from nearly every extant language in the family. At least some earlier sources for several languages were reliable, but because other, unreliable, sources existed for each language, comparativists had no way to know which source to trust. Among us, we three have personally collected data for all but a handful of the languages in the family, which has made it possible in most cases to distinguish the useful sources from those that are not usable. Not all reliable sources are equally rich, and not all issues with transcription have been resolved for all of them (especially of prosodic features, such as vowel length), but an unrounded mid non-front vowel is now clearly confirmed as a phoneme (generally transcribed *ə* , *ë*, or *ö*) in 10 modern Cariban languages: **Akuriyó** (Meira 2000), **Bakairi** (Meira 2003), **Karihona** (Meira 2000), **Kapóng** (Akawaio, Fox 2003; Ingarikó, Souza Cruz 2005), **Mapoyo/Yabarana/Pémono** (Mattéi-Muller 2003), **Panare** (Mattéi-Muller 1994), **Pemón** (Taurepán, Álvarez 2000; Arekuna, Edwards 1978), **Tiriyó** (Meira 1999, 2000; Carlin 2004), **Wayana** (Tavares 2005), and **Ye'kwana/De'kwana** (Hall 1988). In light of these modern findings, Jesuit descriptions can be seen to suggest another mid vowel in **Tamanaku** (Mattéi-Muller and Henley 1990) and **Kumaná** (Cumanagóta, Chaimá; Mattéi-Muller and Henley 1990).[3] We now know that in older materials, *ə* (rather than *ɨ*) was frequently mistranscribed as *e*, leading to orthographic collapse of a phonemic distinction and confusion in correspondences.

Based on these modern sources (as well as his own primary field work with nearly half the languages of the family), Meira (2002) re-opened the question of how many mid-vowels to reconstruct to Proto-Cariban when he compared pronoun sets across the family. In comparing these pronouns, two robustly different correspondence sets emerged, unlikely to be due to a conditioning environment. Since both correspondences present *o* in many languages, Meira posited Proto-Cariban *o in opposition to *o_2: *o becomes *o* in every modern language, but *o_2 develops a range of modern reflexes, including *o, ə, a, ɨ*, and *e*. Meira suggests (p. 260, note 7) "it is not impossible that Proto-Cariban ***o_2** was actually ***ë** ([ə])."[4]

But of course, so limited a lexical selection as the pronouns could conceivably present spurious correspondences, given the sorts of idiosyncratic sound change often associated with high frequency lexical items. The correspondence was confirmed in a much broader sample of the lexicon by Meira and Franchetto (2005). They collected cognate sets with reliable modern data from 7 languages, showing (pp. 168ff) that not only do the correspondences remain consistent beyond the pronoun sets, but they are, in fact, *more* consistent in the rest of the vocabulary:

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[3] For a more modern case, cf. the mistranscription of Pemón *ə* as *e* or *ue* in Armellada and Salazar's 1982 dictionary.

[4] In the attempt to avoid confusion, we here note that there are three different phonetic alphabet traditions in play in this paper. The modern IPA values of the vowels in question are [ɨ] (high central unrounded), [ɯ] (high back unrounded), [ə] (mid central unrounded) and [ɤ] (mid back unrounded). Traditional Americanist IPA symbols for these same vowels are, respectively, [ɨ], [ï], [ə], and [ë]. Individual descriptions of Cariban languages have generally not distinguished the central from back articulation (no individual language makes a phonemic distinction between them), so the symbols [ï] and [ë] have often been used to indicate central vowels. Meira's (2002) usage is this latter; our own usage of [ï] and [ë] in §4-5 reflects the second, the Americanist tradition.

PC	Yukpa	Tiriyó	Hixk	Makushi	Bakairi	Ikpéng	Kuikúru
*o	*o*	*o*	*o*	*o*	*o*	*o*	*o*
*ô	*o*	*ə*	*o*	*ɨ*	*ə*	*o*	*e*

Meira and Franchetto change the symbol $*o_2$ to *ô, but they otherwise make no changes to Meira's (2002) reconstruction. In considering the likely phonetic value of *ô, they leave open the possibility of various phonetic realizations: "*ô might end up being *ə, or "unstressed *o*," or *o* + a "schwa-coloring laryngeal," or "any other future solutions" (p. 171).

An additional aid to recognizing modern reflexes of *ô comes from recent advances in the understanding of root-initial ablaut. Descriptions of ablaut show *e/o* and *e/ə* alternation conditioned by person-marking conjugation in nouns, verbs, and postpositions, as well as by a valence reducing prefix in verbs (Meira, Gildea and Hoff 2007). These correspondences are now well-documented, and the various ablaut alternations are now understood as the outcome of various combinations of these historical changes:

- Across the family, *i-ô > *e*
- In all branches of the family except Parukotoan, *jô > *je*
- In a few languages, *ô > *a* /_C*a* (vowel harmony).
- In a few languages, *ô > *a* /#_ (initial lowering, largely restricted to high-frequency morphemes like *ô- '2', *ôte- 'Detransitivizer', and free pronouns).
- There may also be some idiosyncratic resolutions to vowel hiatus when *ô is involved (*e-ô > *e*, but with any other vowel, *e-V > V; also, in some cases, *ôe > *ô*).
- In a later development, in about half the languages of the family, *ô > *o*, creating *e* ~ *o* ablaut from *e* ~ *ô* ablaut.

At this point, we arrive at the contributions of this paper: we collect cognate sets from all members of the family for which we have data (Appendices 2 and 3) and we consider (§3) all the modern reflexes of *ô that appear in the resulting correspondence sets (Appendix 1). A casual inspection of these cognate sets makes it clear that we have a distinct, reliable correspondence that must be reconstructed as a separate proto-phoneme. We then construct the case for evidence of an attested change: *ô > *ë > *o* in Kari'nja (§4). We conclude with some discussion of the probable phonetic value of Proto-Cariban *ô (§5).

3 Modern reflexes of *ô

The correspondences are presented in appendix 1, extracted from the cognate sets in Appendix 2. We divide these into two groups of languages: those in which the modern reflex of *ô represents a separate phoneme (3.1) and those in which the modern reflex of *ô has undergone an unconditioned merger with another phoneme (3.2). We then consider briefly some individual phonological environments in which a number of modern reflexes of *ô have undergone conditioned mergers with other phonemes (3.3).

As a preliminary to the consideration of individual language names, we present a conservative modern classification of the family (Figure 1). We have chosen specific spellings for the name of each language based on (i) the spelling preferred by the majority of the communities who speak the language (where that is known to us), and (ii) the spelling adopted in the source(s) we cite. To help avoid adding to confusion amidst the proliferation of names, we specify some commonly-known alternate names for certain languages: **Karihona** (Carijona), **Kari'nja** (Carib, Galibi, Cariña), **Katxuyana** (Kaxuyana), **Kuhikuru** (Kuikuro), **Kapóng** (preferred spelling in Guyana, where most Kapóng live, for Akawaio, Patamuna and Ingarikó), **Pemón** (preferred spelling in Venezuela, where most Pemón live, for Taurepang, Arekuna and Kamarakoto), **Yabarana** (for Yawarana, Mapoyo/Wanai, and Pémono), **Tiriyó**

(preferred spelling in Brazil, as opposed to Trio, preferred spelling in Suriname), and **Ye'kwana** (De'kwana, Makiritare, Maionggong). Other names are more standard, at least in the modern literature.

We believe that our classification is reliable in recognizing individual languages and the immediate Groups into which many of them fall. Among the Groups, only Taranoan has been thoroughly documented (Meira 2000); the others are so obviously related that we do not expect additional documentation and comparative work to alter them.

Relationships above the level of Group are more tentative, in part because of the relatively conservative nature of Cariban phonology (which led Girard 1971 not to posit any higher-level branches) and in part because we have not yet thoroughly combed our new databases in search of potential shared innovations. The Venezuelan Branch presented here differs from the one proposed in Gildea (2003), Mattéi-Muller (2002, 2003) in that it excludes the Kumaná and Makiritare Groups, which were originally included due in part to the mistaken belief that their separate phoneme *ə* might constitute a shared innovation (from Proto-Cariban *o). While additional criteria might still relate them to the other Venezuelan Branch languages, here we strip the branch to those languages that present more potential shared innovations. The Pekodian Branch is as proposed in Meira and Franchetto (2005). Certainly future comparative research is likely to identify more high-level relationships amongst the Groups.

Figure 1. A conservative classification of the modern Cariban Family

Venezuelan Branch (A-B-C-D)

Pemóng-Panare Macro-Group (A-B)

A. Pemóng Group (Kapóng [Akawaio, Patamuna, Ingarikó], Makushi, Pemón [Taurepang, Kamarakóto, Arekuna]).

B. Panare

Mapoyo-Tamanaku Macro-Group (C-D)

C: Yabarana (Mapoyo, Wanai, Yawarana, Pémono)

D: †Tamanaku

Pekodian Branch (E-F)

E. Bakairí

F. Arara Group: Arara (Parirí), Ikpéng (Txikão)

Residue (Groups and Languages still in search of branches, in alphabetical order)

Groups

G. †Kumaná (†Chaima, †Cumanagota)

H. Makiritare (De'kwana, Ye'kwana, Maiongong)

I. Nahukwa Group: Kuikúru, Kalapalo

J. Parukotoan Group

J1. Katxúyana (Shikuyana, Warikyana)

J2. Waiwai SubGroup: Waiwai (Wabui, Tunayana), Hixkaryana

K. Taranoan Group

K1. Tiriyó Subgroup: Akuriyó, Tiriyó, Trio

K2. Karihona

L. Yukpa Group: Yukpa, Japréria

Languages

M. Apalaí

N. Kari'nja (Carib, Kalinya, Cariña, Galibi)

O. Waimirí Atroarí

P. Wayana

3.1 *ô as a Separate Phoneme

Eleven modern languages present clear cases in which modern reflexes of *ô are a separate phonemic category, 10 presenting the mid-central vowel *ə* and one the mid front vowel *e*. In addition, Jesuit descriptions of Tamanaku and Kumaná are best interpreted as reflecting mistranscriptions of *ə* (cf. Mattéi-Muller and Henley's 1990 work on Tamanaku, and cf. the correspondences for *ô in Appendices 2 and 3), raising the total number of languages that present *ə* to 12. As listed in Figure 2, these languages belong to nine different groups, plus one language (in a group of one) that presents *e*, meaning a separate phoneme is attested in 10 out of 16 groups of the family. If the Venezuelan and Pekodian Branches are counted as only one unit each, then a separate phoneme reflex of *ô is seen in seven of 12 units, making it nearly impossible to posit that modern *ə* is a consequence of a shared innovation in which a single proto-phoneme (e.g., *o) split to become two modern phonemes in these languages.

Figure 2. Languages with *ô as a separate phoneme

Mid-central vowel: *ô > *ə*

A. Pemón, Kapóng } Venezuelan Branch
B. Panare, } Venezuelan Branch
C. Yabarana/Mapoyo } Venezuelan Branch
D. (Tamanaku) } Venezuelan Branch
E. Bakairi. } Pekodian Branch
G. (Kumaná)
H. Ye'kwana
K. Tiriyó, Akuriyó, Karihona
P. Wayana

Front vowel: *ô > *e* (*e merges with *i)

I. Kuhikuru

3.2 Unconditioned mergers

Ten modern languages present clear cases in which modern reflexes of *ô have consistently merged with another proto-vowel, and thereby do not constitute a separate phonemic category, eight presenting as the modern reflex the mid back rounded vowel *o* and two the high central unrounded vowel *ɨ*. As listed in Figure 3, these languages belong to seven different groups (five merging *ô with *o, two with *ɨ). Note that two members of the Pekodian Branch and one member of the Venezuelan Branch are present in this group as well, making it difficult to argue that either merger can be characterized as either entirely a shared innovation or as due to contact.

Figure 3. Languages in which *ô merged with another vowel

Merge with *o

F. Arara, Ikpéng } Pekodian Branch
J. Waiwai, Hixkaryana, Katxúyana
L. Yukpa
M. Apalaí
N. Kari'nja

Merge with *ɨ

A. Makushi } Venezuelan Branch
O. Waimiri-Atroari

3.3 Conditioned mergers (Meira, Gildea and Hoff, 2007)

In our ongoing investigation of modern Cariban morphophonology, we have found a number of phonological processes that appear to apply only to modern reflexes of *ô. Particularly fronting leading to ablaut, lowering harmony, and word-initial lowering. The same fronting, harmony processes, and sporadic lowering appear to have operated historically to yield specific inconsistencies in modern cognate sets.

First, we recapitulate the findings of Meira, Gildea and Hoff (2007) with regard to ablaut caused by fronting. In all languages of the family, vowel hiatus caused by *i- '3' prefixed to any root beginning with *ô results in a single vowel, *e, at the beginning of the root; before all other vowels, *i- simply disappears with no synchronic reflex. In all except the languages of the Parukotoan Group (Hixkaryana, Katxuyana, Waiwai), the sequence *jô > *je*, most frequently following the relational prefix *j-*, but also morpheme-internally in 3 lexical items (cf. TOOTH, BONE, COOK in Appendix 2). In no Cariban languages does *i- '3' survive preceding vowels, and in most modern Cariban languages, word-initial *j- 'Rel' > Ø, which leads to the loss of the conditioning environment for fronting. As such, roots beginning with the vowel *ô present a synchronic alternation that Meira, Gildea and Hoff call *ablaut* in these languages (Table 1).

	P.C. *ônu	TIRIYÓ *enu*	KARI'NYA *enu*	WAYANA *ewu*	BAKAIRI *enu*	KATXUYANA *enu*
3	* i- ônu	*enu*	*enu:-ru*	*ewu*	*enu*	*enu-ru*
2	*ô-j-ônu	*ə- enu*	*aj- e:nu-ru*	*əw- ewu*	*inu*	*o- onu-ru*
1	*u-j-ônu	*j- enu*	*j- e:nu-ru*	*j- ewu*	*j- enu*	*j- onu-ru*
NP	*j- ônu	*enu*	*enu:-ru*	*ewu*	*enu*	*j- onu-ru*
1+2	*k- ônu	*k- ənu*	*k- onu:-ru*	*k- əwu*	*k- ənu*	*k- onu-ru*
3R	*t- ônu	*t- ənu*	*t- onu:-ru*	*t- əwu*	*t- ənu*	*t- onu-ru*
Ø	* ônu	*ənu*	*o:nu*	*əwu*	——	——

Table 1. Ablaut with the word for 'eye' in selected Cariban languages (back grade shaded)

The rows are sorted according to ablaut effect. The top row shows that the initial *ô in 'eye' is fronted to *e* in all languages for third person. The next three rows demonstrate the differential effect of *j- 'Rel', which only occurs following the first and second person prefixes and following a preceding possessor NP: *ô is fronted to *e* for most languages, excepting Katxuyana (a Parukotoan language, in the final column), where *ô is not fronted following *j-, but remains back and later participates in the general merger when *ô > *o*. The bottom three rows demonstrate the form of the root taken when there is neither a third person nor a relational prefix conditioning fronting: the unfronted reflexes of *ô are simply unrounded *ə* or rounded *o*.[5]

The second conditioned merger is an outcome of lowering harmony triggered by the low central vowel *a* as the nucleus of the following syllable: *ô > *a* / _C*a*. This is described in multiple languages as a synchronic vowel harmony rule, in which a prefix contains a modern reflex of *ô (whether *ə* or *o*) that becomes *a* when the prefix is attached to a root whose first

[5] Recall that in Kuhikuru, a later vowel shift led to *e > *i* and *ô > *e*, such that the ablaut alternation is not *o* ~ *e*, but rather *e* ~ *i*: e.g., *egi* 'song', *ete* 'village', *eku* 'semen' → *u-igi-sɨ* 'my song', *u-itu* 'my village', *u-iku-ɣu* 'my semen'.

vowel is *a* (both with and without an intervening consonant). Ready examples are found in languages where the second person prefix has the allophone *a-* conditioned by an *a* in the initial syllable of the root (e.g., Apalai, Koehn & Koehn 1986.97; Hixkaryana, Derbyshire 1985.199; Katxuyana, Gildea's field notes; Tiriyó, Meira 1999.201), or where the detransitivizer prefix has an allomorph *at-* or *as-* when the root has *a* in the first syllable (Apalaí, Arara, Ikpéng, Bakairi, Hixkaryana, Karihona, Katxuyana, Kuhikuru, Makushi, and Ye'kwana; Meira, Gildea, and Hoff 2007). The most extreme example in this case is found in Katxuyana, where vowel harmony applies across the entire stem (i.e., no stems are attested that begin *oCa*) and where some cases of ablaut are between fronted *e* alternating with lowered *a*, for example, *ɛwahu* 'his calf (of leg)' (< *i-ôwapu) versus *t-awahu* 'his own calf' (< *t-ôwapu).

In addition to harmonic lowering, there are some inconsistent cases of *ô > *a* word-initially (often a prosodically weak position in these dominantly iambic languages). These are gathered together in Appendix 3. We will return to this phenomenon in more detail in §4, where we examine both modern dialectal variation and attested historical transcriptions of Kari'nja.

3.4 Summarizing the evidence so far

At this point, we can see two converging lines of evidence pointing to Proto-Cariban *ô as a distinct vowel: first, there is a substantial set of cognates that display a consistent correspondence of *ə* : *o* : *ɨ* : *e*, and second, there are two conditioned historical phonological processes (fronting and lowering) that have affected only this vowel. We can now turn to these changes and try to sequence them, after which we can look for evidence of the relative time depth of each change.

The most obvious conclusion available to us is that unconditioned mergers all came after any conditioned changes, as subsequent conditioned changes would have applied to the entire merged category, and not just the subset that has its origin in *ô. Hence, we date the many cases of unconditioned *ô > *o* and the two cases of unconditioned *ô > *ɨ* as the last changes to take place. The order of the conditioned changes is less transparent, but it seems clear that fronting is an exceptionally old process: coalescence of the third-person prefix *i- with the initial vowel of the stem probably predates Proto-Cariban, and the ubiquity of the change *jô > *je* argues for its antiquity as well, especially given that the conditioning environment (the initial *j-) is lost in so many languages. In contrast, both harmonic and sporadic lowering of *ô > *a* is more limited, either to specific very old, high-frequency morphemes such as **ô-* '2' and *ôte- 'Detransitivizer [reciprocal]', or limited to a few languages in a geographically contiguous area of northern Brazil.[6] Of particular interest is the evidence from Katxuyana that fronting predates lowering; only after *i-ô > *e* for third person do the remainder of *ô lower to *a* in the harmonic environment, creating *e* ~ *a* ablaut for a handful of words.

Given that the mergers are at the end of this chain of changes, one might ask how recently such mergers have taken place. The answer is "relatively recently", as seen in the divergence in outcome within closely-related genetic groups. For example, Makushi is still largely mutually intelligible with its two sister languages in the Pemón group, Pemón and Kapóng, yet of the three, only Makushi has merged *ô > *ɨ*. Meira and Franchetto (2005) argue for the existence of the Pekodian Branch of the family, uniting Bakairi with the Arara/Ikpéng Group, yet while Bakairi maintains *ô as the separate phoneme *ə*, Arara and Ikpéng have both merged *ô > *o*. However, it is difficult to project the time depth of these changes back in real time,

[6] For now, we offer this maximally restrictive characterization, but as more detailed descriptions become available for other languages, productive harmonic lowering may be found outside of this region.

as we cannot determine actual dates when the groups in question separated. In §4, we turn to something closer to a case of attested change: the varieties of Kari'nja captured in historical wordlists and attested in modern dialectal variation.

4. The Kari'nja evidence: *ô > o as a recent change

The Kari'nja language, also known as Carib proper, Galibi, Kaliña, Kari'na, and Cariña, is the one for which the family received its name. It is spoken by between 10,000 and 25,000 people along a roughly 1000-mile arc of the coast and one to two days inland beginning in Brazil near the border with French Guiana, continuing through French Guiana, Surinam and Guyana, and ending in the easternmost 300 miles of the Venezuelan coast. As one of the first languages contacted, and as a language spoken by a larger population than most, Kari'nja has a rich record of colonial documentation, plus more ample modern documentation from multiple dialects. Present-day Kari'nja is one of the languages in which *ô merged with *o, generating a typical six-vowel system (*a e i o u i*). There is, however, some historical evidence that points to the existence of an earlier seventh vowel in the Kari'nja vowel system.

Further, Kari'nja served as the basis of a pre-Colombian trade pidgin that is documented in two word lists. When the West-European traders arrived on the north coast of South America, they found a pidginized Kari'nja language waiting for them to be used in their dealings with the Indians, all along the coast (Boyer 1654, Biet 1664). And long before that time, due to a Kari'nja invasion some 2-3 centuries before the arrival of Colombus, the same contact language had already served as the lexifier for the male speech of Island Carib, an Arawakan language of the Lesser Antilles with a strong gender-based register distinction (Taylor & Hoff 1980, Hoff 1995). This language is known to us thanks to the work of Raymond Breton (1665, new edition 1999). A modern descendent of Island Carib, Garifuna, received some descriptive attention in the 20th century (Taylor 1951, 1977).

Taken together, these sources give evidence that early Kari'nja retained a phonemic distinction between the reflex of *ô as an unrounded mid back vowel *ë* and that of *o as *o*. In all modern dialects of Kari'nja, *o is still *o*, but an independent reflex of *ô has completely vanished: most of its territory has been taken over by *o*, a small part by *a*, and via the ablaut process, another part to *e*. We consider first the evidence provided by Island Carib for the survival of *ô as an independent phoneme in early Karinya (§4.1). Then we turn to the process by which some instances of *ô merged with the phoneme /a/ in the Kari'nja pidgin and in some dialects of modern Kari'nja (§4.2).

4.1 Island Carib and Garífuna: the evidence for Early Kari'nja *ë < *ô

All lexical information about Island Carib comes from Breton's (1665) dictionary. It is not a trivial task to interpret Breton's orthography, in which one finds several symbols that suggest an *e*-like sound—*e*, *eu*, *ê*, *é*—and also the symbols *ou* and *o*, which suggest back rounded vowels. Breton's data have been successfully decoded by Douglas Taylor, largely on the basis of his findings from descriptive study of present-day Island Carib, better known as Garifuna (Taylor 1951:12, 160-171; 1977: 29-43, 138-142). We illustrate Breton's transcription and Taylor's interpretation of it by means of the concrete examples found in Table 2.

In Table 2, cognates are presented from modern Kari'nja, Island Carib, and modern Garifuna, and from these we reconstruct *Early Kari'nja*, the common ancestor that is shared by modern Kari'nja and, via Island Carib, by modern Garifuna.

Table 2. Reflexes of *ô,*ï, *e, and *o in early and modern stages of Kari'nja

		MODERN KARI'NJA	EARLY KARI'NJA	ISLAND CARIB		GARIFUNA
1	TWO	/*oko*/	*/ëkë/	*eukê*	/ïkï/	-----
2	STONE	/*topu*/	*/tëpu/	*tébou*	/tïbu/	/*dïbu*/[7]
3	FLEA	/*siko*/	*/sikë/	*chicke, -chigu-*	/*sikï*/	/*sigï*/
4	MOUNTAIN	/*wïpï*/	*/wïpï/	*ouébo*	/uïbu/	/*uïbu*/
5	AXE	/*wïwï*/	*/wïwï/	*houéhoue*	/uïuï/	-----
6	SUN	/*weyu*/	*/weyu/	*huéyou*	/ueiu/	/*ueiu*/
7	PERSON	/*itoto*/[I]	*/itoto/	*etoútou*[II]	/itutu/	/*idudu*/[III]

[I]Tiriyo Indian, [II]Arawak Indian, [III]Miskito Indian.

Starting from Early Kari'nja *ëkë* 'two' in the third column and moving to modern Kari'nja in the column to the left, we see the result of the historical rounding process in both vowels. Moving to Island Carib in the column on the right, Breton's version *eukê* together with the comments in his grammaire (1667) suggest an *e*-like rather than an *o*-like sound. Taylor came to the conclusion that one and the same phoneme of Island-Carib is symbolized here once by *eu* and once by *ê*, and that this phoneme was back and unrounded. It cannot have been high or mid in a phonological sense, because the high/mid distinction is not available to back vowel phonemes in Arawakan systems like that of Island Carib: rounded /u/ presents the allophones [u, o], whereas the actual pronunciation of unrounded /ï/ varied between [ï, ë]. Breton distinguished the high from mid allophones, writing both *o* [o] and *ou* [u], *ê* [ë] and *eu* [ï]. Taylor, observing the allophony in the modern language, recombines these distinct graphemes to the single phoneme they must have represented.

In the second and third examples, Modern Kari'nja shows the expected rounded reflexes. However, the spelling *tébou* for 'stone' reveals a typographically vulnerable spot in Breton's book: a circumflex has been suppressed here by the stress mark, creating typographical ambiguity between the front and back unrounded mid vowels – this happened quite often in the dictionary, and can only be disambiguated by consulting Taylor's modern Garifuna examples. In the third example, Breton's unmarked *e* suggests a front vowel, but both the modern Kari'nja reflex and the modern Garifuna reflex suggest that it must have been the unrounded back vowel. As noted in section 2, such confusion is common in the Jesuit sources; even though Breton clearly could hear (and did mark) many /ë/ and /ï/, his data are not free of this problem.

In 'mountain' (4) and 'axe' (5) we assume that a high unrounded back /ï/ of early Kari'nja remained unmodified in modern Kari'nja and Island Carib (and in Garifuna).

The sixth example, 'sun', in Island Carib contained a front vowel /e/, again made ambiguous by the stress mark. In comparing (5) and (6), we can see that Breton leaves us a clue to vowel quality in the spelling of the preceding non-syllabic /u/. Like his compatriots Boyer and Biet, Breton transferred a peculiarity of French phonology and French orthography to his Kari'nja data. French distinguishes between a labial-palatal approximant (as in /ɥi/ *huit* 'eight') and a labial-velar approximant (as in /wi/ *oui* 'yes'). Accordingly, the French authors spell the labial approximant of Carib before a front vowel as *ü*, *hü* or *vü*, and before a back vowel as *oü.* So we

[7] Note that we deviate from one of Taylor's spelling conventions: for the non-low, unrounded back vowel phoneme of Garifuna we write /ï/ instead of Taylor's /o/.

can be certain that *houé* (in 5) indicates the sequence /uï/, whereas *hué* (as in 6) indicates the sequence /ue/, both confirmed by the cognates in modern Kari'nja and Garifuna.

Row 7 illustrates reflexes of *o: they remain /o/ in modern Kari'nja, but in both Island Carib and Garifuna, they have merged with /u/ into a single phoneme, which (following Taylor) we represent as /u/.

To summarize the Island Carib facts, a phonemic contrast is seen between two back vowels, one rounded and one unrounded, each of which apparently varied freely between high and mid pronunciations. In Breton's Island Carib transcriptions, the back unrounded vowel is sometimes uniquely distinguished as *ê* or *eu*, but often ambiguously written as *é* or *e*; these can sometimes be disambiguated via Breton's convention for writing the bilabial approximant, rendering the sequence /uï/ as *(h)oué* and the sequence /ue/ as *hué*.

We now summarize the argument for our reconstruction of four back vowels in Early Kari'nja. First, modern Kari'nja presents three back vowels, two rounded /o, u/ and one unrounded /ï/. Second, the Island Carib rounded back vowel /u/ contains correspondences to both modern Kari'nja /u/ and a subset of /o/. We presume two Early Kari'nja rounded back vowels, high *u and mid *o, which survived unchanged into modern Kari'nja, but which, upon being borrowed into Island Carib's Arawakan phonological system, merged into a single back rounded phoneme. Third, the Island Carib unrounded back vowel /ï/ contains correspondences to both modern Kari'nja /ï/ and another subset of /o/. We presume two Early Kari'nja unrounded back vowels, high *ï and mid *ë, which underwent an analogous merger in Island Carib, to a single back unrounded vowel; in modern Kari'nja, the high back unrounded vowel survived unchanged, but the mid back unrounded vowel /ë/ became rounded in all environments and thereby underwent an unconditional merger with *o.

Finally, we have to link up early Kari'nja *ë to proto-Cariban *ô. To test this connection, we added as many Island Carib and Garifuna cognates as possible to our Cariban cognate sets in Appendix 2. The resulting correspondences, presented in Appendix 1, show that, although we were unable to find clear evidence for the actual Island Carib vowel in most cognates, in the handful of cases where we have such evidence (whether from Taylor's decoding of Breton's Island Carib orthography or from Taylor's modern Garifuna data) the reflex of Proto-Cariban *ô is the unrounded back vowel. Thus, the outcome of this experiment confirmed our expectations: where we have evidence, early Kari'nja *ë is the continuation of Proto-Cariban *ô. We summarize these changes in Table 3.

Table 3. Proto-Cariban (PC) > Early Kari'nja (EK) > attested languages

PC	EK	Kari'nja	Island Carib	Garifuna
*u	*u	*u*	*u* [u~o]	*u* [u~o]
*o	*o	*o*	*u* [u~o]	*u* [u~o]
*ɨ	*ï	*ï*	*ï* [ï~ë]	*ï* [ï~ë]
*ô	*ë	*o*	*ï* [ï~ë]	*ï* [ï~ë]

4.2. *ô > *a* before and since Early Kari'nja

In the opening sentence of §3.2 (and again in the opening paragraph to §4), we presented the somewhat simplistic categorical statement that the loss of *ô in present-day Kari'nja was due to its merger with *o*. However, prior to this generalized merger was another, more restricted

merger, in which a subset of Proto-Cariban *ô > *a*. In §4.2.1 we describe a morphonological alternation of /a/ and /o/in the Tïre'wuyu dialect of Maroni and Mana Rivers that synchronically continues to manifest *both* shifts. In §4.2.2 we present lexical data from the old printed sources, which suggest a possible shift from *ë > a > o. And prior to both of these shifts was the shift mentioned briefly at the end of §3.3, in which both Island Carib and Kari'nja share a number of words in which *a* is the reflex of Proto-Cariban *ô in initial position. Given that all modern Kari'nja dialects and the borrowed lexicon in Island Carib share the same reflex, we presume that for these words, the shift from *ô > *a* must have happened between Proto-Cariban and Early Kari'nja (cf. Appendix 3).

4.2.1. Morphonological alternations in the Tïre'wuyu dialect of Kari'nja: a ~ e, o ~ e, a ~ o.

The Tïre'wuyu dialect differs from the other Kari'nja dialects in Suriname by the occurrence of /a/ (instead of /o/) in prosodically weak first syllables.[8] Where syllables are prosodically strong, /o/ occurs in all dialects, and ablaut changes *ô > e the same in all dialects. The paradigms in (1-4) illustrate, (1) and (2) with nominal, (3) and (4) with verbal examples.

	Tïre'wuyu	**Other dialects**	**gloss**
(1)	*ar**e**mi*	*oremi*	'spirit song'
	*k-a**r**e**e**mi-rï*	*k-oremi-rï*	'our spirit songs'
	*y-**e**remi-rï*	same	'my spirit song'
	*Ø-er**e**mi-rï*	same	'his spirit song'
(2)	***om**bata*	same	'face'
	*k-**om**bata-rï*	same	'our faces'
	*y-**em**ba-tarï*	same	'my face'
	*Ø-**em**bata-rï*	same	'his face'
(3)	*am**a**-no*	*oma-no*	'way of life'
	*k-am**ai**-ya*	*k-omai-ya*	'we live, dwell'
	*y-**e**mai-ya*	same	'I live, dwell'
	*Ø-em**a**mï-rï*	same	'his living, dwelling'
(4)	***om**bakano*	same	'waking up, transitive'
	*k-**om**bakae*	same	'you wake me up'
	*y-**e**mbakano*	same	'he wakes me up'
	*kïn-**e**mbakano*	same	'he wakes him up'

[8] Diphthongs and vowels followed by a consonant coda count as strong. Another source of strength is a general prosodic rule, which imposes either an iambic or a trochaic pattern on the first two syllables of words, starting from the left. In the western dialects, in the first foot this prosodic strength is phonetically realized only by quantity. The Tïre'wuyu dialect, however, also differs in *this* respect. In the first foot, too, strong prominence is primarily due to melodic rises or falls (Hoff 2000, unpublished ms). In the following examples, we shall indicate prosodically strong vowels by bold font.

In all four examples, most dialects show the standard outcome of the old *o* ~ *e* ablaut process; however, in Tïre'wuyu, only the vowels in heavy syllables (2, 4) show the *o* ~ *e* alternation, whereas the vowels in light syllables (1, 3) instead show an *a* ~ *e* alternation. Both pairs, of course, continue the same historical ablaut process, but the Tïre'wuyu dialects show a prior change of unstressed *ë > *a* before the unconditioned merger of *ë > *o*.

To witness an alternation *a* ~ *o*, we must exclude ablaut by avoiding fronting prefixes. To this end, we choose one verb from an intransitive subset that employs only non-fronting prefix allophones. It is a derivation by means of the intransitivizer prefix, reconstructed to Proto-Cariban as *ôte-, with reflexes of *at-* in Island Carib, Tïre'wuyu and Venezuelan Kari'nja (Mosonyi 1978.61), but as *(w)ot-* in the other dialects of Suriname (Hoff 1968.122-4). See Table 4.

Table 4. The intransitivizer prefix *at-/(w)ot-*

	ISLAND CARIB	TÏRE'WUYU DIALECT	OTHER DIALECTS
'he propelled himself'	*n-at-alima-i*	*n-at-arima-i*	*n-ot-arima-i*

The paradigm in example (5) shows that the vowel in the prefix remains *a* as long as it is prosodically weak, by being in the first syllable of the first, iambic, foot. When further prefixation (in the fourth example) pushes it into the strong position, *a* is replaced by *o*. Note that in the other dialects /a/ does not occur at all in the same prefix.

(5)	**Tïre'wuyu**	**Other dialects**	**gloss**
	*at-**a**rima*	*wot-arima*	'propelling oneself'
	*w-at-**a**rima-i,*	*Ø-wot-arima-i*	'I propelled myself'[9]
	*n-at-**a**rima-i,*	*n-ot-arima-i*	'he propelled himself'
	*kï-n-**o**t-arima-no*	same	'he propels himself'

4.2.2. The path from *ô to *a* in the lexicon.

As seen in Appendix 3, several languages present *a* as the reflex of Proto-Carib *ô when it occurs in the (unstressed) first syllable. The agreement of Island Carib, Garifuna, and all dialects of modern Kari'nja allow us to posit that Early Kari'nja was one such language. However, in considering more closely the data from Breton's dictionary with the equivalents in modern Kari'nja of Surinam, we found other cases in which an *a* of Island Carib coincided with an *o* in modern Kari'nja, as well as other anomalous correspondences that might represent modern reflexes of Proto-Cariban *ô. This section is dedicated to an exploration of these anomalous correspondences.

Presumably, changes towards /a/ have left few traces in the present language. From the written sources, however, one may gain the impression that in the past the frequency of *a* from *ô has been higher. We believe that this impression in most, though not all, cases would be incorrect. With the intention to gain more insight into what historically may have happened, we

[9] Suffixation with *-i* expresses involvement mode, *-no*, in the next example, the unmarked (present) tense.

bring together a number of words that in the modern language of Surinam all contain one or more *o*'s (cf. the last column in Tables 5-6, next-to-last column in Table 7), corresponding to what one or two old sources wrote as either *e* or *a*.

Tables 5-7 each present data from Island Carib, Carib Pidgin, Modern Kari'nja as spoken in 1655, and Modern Kari'nja as spoken in 1955. One major divide separates the first two columns (both reflecting a contact language that used Early Kari'nja as a lexifier) from the third and fourth columns (representing different historical stages of direct descendents of Early Kari'nja). A second major divide separates the first three columns (all 17th-century sources of questionable reliability) from the fourth (a reliable modern source). Within the Kari'nja language itself, Pelleprat's (1655) materials indicate that the merger of *ô > o was already nearing its completion. But the two contact languages on the left, though recorded at nearly the same time, reflect the forms of the words as they were many centuries earlier, when the Pidgin took its lexical material from Early Kari'nja and thereby was cut loose from further developments within that language (Boyer 1654, Biet 1664). Basing himself on archeological evidence, Boomert (personal correspondence) estimates the beginning of widespread intertribal trade in the Caribbean area, and –with it– the formation of the Pidgin, at a period between 500 and 800 AD. [10] The divide between the Pidgin and its lexifier language became still steeper when the latter was incorporated into the Arawakan Island Carib language, perhaps 2-3 centuries before the arrival of Colombus.

[10] Personal communication. Boomert relates the beginning of intertribal trading to the Koriabo pottery complex that appears in the Guiana's at an estimated date between 500 and 800 AD. "Koriabo pottery is found all along the coast of the Guiana's, and it is also richly represented in the interior. Shards of traded pottery have been found even in the lower reaches of Orinoco R. In Brazilian Guiana and on Oyapock R. a different but closely related pottery complex is found. Therefore we may safely surmise that this whole area was in constant interaction, in any case along the coast. This also applies to the relations between the coastal area of the Guiana's and the Windward Islands. As a contact language presupposes relations between Indians of various linguistic backgrounds, I believe that a contact language based on Carib should date from the late pre-historic period, say from between 500-800 AD" (see also Boomert 1995).

Table 5. Clear reflexes of *ô in early and modern stages of Kari'nja

		ISLAND CARIB, 1655	PIDGIN LISTS, 1654-1664	MODERN KARI'NYA, 1655	MODERN KARI'NYA, 1955
1	pig (peccary)	boinkê	poingé, poinga, poingo	poincо	poingo
2	fart	i-bikê-li	piqua	—	piko
3	flea	chicke	(Dutch sika)	chíco	siko
4	stone	tebou	—	tóbou	topu
5	woman	oüélle	oüali	oüori	worïi
6	you	amánle	amoré	amóro	amoro
7	moon	nónum	nouna	noûno	nuno
8	who	anaki	anakè, anac, nec	nóke, anóke	nokï
9	come!	akeu	ac-né	occó-né	ohko ne
10	how many	átêli	—	óttoro	ohtoro
11	cut	ch-ackeuta-é	—	—	s-akoto-ya
12	you came	mábouica			mopïi ko
13	sleep	aónikay	nanegué	—	no'nïkïi
14	star	chiric	serica, sirica	sirícco	siriko
15	He	—	inali	—	inoro
16	snake	—	acoïou	—	okoyu
17	toad	—	balalou	—	pïroru

In the three columns that are based on the old written sources the original spellings have been retained. Only Breton made an attempt to distinguish the unrounded back vowel /ë/ from /e/ (as discussed in §4.1) by rendering it either as a digraph *eu* (items 9 and 11) or as *é* (items 1, 2, and 10). Where these unique graphemes are lacking, we still identify *e* or *é* as /ë/ when it follows *oü* (item 5) or when it takes part in the historical developments towards *a* and *o* (the remaining underlined *e* or *é* in 3, 4 6,, cf. also Appendices 2-3). Additionally, we see a few cases in which Breton appears to represent /ë/ via digraphs that would have yielded a centralized nasal vowel in French: *an* (6) and *um* (7). However, even after resolving these orthographic convolutions, we remain with a residue of cases (8-13), in which Breton transcribed *a* for what the comparative record (and the outcome in Modern Kari'nja) tells us should have been the phoneme /ë/.

Looking now at the two middle columns, we can see that Boyer and Biet's Pidgin data shows, if anything, more cases of *a* than Breton's IC, whereas Pelleprat's contemporary Kari'nja words show the same *o* as Hoff's modern data. Table 6 offers another 9 potential modern reflexes of *ô—wherever a Kari'nja /o/ corresponds to an *e*, *a*, etc. in IC we add them to this table, even though there is no evidence for the status of the vowel in the larger comparative Cariban picture.

Again, we find IC *e* (1-3), and *a* (4-6) corresponding to Kari'nja *o*, and once again, the Pidgin list shows nearly all *a* for these correspondences; here, Pelleprat's 1655 Modern Kari'nja data are missing most cognates, with only one case of *o* (3) to match those in Table 5 and an anomalous case of *e* (1).

Table 6. Possible reflexes of *ô in early and modern stages of Kari'nja

		ISLAND CARIB, 1655	PIDGIN LISTS, 1654-1664	MODERN KARI'NYA, 1655	MODERN KARI'NYA, 1955
1	angry	tere-coù	tari-qué, teri-qué	téle-ké	toreh-ke
2	family	eme-ri	ï-amo-ri	—	omorï
3	wind	Bebéite	epepeita	bebeíto	pepeito
4	shiver	Ticámain	tigaminé	—	tïko:mïine
5	modal particle	Ála	—	—	oro
6	water-spirit	acáyouman	—	—	oko:yumo
7	day after tomorrow	—	(a)manicoropo	—	monïngoropo
8	thievish	—	manamé	—	moname
9	long	mouchí-pe	manci-pe, mosim-bè	—	mansi-pe mo:si:-pe

Finally, we have three anomalous cases, presented in table 7. Two clear reflexes of Proto-Cariban *o present unrounded reflexes in Island Carib: 'beer' presents the sequence *oue* /uë/, which is confirmed to be the unrounded back vowel by its Garifuna cognate *uïgu*, and which also presents a correspondence of *a* in the Pidgin; 'cashew' presents the expected reflex *ou* /u/, but alongside it also the unexpected *á*. 'Bullet" presents a still more interesting story, in which the final vowel of the Spanish loanword *pelota* is borrowed into both the Pidgin and Modern Kari'nja, as *e* (presumably /ë/) in the Pidgin, but as *o* in Modern Kari'nja.

Table 7. Parallel correspondences that are not reflexes of *ô

		ISLAND CARIB, 1655	PIDGIN LISTS, 1654-1664	MODERN KARI'NYA, 1655	MODERN KARI'NYA, 1955	Proto-Cariban
1	beer	Oüecou	oüacou	oúocou	woku	*woku
2	cashew	oúloüi, áloi	—	—	oroi	*oroi
3	bullet		piroté	piróto	pïroto	pelota (Sp)

How do we account for the patterns that involve *a* in Island Carib and in the Pidgin? First, are we forced to accept another wave of unconditioned sound change, in which /ë/ > /a/? Second,

especially given the case of Spanish /a/ being borrowed into Modern Kari'nja as /o/, is it possible that /a/ might have served as a stepping-stone in the change from /ë/ to /o/?

Turning to the first question, we must consider whether we accept Breton's, Boyer's and Biet's transcriptions as accurate. For Boyer and Biet, it seems clear that they did not hear the vowel /ë/, possibly because the distinction did not survive so late into the Pidgin, but more likely because they (like the Jesuits working on Tamanaku and Kumaná) simply mistranscribed /ë/ as *a* or *e*. In support of the mistranscription position, note that the final vowel of *pelota* would almost surely have been borrowed into the Pidgin as either /a/ or /ë/ (the two available back unrounded non-high vowels); the *é* that is recorded could not represent a front vowel, and so must represent /ë/. Since Breton did have graphemes dedicated to /ë/, obviously he could hear the distinction at least sometimes; yet his use of *an*, *um*, and (unmarked) *e* suggests that he sometimes confused the distinction, and it is not unreasonable to assert that some cases of *a* might be similarly confused renditions of /ë/. On the other hand, Breton lived for many years among the Island Carib and spoke their language. What is more, in the two cases where Taylor provides a modern Garifuna form, the *a* in Breton is confirmed: (6) from Table 6, *a̲ca̲youman*, is confirmed by modern Garifuna *a̲ga̲iumau* 'water spirit', and (12) from Table 5, *ma̲bouica̲* 'you came' is confirmed by Garifuna *ma̲buiga̲* 'so you have come'. We are forced to conclude that at least some portion—and perhaps all—of these anomalous *a*'s in Breton are the outcome of an unconditioned sound change, /ë/ > /a/.

However, even accepting the existence of /ë/ > /a/, we still find it difficult to believe that an /a/ in Island Carib or Pidgin could represent a transitional stage between /ë/ and /o/. In terms of articulation, even if we assume that lowering of /ë/ produced a temporary second low vowel phoneme, back /ɑ/ (distinct from front /a/), which could then change to /o/, this quite a labor-intensive way to get from point a to point b, when simply adding lip rounding to /ë/ could do the job (cf. §5). We prefer to assume that Frenchmen dealing with the Pidgin speakers identified the /ë/ of their Amerindian counterparts with the low back unrounded phoneme /ɑ/ of French (their own language),[11] and accordingly used the grapheme *a* for both /a/ and /ë/. If the Amerindians also shared the assumed equivalence ("ë of the Amerindians = ɑ of the Europeans"), then we have an explanation for what happened to borrowed Spanish 'bullet': it must have independently started both its Pidgin and its Kari'nja careers as *perotë* (written *piroté* by Biet); in Kari'nja, it must have been among the last of the Kari'nja lexicon to contain a /ë/, which soon followed the rest of the phonemic category (the reflexes of *ô) in becoming /o/. Mosonyi has a few more entries with /a/ where Suriname Kari'nja has /o/: *akoðu* 'snake' (see *acoïou*, *okoyu* in 16 of Table 5); *amɨða* 'beauty', for Suriname Kari'nja *omïya*. Presumably, the variants are the outcomes of independent shifts, which happened after the geographical separation of the Venezuelan and Surinamese dialects.

The cognates in Tables 5 and 6 also appear to give evidence for different stages of the wave in which *ë > o. Already in the very early period when the Pidgin was collecting vocabulary from Kari'nja, the wave must have started. For example, in the Pidgin most reflexes of *ô are *e* or *a*, but some *o* can also be seen: the second vowel of 'you' (6 of Table 5) and one variant of the final vowel of 'pig' (1 of Table 4); in Island Carib, the first root vowel of 'sleep' (13 in Table 5). In 'long' (9 of Table 6), *a* and *o* appear to have alternated through the centuries. *Mansipe* was noted down by Ahlbrinck (1931:271); the same form is also found for modern Venezuelan Kari'nja (Mosonyi 1978:30).

[11] Dutch and Spanish speakers may have done the same.

We conclude with a final anomaly from Island Carib: the Proto-Cariban item *arô 'take, carry' appears in Island Carib with two variants, the expected *alee* (presumably = *alë*) and the surprising *eulê* (= *ëlë*). This latter form remains a puzzle.

5 Towards determining the the phonetic value of Proto-Cariban *ô

At this point, it should be obvious that Proto-Cariban *ô was an unrounded mid vowel—the only question is whether is was back /ë/ or central /ə/. In the first place, neither candidate can be excluded on general grounds. The mid unrounded back vowel is rare in the languages of the world and also peripheral typologically, but it is still found to exist in Scottish Gaelic and in Vietnamese (Ladefoged 2005: 178-179; Ladefoged & Maddieson 1996: 293). The central vowel is quite common, and while in some languages it is restricted to prosodically weak syllables, there are others where it functions on a par with the other vowels, for instance in Okanagan and in UK English (Jones 1960: 88-91). In this section, we make the case for each of these alternants, beginning with /ə/.

In favor of /ə/, we put first the number of modern descriptions that have identified the modern reflex of *ô as a schwa. Although the practical orthographies generally utilize symbols like ë and ö, the articulatory descriptions that accompany them generally describe the vowel as central. Similarly, most descriptions of modern reflexes of the corresponding high vowel, *ɨ, describe it as central rather than back. Meira's (in press) acoustic analysis of the F1 and F2 of Tiriyó /ə/ and /ɨ/ confirm that they are both more central relative to the pair of back vowels, /u/ and /o/. To the extent that future acoustic studies confirm a parallel result in other languages with the seven-vowel system, the principle of parsimony would guide us towards reconstructing two central vowels. However, two-dimensional plots of formant frequencies alone are insufficient to determine the nature of vowel systems that combine the dimensions front - back and spread - round (Ladefoged 1971: 74).[12] Once again, the comparative enterprise is dependent upon increasingly sophisticated field work, including the instrumental study of articulation. Given that the community of field workers in the Cariban language family continues to produce increasingly sophisticated and reliable phonetic studies, there is some hope that we can return to this question a few years down the road. But even if we were to have incontrovertible phonetic data for all languages, the degree of precision of the descriptions of the modern languages (Kari'nja, Garifuna, Tiríyo) is only marginally relevant to the phonetic value of the proto-vowel. Original values may survive, but they may undergo change as well.

In favor of /ë/, there are a number of modern descriptions that place the modern reflex of *ɨ as an unrounded high **back** vowel, including for Kari'nja (Hoff 1968), Hixkaryana (Derbyshire 1985), and Garifuna (where the unrounded back vowel alternates between high and mid). If the unrounded high vowel were to reconstruct as back rather than central, then by analogy this would make more likely the reconstruction of the unrounded mid vowel as back. But rather than rely solely on numbers, in favor of this position we can add an argument that follows from the phonetic properties that would create a disposition for the mergers with four other vowel phonemes, resulting in its ultimate disappearance. Starting from the unrounded mid back vowel /ë/, all four mergers could come about by the change of just one phonetic feature: fronting produced /e/, lowering produced /a/, raising produced /ɨ/ or /ï/, and rounding produced /o/. To realize the merger with /a/ both vowels presumably are equally suited: lowering will do. For

[12] In essence, F2 is lowered not only by greater backness in tongue position, but also by lip rounding. This introduces a confounding variable to explanations for relative F2 values, such that in a contrast between rounded and unrounded vowels, even if the tongue position is held constant, the F2 of the unrounded vowel will be higher, making it plot acoustically as more central. Thus, acoustic measures do not allow us to identify what portion of the change in F2 is due to rounding and what portion to tongue advancement.

the merger with /ɨ, ï/, both vowels are equally well-suited (assuming parallism between the high and mid unrounded vowels): the central /ə/ would raise to the central /ɨ/ or the back /ë/ would raise to the back /ï/. For the merger with /e/, both vowels need to move in the same direction: forward. Our impression is, however, that fronting of back vowels is a more natural change than fronting of central vowels. For the merger with /o/, the back vowel only has to lose its atypical unroundedness. The central vowel, on the other hand, has both to acquire rounding and to move backwards: a complicated change, and therefore less likely to end up in a disappearance by merger (Labov 1994:327-329). This fact puts *ə at a disadvantage, except in those languages where the merger with /o/ did not happen and instead /ə/ is found. For these languages the other candidate, *ë, needs an extra change from back to central. This change, however, is less complicated than the combined change (backing, rounding) needed to move from *ə* towards /o/.

The simplicity of the four changes, each involving only a single feature, should increase the likelihood that the changes would result in mergers, as did happen—rather than in the emergence of new vowels, as otherwise might have happened. For in another respect the conditions for the preservation of the phonological distinction were favorable: there was ample room in phonetic space for distinctions like e versus ɛ, o versus ɔ, a versus ɑ (cf. Labov 1994:327-329).

So we conclude that *ô certainly was an unrounded mid vowel, more likely back than central.

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