

ORIGINS OF NORTHERN COSTANOAN *fak:en* ‘six’:
A RECONSIDERATION OF SENARY COUNTING IN UTIAN¹

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Proto-Costanoan numerals for ‘one’, ‘two’, ‘three’, and ‘six’ are reconstructed by Callaghan (1990), leading her to suggest that Proto-Costanoan may have had a senary (base 6) counting system, as originally proposed by Beeler (1961a). This paper suggests (i) that Northern Costanoan **šak:en* ‘six’ is a loan from Proto-Eastern-Miwok **šak:en* ‘six’; (ii) that, though there is little evidence for a senary counting system in Costanoan, there is evidence for base 6 counting in Eastern Miwok, from which, it is argued, the term *fak:en* ‘six’ was borrowed into Northern Costanoan and northern Yokuts; and (iii) that Proto-Eastern-Miwok **šak:en* ‘six’ is a derived form of the Proto-Eastern-Miwok stem **šok:e-*, **šyk:e-* ‘all, whole, everything’, lending further support to a senary count within this subgroup of Miwok. Under this analysis, only the numerals ‘one’, ‘two’, and ‘three’ are reconstructible for Proto-Costanoan. This parallels Callaghan’s (1994) findings for Miwok, suggesting a restricted numeral system for Proto-Utian as a whole.

[KEYWORDS: Proto-Costanoan, senary numeral systems, restricted numeral systems]

1. Senary counting in Costanoan? Costanoan and Miwok are two families of Central California languages. There is mounting evidence of a distant genetic relationship between these two families, with the mother language referred to as Utian, after Proto-Utian **?oʔi* ‘two’ (Callaghan 1982; 1983; 1986; 1988).

Beeler (1961a) suggests that the borrowing of numerals for 7, 8, 9 from Coast Miwok into Northern Costanoan is evidence of a senary or base 6 counting system in Costanoan. Beeler’s argument for this senary system in Costanoan is twofold: first, he argues, only numerals 1–6 were elicited by Kroeber for San Jose (Chochenyo) Costanoan; second, a count ending at 6 would explain why the numerals 7, 8, and 9 were borrowed from Coast Miwok into Northern Costanoan. Note that Beeler’s argument is actually not that there was a base 6 system in Costanoan, but that the count simply STOPPED at six. He offers no evidence that, for example, higher numerals were expressed with base 6 in any Costanoan language.

¹ Many thanks to Victor Golla, Jon Rodney, Andrew Garrett, and an anonymous referee for comments and criticisms on earlier versions of this paper which resulted in a recasting of the problem, and a novel solution. I am also grateful to Bernard Comrie for correspondence on restricted numeral systems and the difficulties inherent in reconstructing them. Additional thanks to Jon Rodney for editorial and bibliographical assistance.

Beeler's arguments for a limited 1–6 count are weakened by additional evidence. First, Kroeber's consultant for Chochenyo was Maria de los Angeles Colos, the same consultant interviewed by Harrington in 1929–30 (Kroeber field notes, 1904, 1909; J. P. Harrington field notes, 1921, 1929–30). In Harrington's elicitations, Colos provides words for numbers 1–10 as well as 20 and 30. Second, the word for 'ten' in Northern Costanoan in Harrington's Chochenyo, Curtin's Niles vocabulary, and Henshaw's Santa Clara and Santa Cruz word lists (Heizer 1955) is *'iwes*, *?iwef* from the verb stem *?iwe-* 'to finish, to end'. That this served as a base for higher numerals is supported by Harrington's Chochenyo *?u?hin ?iwef* 'twenty, literally two ten' and *kaphan ?iwef* 'thirty, literally three ten'. Finally, if, as Beeler suggests, the Costanoan count was originally limited to 1–6, why, in Callaghan's (1990) careful study of Proto-Costanoan numerals, is it only possible to reconstruct numerals for 'one', 'two', 'three', and 'six'? What happened to 'four' and 'five'?

The following section outlines an alternative history where Northern Costanoan **?saken*: 'six' is a loan from Proto-Eastern-Miwok **?sak:en* 'six', where there was a senary count. This is supported by the fact that at least two Eastern Miwok languages show evidence of a base 6 in higher numerals and by a plausible etymology for Proto-Eastern-Miwok **?saken* 'six' from the stem **?yok:e-*, **?yke-* 'all, whole, everything'.

Transcriptions from primary sources cited in running text are italicized and enclosed in angle brackets (<>); transcriptions from primary sources in examples and tables are italicized. All other transcriptions are in the International Phonetic Alphabet.

2. Senary counting in Eastern Miwok? I follow Callaghan (1994) in subgrouping the Miwok languages into Eastern and Western groups. The Eastern group includes Sierra Miwok (Northern, Central, and Southern), Plains Miwok, and Bay Miwok, while the Western group includes Coast Miwok (Bodega, Marin) and Lake Miwok.

Though there are no Miwok languages where *?sak:en* 'six' occurs as a simple numeral, both Northern Sierra Miwok and Central Sierra Miwok show higher numerals where this form occurs as a base 6. These numerals are shown in boldface in (1).

(1) Higher base 6 numerals in Eastern Miwok languages?

	2	12	3	18
N. Sierra	<i>?o?i:ko-</i>	?o?ik-sake:n-y-	<i>tolo:kos-u-</i>	<i>tak-cakena</i>
		?o?ik-sake:n-u-		/tak-?aken-a/

C. Sierra	ʔoʔi:ko-	ʔoʔik-ʂake:n-y-	tolo:koʂ-u-	<i>naatca mu kawinta</i>
S. Sierra	ʔoʔi:ko-	naʔa:caʔ ʔoʔi-ʔ:yni-ʔ	tolo:koʔ	—
Plains	ʔo:jok:o-	ʔojkop:a-	tel:ok:o-	—
Bay	<i>ohuothro</i>	—	<i>tolocothro</i>	—
	<i>ʔʔowoʔol</i>		<i>ʔtolokoʔol</i>	

All Northern Sierra Miwok forms are from Callaghan (1987), with the exception of ‘eighteen’, which is from Dixon and Kroeber (1907:680). All Central Sierra Miwok forms are from Freeland and Broadbent (1960), with the exception of ‘eighteen’ which is also from Dixon and Kroeber (1907:680). Southern Sierra Miwok data are from Broadbent (1964), Plains Miwok data are from Callaghan (1984), and Bay Miwok (Saclan) forms are from Arroyo de la Cuesta’s (1821) word list. In Appendix A, numerals from all Eastern Miwok data sources consulted in this study are compiled, with forms reflecting **ʂak:en* ‘six’ in boldface.

Callaghan (1994) analyzes the Northern and Central Sierra Miwok words for ‘twelve’ as composed of the morphemes *ʔoʔik-* ‘two’, *sak-* ‘continuative?’ plus *e:n-y-* ‘agentive’. This appears to be the only Miwok number word with a continuative suffix, and certainly the only one with continuative followed by agentive. Given that a near-identical sequence *ʂaken* shows up in Northern Sierra Miwok ‘eighteen’, and that both twelve and eighteen are multiples of six, I suggest that *sake:n*, *ʂake:n*, *ʂaken* in the number words in (1) reflect Proto-Eastern-Miwok **ʂak:en* ‘six’ or ‘all’ (of count). The numeral ‘twelve’ is literally ‘two-six’ (2×6), while ‘eighteen’ may be literally ‘three-six’ if *tak-* is interpreted as a shortened, reduced form of *tolook-* ‘three’.² The numeral 24 is not recorded for any Eastern Miwok language, while 18 is unattested for Southern Sierra Miwok, Plains Miwok, and Bay Miwok (Saclan). In this last language, there is no record of any numeral above ten.

Northern Sierra Miwok also has *lus:ak:e:nu-* ‘eleven’, where initial *lu-* looks like truncated *luti* ‘one’. Comparing ‘eleven’ and ‘twelve’ makes it look like *sak:en* could also mean ‘ten’ or ‘all’. This is true in Central Sierra Miwok (also known as Tuolomne Moquelumnan) too, where *tolok-sakenu* is recorded for ‘thirteen’ by Dixon and Kroeber (1907:680). In sum, there is evidence from higher numerals in Eastern Miwok for a numeral formative **ʂak:en* meaning ‘six’, ‘ten’, or ‘all’.

Within Eastern Miwok, there is a plausible etymology for **ʂak:en* ‘six’, ‘ten’, or ‘all’ which associates it with the end of the count. The stem **ʂak:e-*

² The same short form may occur as the last element in “Huimen” Miwok (Arroyo de la Cuesta) <*patithrac*> ‘six’ (2–3) and Bodega Bay Miwok *patʔitʔak* ‘six’.

appears to be a variant of Proto-Eastern-Miwok **sok:e-*, **syk:e-* ‘all, whole, everything’ plus final *-n*, which could be an adverbial or verbal marker. Comparative data are shown in (2).

- (2) Proto-Eastern-Miwok **sak:en* ‘six’ < **sok:e-*, **syk:e-* ‘everything’ + *-n*

Northern Sierra Miwok: *sok:e* ‘things, everything’, *sok:et:i* (N. dim.)
 ‘all, everything, the whole, every’

Central Sierra Miwok: *fok:e* ‘all’, *suk:e-* ‘all’

Plains Miwok: *syk:e-* ‘all, everything, the whole’

The *a/o,y* vowel difference in the initial syllable of reconstructed forms in (2) has parallels in modern languages, where *a/o* and *a/y*, and *o/y* stem variants occur. Compare, for example, Northern Sierra Miwok *te:py-*, *tep:a-* ‘to cut off’, *ka:le-* ‘phlegm’, *kol:e-* ‘to cough up’; Central Sierra Miwok *low:a-*, *lowo:-t-* ‘to boil’, *lep:a-*, *lepy:t-* ‘to finish’, *pot:a-* ‘to grind’, *paṭ:a-* ‘grinding stone’; Southern Sierra Miwok *jyka:-t-* ‘to shake’, *jakak:ak:-* ‘to have the shakes’; and Plains Miwok *sala:k-y-*, *syla:k-y* ‘to row, to stir’, *tanuk:a-*, *tonuk:a* ‘bow’, *kawakso-*, *kawaksy-* ‘eel’.

Positing Proto-Eastern-Miwok **sak:en* ‘six’ requires an explanation for modern words for ‘six’ in Eastern Miwok languages, illustrated in (3).

- (3) Words for ‘six’ in Eastern Miwok languages

Northern Sierra Miwok	tem:ok:a
Central Sierra Miwok	tem:ok:a
Southern Sierra Miwok	tem:ok:a
Plains Miwok	tem:epu
Bay Miwok(Saclan)	<i>jesmuhi</i> /hesmuy/, /hesmu’i/?

With the exception of the Bay Miwok form, all of these words for ‘six’ appear to be based on a stem *tem:e-* ‘big’ (cf. Plains Miwok *teme-*, *tem:e-* ‘big’) or possibly a stem *tem:V-* meaning ‘to trade; to go across’ (cf. N. Sierra Miwok *tema:l-y-* ‘to trade’, *teme:N-y-* ‘to cross, to go across’, *tem:a-* ‘to strike back, get even’; S. Sierra Miwok *tema:l-* ‘to exchange’), which could refer to the switch of hands which occurs between five and six. Since, in both cases, *tem:ok:a* has a plausible Eastern Miwok etymology, it could well be an internal Eastern Miwok form which co-existed with **sak:en* ‘six’ or which replaced this form once the count was extended or, in some languages, was restructured as a decimal system.

The evidence in (1) and (2) weakly suggests a senary counting system in Proto-Eastern-Miwok in words for ‘twelve’ and ‘eighteen’. The only other

northern central California language where a higher numeral is claimed to be expressed as a multiple of six is “Northerly Wintun” as recorded by Barrett (1908:85–86), where the word <*tcansēm*> means both ‘five’ and ‘thirty’.³ Beeler’s (1961*a*) view of this as a possible senary count might be further supported by Barrett’s recording of <*panōL*> for ‘three’ and ‘eighteen’, where an unexpressed factor of six might indicate the default base. However, there are two weaknesses in this argument. First, Barrett records <*panōL*> ‘twelve’ as well, where the unexpressed factor would be four. Second, Pitkin’s (1985) extensive lexicon of Wintu shows two closely related words: *panuλ* ‘three’ and *panu:λ* ‘many’. It is quite possible, especially in light of Barrett’s failure to distinguish long and short vowels in these forms, that higher numerals elicited by Barrett which were not multiples of five were simply translated as ‘many’.

In 3 below I suggest that Proto-Eastern-Miwok **šak:en* ‘six’ was borrowed into both Northern Costanoan languages and into far northern Yokuts dialects. This differs from the position of Callaghan (1990), who reconstructs Proto-Costanoan **šak:en* ‘six’, and from Beeler (1961*a*), who suggests that far northern Yokuts *saken*, *faken* ‘six’ is a borrowing from Northern Costanoan.

3. The spread of Eastern Miwok **šak:en* ‘six’.

3.1. To Northern Costanoan. I follow Beeler (1961*b*) and Callaghan (1988) in classifying Costanoan languages into three subgroups: Karkin; Northern Costanoan (including Chochenyo, and the languages of Santa Cruz, Santa Clara, and San Francisco Missions); and Southern Costanoan, including Mutsun and Rumsen. Callaghan tentatively classifies Soledad, the southernmost of the Costanoan languages, as Northern Costanoan. For the purposes of this study, Soledad is classified as Southern Costanoan, following Garrett (2002), although conclusions would be similar if it were treated as a Northern language, since it does not have any reflex of **šak:en* ‘six’.

The most reliable sources of data are the field notes of J. P. Harrington, where Mutsun, Rumsen, and Chochenyo speech is transcribed. Karkin, Soledad, and other Northern Costanoan languages (San Francisco, Santa Clara) are known only from short and sometimes unreliable word lists.

³ Pitkin’s (1985) authoritative Wintu dictionary has *c’ansem* ‘five’ (cf. *c’an* ‘half, side, one side, one-half’, *c’anseh* ‘one hand’), but two different forms for thirty, one with base 20 and the other with base 10: *k’ete wint^huh tigeles λomi* ‘literally one enumerable-unit ten add’, where *k’ete wint^huh* means ‘twenty’ and *panuλ tigeles* ‘literally three ten’.

Callaghan (1990) reconstructs the Proto-Costanoan numerals shown in (4).

(4) Proto-Costanoan numerals from Callaghan (1990:table 1)

(4a) *(h)im:en 'one, union'

(4b) *ʔoθhin 'two'

(4c) *kaphan 'three'

(4d) *ʂak:en 'six'

Callaghan's reconstruction in (4d) is based on two attestations: Chochenyo *fak:en* 'six' (from J. P. Harrington) and Rumsen *xali-fak:en* 'six' (from Alphonse Pinart), as published in Heizer (1952).⁴

There is little question that **fak:en* 'six' should be reconstructed for Proto-Northern-Costanoan. This is the form attested in all Northern Costanoan languages, from Father Vicente Santa Maria's journal pages, which record words from the 1775 Spanish naval expedition into San Francisco Bay, to later records from Chochenyo, Santa Clara Costanoan, and Santa Cruz. Attested words for 'six' in Northern Costanoan languages are shown in (5). From Henshaw's Santa Cruz word list there is also <*cak-kěn-i-yis*> 'sixteen' (literally 'six more') and <*cak-kěn'-i-wis*> 'sixty' and from his Santa Clara word list <*sak-ěn'-ni-wes*> 'sixty', both literally 'six ten' (Heizer 1995).

(5) Northern Costanoan words for 'six'

	As Recorded	Phonemicization	Source
Juichun	<i>sacken</i>	/jak:en/	Arroyo de la Cuesta
San Francisco	<i>saquen</i>	/jak:en/	Fr. Vicente Santa María
Chochenyo	<i>fak:en</i>	/jak:en/	Harrington notes
	<i>saken</i>	/jak:en/	Kroeber notes
Niles	<i>säkě'n</i>	/jak:en/	Curtin notes
Santa Clara	<i>shakén</i>	/jak:en/	Mengarini in Powers (1877)
	<i>sak-ěn</i>	/jak:en/	Henshaw (1884) in Heizer (1955)
	<i>caken</i>	/jak:en/	Kroeber (1910)
Santa Cruz	<i>šaken</i>	/jak:en/	Pinart (Costanoan III)
	<i>cak-kěn'</i>	/jak:en/	Henshaw (1884) in Heizer (1955)
	<i>saken</i>	/jak:en/	Comelius in Powers (1877)

⁴ Callaghan (1990:128) notes that when I. Meadows was asked about Rumsen *xali-fak:en* 'six', she guessed it should be *xale-šak:en*.

However, the situation is different for other branches of Costanoan. The Karkin word for ‘six’ recorded by Arroyo de la Cuesta is <*tanipos*>. And, as shown in (6), the range of words for ‘six’ in Southern Costanoan languages does not support reconstruction of **fak:en* ‘six’ for this subgroup.⁵ The stem is found only in Rumsen, where it is the second element of a compound numeral.

(6) Words for ‘six’ in Southern Costanoan

	Original		
Language	Transcription	Probable IPA	Source
Rumsen	<i>xali-šakken</i>	hali-ʃak:en	Pinart (1878)
Rumsen	<i>hale-caken</i>	hale-ʃak:en	Kroeber (1910)
Rumsen	<i>hāl-ǰ-räk ʻ-ǰn</i>	hali-ʃak:en	Henshaw (1884) in Heizer (1955)
Rumsen	<i>Hah-lā ʻ sah ʻ-ke</i> ⁶	hale-ʃak:e	Merriam (1906; 1933)
Mutsun	<i>nakitci</i>	nakitʃi	Arroyo de la Cuesta
Mutsun	<i>heennaktceei</i>	hin:aktʃi	Merriam (1906; 1933)
Mutsun	<i>nakči</i>	naktʃi	Harrington notes
Soledad	<i>imměnokši</i>	him:enokʃi	Pinart (1878) in Heizer (1952)
Soledad	<i>imin-ukca</i>	him:enokʃe	Hale in Kroeber (1910)

Differences in transcription systems, along with a possible error in Henshaw’s writing of *r* and possible omission of final /n/ by Merriam, allow us to interpret all Rumsen forms in (6) as transcriptions of *hāle-ʃák:en* ‘six’, with optional raising of final unstressed /e/ to [i]. Based on other Rumsen numerals, shown in (7), *hāle-ʃák:en* ‘six’ appears to be a compound of *hāle* + *ʃak:en*, where *hāle* is a reduced form of *?imhala* ‘one’. Under this analysis, suggested by Callaghan (1990:124), *hāle-ʻis* ‘five’ is literally ‘one hand’; in fact, in one of the earliest transcriptions of this word, *hali-izu* from the 1792 expedition of the Spanish schooners *Sutil* and *Mexicana* (Cutter 1990), the final etymological vowel from Proto-Costanoan **?is:u* ‘hand’ is recorded; the same vowel is also found in Rumsen *?is:un* ‘to get to be five’ (Miller 2000:485).

⁵ Recall that Soledad, the southernmost Costanoan language, is sometimes classified as a member of Northern Costanoan (e.g., Callaghan 1988 and Mithun 1999:535). With respect to the word for ‘six’, however, it patterns with other Southern Costanoan languages, having a form distinct from *fak:en*. On methods of reconstitution for poorly attested languages with specific reference to Rumsen, see Broadbent (1957).

⁶ Merriam also writes what appears to be a variant form where <*sah-ke*> is inserted after the word <*Hah-lā-ēs*>.

(7) Rumsen numerals 1–3 and 5–8

No.	Original Transcription	Probable IPA	Source
1	<i>enjalá</i>	ʔimhala	1792 expedition in Cutter (1990)
1	<i>imhala</i>	ʔimhala	Pinart (1878) in Heizer (1952)
1	<i>im´-ha-la</i>	ʔimhala	Henshaw (1884) in Heizer (1955)
1	<i>Eem´-^{ch}hah-Lah⁷</i>	ʔimxala	Merriam (1906; 1933)
1	<i>imxala</i>	ʔimxala	Kroeber (1910)
2	<i>ultis</i>	ʔuthis	1792 expedition in Cutter (1990)
2	<i>uthis</i>	ʔuthis	Pinart (1878) in Heizer (1952)
2	<i>u´-tīs</i>	ʔut:is	Henshaw (1884) in Heizer (1955)
2	<i>Oo´-tis</i>	ʔut:is	Merriam (1906; 1933)
2	<i>utis</i>	ʔut:is	Kroeber (1910)
3	<i>kappes</i>	kap:es	1792 expedition in Cutter (1990)
3	<i>kappes</i>	kap:es	Pinart (1878) in Heizer (1952)
3	<i>kăp´-pis</i>	kap:is	Henshaw (1884) in Heizer (1955)
3	<i>kah´-pis</i>	kap:is	Merriam (1906; 1933)
3	<i>kapes</i>	kap:es	Kroeber (1910)
5	<i>hali-izu</i>	hali-ʔis:u	1792 expedition in Cutter (1990)
5	<i>xali-is</i>	haliʔis	Pinart (1878) in Heizer (1952)
5	<i>hăl-ī-is</i>	haliʔis	Henshaw (1884) in Heizer (1955)
5	<i>Hah-Lā´-is´</i>	kap:is	Merriam (1906; 1933)
5	<i>hale-is</i>	haleʔis	Kroeber (1910)
5	<i>halaʔis:</i>	halaʔis:	Harrington notes
6	<i>hali-shakem</i>	hali-fak:en	1792 expedition in Cutter (1990)
6	<i>xali-šakken</i>	hali-fak:en	Pinart (1878) in Heizer (1952)
6	<i>hăl-ī-räk´-ěn</i>	hali-fak:en	Henshaw (1884) in Heizer (1955)

⁷ Merriam also writes variants of <Ēʔm-kah´-lah>, <Im´-hah-lah>, <Im´-^{ch}hah-Lah>.

6	<i>Hahi-lā' sah'-ke</i> ⁸	hale-fake	Merriam (1906; 1933)
6	<i>hale-caken</i>	hale-fak:en	Kroeber (1910)
8 [sic]	<i>ultumai-shakem</i>	ʔuthu-mai-fak:en	1792 expedition in Cutter (1990)
7	<i>učumai-šakken</i>	ʔuthu-mai-fak:en	Pinart (1878) in Heizer (1952)
7	<i>u-tū-mai-säk'-ĕn</i>	ʔuthu-mai-fak:en	Henshaw (1884) in Heizer (1955)
7	<i>Oo-troo-mi-sah-ken</i>	ʔuthu-mai-fak:en	Merriam (1906; 1933)
7	<i>utxomai-caken</i>	ʔuthu-mai-fak:en	Kroeber (1910)
7 [sic]	<i>kapkamai-shakem</i>	kapxa-mai-fak:en	1792 expedition in Cutter (1990)
8	<i>kapxamai-šakken</i>	kapxa-mai-fak:en	Pinart (1878) in Heizer (1952)
8	<i>kap-pa-mai-säk'-ĕn</i>	kap:a-mai-fak:en	Henshaw (1884) in Heizer (1955)
8	<i>Kahp-hah-misah-ken</i>	kap:a-mai-fak:en	Merriam (1906; 1933)
8	<i>hapxa-is-cak(k)</i>	kapxa-ʔij-fak(:)	Kroeber (1910)

While Callaghan (1990:129) maintains that the compound *hále-fák:en* ‘six’ must be interpreted as ‘one unit of six’, words for ‘seven’ and ‘eight’ show similar compounds with initial elements ‘two’ and ‘three’ respectively. The structure of Rumsen numerals 6, 7, and 8 then are parallel, with each of these compound numbers containing a first numeral 1, 2, 3 respectively, followed by the element *fak:en* (or in Kroeber’s *kapha-’if-fak*, a truncated form *fak*).⁹ Whatever the original meaning of *fak:en* and its source, in Rumsen, the 6–7–8 count is only consistent with *fak:en* meaning ‘five’, ‘all, whole’, or ‘the other hand’ (with the first part of the compound indicating how many fingers there are on ‘the other hand’), or something other than ‘six’, since combining 2 and 3 with 6 gives 8 and 9 respectively, not 7 and 8.

(8) 6–7–8 count in Rumsen and Soledad

	Rumsen	Soledad	
6	hale-fak:en	himmen-okʃi	1+x
7	ʔuthu-mai-fak:en	ʔuth-okʃi	2+x
8	kapha-mai-fak:en		3+x

The Rumsen 6–7–8 count is repeated in (8) and compared to Soledad, where 6–7 also appear to be compounds whose first elements are 1–2 respectively.

⁸ Merriam also writes what appears to be a variant form where <*sah-ke*> is inserted after the word <*Hah'-lā-ĕs*>.

⁹ The meaning of *mai* in Rumsen words for ‘seven’ and ‘eight’ is unknown. Miller’s (2000) “Partial Rumsen Dictionary” with over 600 pages of entries from Harrington’s notes does not contain numerals six, seven, or eight, or any formative similar to *-mai*.

The shift in meaning from Proto-Northern-Costanoan **fak:en* ‘six’ to Rumsen *fak:en* ‘five’, ‘all, whole’, or ‘other hand’ is consistent with **fak:en* ‘six’ originally being limited to Northern Costanoan languages and then borrowed later into Rumsen with a different interpretation.¹⁰

Other Southern Costanoan languages do not show evidence of reflexes of **fak:en* ‘six’. Soledad *himmenokfi* ‘six’ appears to have an initial element *himmen* ‘one’, parallel in form to the Rumsen word for six, while Mutsun *nakitci* ‘six’ looks like a shortened form of the longer Soledad word, without the initial two syllables.¹¹

In sum, an apparent shift in meaning between Northern Costanoan **fak:en* ‘six’ and Rumsen *fak:en* along with the limited distribution of *fak:en* in Southern Costanoan languages suggests that **fak:en* ‘six’ was originally limited to Northern Costanoan languages and borrowed later into Rumsen.¹² On this basis, **fak:en* ‘six’ is not reconstructed for Proto-Costanoan.

3.2. To Far Northern Yokuts. Three Far Northern Yokuts village or tribelet dialects, Tamukan, Tawichi and Yachik (or Chulamni), show evidence of borrowing from Plains Miwok for the numerals 7–10. In all three of these languages, the word for ‘six’ *saken*, *faken* is also clearly borrowed. Beeler (1961a) assumes that this word for ‘six’ was borrowed from neighboring Costanoan languages, but given the Eastern Miwok source of 7–10, and the attestation of *faken* in higher numerals in both Central Sierra Miwok and Northern Sierra Miwok noted above, it seems more plausible that numerals 6–10 all have an Eastern Miwok source. The northern Yokuts data are shown in (9) with Eastern Miwok forms for comparison, where NS, CS, and Pl stand for Northern Sierra, Central Sierra, and Plains respectively.

¹⁰ Victor Golla (personal communication, 2004) suggests that the Rumsen word for ‘six’ may be a calque on Esselen *<pek-walanai>*, which, Kroeber (1904:61–62) notes, is the first numeral in the second round of what seems to be a strictly quinary system. The Rumsen numerals 1–10 lend themselves to the same analysis, with the exception of *pak* ‘nine’ which may be borrowed from Esselen *pek* ‘one’, signifying ‘one less than the full count’. Golla further notes that this calquing is consistent with *fak:en* as a borrowing from Northern Costanoan. As a borrowing, it could easily be reinterpreted by Esselen-influenced Rumsen speakers as ‘(a numeral in) the second quinary round’. As argued in the text, if *fak:en* ‘six; the end; completion of the first senary round’ was inherited, its reinterpretation as a quinary element is harder to justify.

¹¹ Callaghan (1990:129) recognizes truncation in Soledad ‘six’ as well but segments the form as *heme-noksi*. Truncation may also relate Soledad *ut-okfi* ? ‘seven’ with Mutsun *taktfi* ‘seven’, where the Mutsun form has lost an initial syllable.

¹² The alternative, that **fak:en* ‘six’ is Proto-Costanoan, involves an explanation for its loss in Karkin, its disappearance in Mutsun and Soledad, and its shift of meaning in Rumsen. Such an alternative cannot be excluded, but seems less likely than the analysis sketched here, especially in light of the Miwok higher numerals mentioned earlier and the Yokuts data discussed below.

(9) Words for 6–10 in Far Northern Yokuts dialects and in Eastern Miwok

	Tamukan (Curtin 1884)	Tawitchi (Curtin 1884)	Yachik (Kroeber 1959)	Eastern Miwok
6	<i>cäkě́n</i>	<i>sä́ken</i>	<i>cakén</i>	(earlier <i>fak:en?</i>)
7	<i>kidé</i>	<i>kínek</i>	<i>k'ine</i>	kenek:ak (NS, CS, Pl)
8	<i>káwinta</i>	<i>kawunta</i>	<i>kawünta</i>	kaw:inta- (NS, CS, Pl)
9	<i>wai</i>	<i>wá'é</i>	<i>wo'é</i>	woʔe- (NS, CS, Pl)
10	<i>ékuke</i>	<i>ékuke</i>	<i>ékuke</i>	ʔek:uke- (Pl)

While it is possible that the word for ‘six’ was borrowed from Northern Costanoan into Yokuts, while words for 7–10 were borrowed from neighboring Plains Miwok, to the extent that patterns of numeral borrowing reflect ancient patterns of trade (Beeler 1961*a*), one might expect the entire 6–10 series to have the same source. This is possible under the current analysis, where **ʃak:en* ‘six’ is reconstructed for Proto-Eastern-Miwok.

4. Implications: Restricted numeral systems in north central California? If **ʃak:en* with the meaning ‘six’ cannot be reconstructed for Southern Costanoan, then it remains a unique item in Northern Costanoan, and the numeral system in (4) is reduced to numerals one, two, and three, as shown in (10), where *(*h*)*imhen* is a likely Proto-Costanoan variant for ‘one’, based on identical variation reported for Chochenyo by J. P. Harrington.

(10) Revised Proto-Costanoan numerals

- (10*a*) *(*h*)*im:en*, *(*h*)*imhen* ‘one’
 (10*b*) **ʔoḡhin* ‘two’
 (10*c*) **kaphan* ‘three’

Restricted numeral systems like the Proto-Costanoan system in (10) are common in Australia (Dixon 1980: 107–8) but quite rare in other parts of the world. In Comrie’s (2004) recent survey, there are no numeral systems reported outside of Australia with only numerals 1–3. Comrie (personal communication, 2004) is reluctant to rely on the fact that only lower numerals can be reconstructed to classify a numeral system as restricted. This is because of the many well known cases where all but the lowest numerals are either loans or recent creations, but where we know from independent information that the indigenous number system was once much richer. Comrie (2004) mentions, for example, Thai, where Chinese loans go down to 3, but where comparative Tai allows reconstruction of higher numerals.

In the case of Proto-Costanoan, is there any clear evidence that indigenous higher numerals did not exist? Can one counter the argument that these

higher Proto-Costanoan numerals were simply replaced by loans or more recent creations? In this case, an indirect argument exists. If higher Proto-Costanoan numerals existed, then it would be a striking coincidence that loans and innovations covered the numerals 4–10 in all languages, but in distinct ways.

In (11) noncognate forms for numerals 4–10 in the major Costanoan languages are illustrated. Original transcriptions have been rewritten in IPA symbols for the purposes of comparison. See Callaghan (1990) for remarks on possible etymologies for many of these terms.

(11) Numerals above 3 in major Costanoan languages

	Soledad	Rumsen	Mutsun	Chochenyo	Karkin
4	ʔu:ʔit	ʔu:ʔitim	ʔu:ʔit	katwaf	<i>cathrahuas</i>
5	parwas	haleʔis	parwes	mif:ur	<i>missuru</i>
6	ʔimin-ukʃa	hale-ʃak:en	nakitʃ, hinnaktʃi	ʃak:en	<i>tanipos</i>
7	ʔut-ukʃa	ʔuʔu-mai-ʃak:en	ʔakitʃi, utaktʃi	kene:tif	<i>kenetis</i>
8	kaphaʔisʃak	kapha-mai-ʃak:en	tayitmin	ʔoʃa:tif	<i>othronacantumus</i>
9	watso	pakke, pak	pakki, watsu	tel:ekif	<i>talan</i>
10	matsoso	tanʔaxt, tansah	tanaʔ	ʔiw:ef	<i>tagthreithris</i>

None of these numerals is straightforwardly reconstructible for Proto-Costanoan, and 5–8 defy reconstruction within Southern Costanoan also. In addition, borrowing is evident in many cases. I have already discussed Proto-Northern-Costanoan *ʃak:en ‘six’. As first noted by Kroeber (1910:249) number words for 7, 8, and 9 in Northern Costanoan show borrowing of stems for 1, 2, and 3 respectively from neighboring Miwok languages. This borrowing cannot be attributed to contact during the mission era, since it is already in evidence in the Northern Costanoan numerals found in Father Vicente Santa Maria’s 1775 journal (Beeler 1972).

If numerals above 3 did exist in Proto-Costanoan, then it must be taken as coincidence that there were multiple instances of replacement of just these numerals. Unless some independent principle emerges that makes languages with higher numerals subject to replacement of all and only numerals above three, the most plausible hypothesis is that Proto-Costanoan had the restricted numeral system shown in (10).¹³

¹³ The most plausible alternative, and the only one which can account for the Thai facts noted earlier, is that numeral replacement correlates with frequency: numerals with lower token frequencies are more likely to be replaced via borrowing than those with higher frequencies. In Utian, it is the recurrent and apparently independent replacement of numerals above three in distinct subgroups which needs to be explained. Perhaps these higher numerals were of such low frequency that they were not always transmitted from one generation to the next. Then the question is how low frequencies must go before one refers to the system as a “restricted numeral system.”

If this is the case, is it consistent with what we know of Proto-Miwok? The answer is a resounding yes. In Callaghan's detailed study of Miwok numerals, she concludes that "only the numerals for 'one', 'two', and 'three' can be reconstructed with certainty for Proto-Miwok" (Callaghan 1994:174). Given this, Proto-Utian itself may have had a restricted numeral system, with numerals for 'one', 'two', and 'three' only.

It could be that restricted numeral systems of the Proto-Costanoan type have always been "at risk" when in contact with nonrestricted systems (Comrie 2004). If this is the case, then the identification of restricted numeral systems like that reconstructed for Proto-Costanoan in (10) may provide one small piece of evidence for long-term isolation pre-dating borrowing and innovation of higher numerals.

In this study, I have tried to relate the meaning and distribution of the numeral formative *sak:en* in Eastern Miwok higher numerals, Northern Costanoan and Far Northern Yokuts 'six', and Rumsen 'six', 'seven', and 'eight'. The only language in which a plausible etymology for this term can be found is Eastern Miwok, and this is precisely where the word can be associated with a senary count (in 'twelve' and 'eighteen') or with the end of the count (in Northern Sierra Miwok 'eleven' and Central Sierra Miwok 'thirteen'). While the evidence on which this analysis rests is slight, and open to alternative interpretations, it is the only one which relates these disparate facts. This study also offers a novel explanation for the striking finding that only the numerals 'one', 'two', and 'three' can be reliably reconstructed for Proto-Miwok and Proto-Costanoan, the two major branches of Utian.

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APPENDIX A
EASTERN MIWOK NUMERALS

	“AMADOR” Dixon and Kroeber (1907)	“TUOLUMNE”	N. SIERRA Callaghan (1987)	C. SIERRA Freeland and Broadbent (1960)	S. SIERRA Broadbent (1964)	PLAINS Callaghan (1984)	BAY Arroyo (1821)
1	<i>luti</i>	<i>keñe</i>	lut:i-	kep:e-	kep:e-	ken:aty-, -sak	<i>luthri</i>
2	<i>otiko</i>	<i>otiko</i>	?otfi:ko-	?otfi:ko-	?otfi:-	?o:jok:o-	<i>ohuathro</i>
3	<i>tolokocu</i>	<i>tolokocu</i>	tolo:kos-u-	toló:koju-	tolo:kot-	tel:ok:o-	<i>tolocothro</i>
4	<i>oyisa</i>	<i>oyisa</i>	?oj:is:a-	?oj:is:a-	?oj:is:a-	?ojsek:o-	<i>oisa</i>
5	<i>macoka</i>	<i>macoka</i>	mas:ok:a-	má]:ok:a-	mah:ok:a-	kas:ok:o-	<i>supa</i>
6	<i>temoka</i>	<i>temoka</i>	tem:ok:a-	tém:ok:a-	tem:ok:a-	teme:pu-	<i>jesmuhi</i>
7	<i>kenekaku</i>	<i>kenekaku</i>	kenek:ak-y-	kenék:aky-	ti:aw:a-	kenek:ak	<i>keneheke</i>
8	<i>kawinta</i>	<i>kawinta</i>	kaw:iñta-	káw:iñta-	kaw:inta-	kaw:inta-	<i>osocasi</i>
9	<i>wo'e</i>	<i>woe</i>	wo'e-	wo'é-	?eli:wi-a-	wo'e-	<i>telekaka</i>
10	<i>naatca</i>	<i>naatca</i>	na'a:tja-	na'á:tja-	na'a:tfa-	?ek:uke-	<i>usiusius</i>
11	<i>lu-cakena</i>	<i>keñ-hateaku</i>	lus:ak:e:nu-	kéjhejja:ky-	na'a:tfa' kep:e' ?ymi?	kentopa-	
12	<i>otik-cakena</i>	<i>otik-sakenu</i>	?otiksake:n-y-, ?otiksake:nu-	?otiksake:ny-	na'a:tfa' ?otfi?	?ojkop:a-	
13	<i>toloti-aku</i>	<i>tolok-sakenu</i>	tolokteja:ky-		na'a:tfa' tolo:kot		
14		<i>kolok-aku</i>	kolo:kak-y-, kolo:kos-u-	na'a:tfa' toló:koju' hej:? na'a:tfa' ?oj:is:a' hej:? ju:?'ali-	na'a:tfa' tolo:kot ?ymi? ?ymi?		
15	<i>yuali</i>	<i>yuali</i>					
16	<i>oy-ota</i>	<i>oyoto</i>					
17	<i>otiko-maiazo</i>	<i>naatch mu kenekaku</i>					
18	<i>tak-cakena</i>	<i>naatca mu kawinta</i>					
19	<i>minimi</i>	<i>naatca mu woe</i>					
20	<i>naa</i>	<i>naa</i>	na'a:-	ná?:a-	?otfi:-jak na'a:tfa' na'a:-		
21	<i>naa-ima luti</i>	<i>naa-mu keñe</i>		ná?:a? kep:e? hej:?			
30	<i>naa tomeakü</i> <i>Naatcai</i>	<i>naa mu naatca</i>		ná?:a? na'a:tfa' hej:?	tojak na'a:tfa'		
60	<i>tolok-momo,</i> <i>tolok-muyu</i>	<i>tolok mumu</i>		tolokmumu-	tem:ojak na'a:tfa'		