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THE CLASSIFICATION OF THE UTO-AZTECAN  
LANGUAGES BASED ON LEXICAL EVIDENCE<sup>1</sup>

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**0. Introduction.** There has been a notable lack of agreement among informed scholars on the classification of the Uto-Aztec languages. The problem revolves around the family-tree approach versus the wave or mesh approach (see Bloomfield 1933:311-18 and Swadesh 1959). The family-tree approach assumes sudden splits within a dialect-free parent, while the wave approach assumes a dialect continuum which dissolves into distinct languages and in which the newly budded languages reflect the earlier dialect interrelationships.

The wave principle operated to a greater extent in Uto-Aztec than some other families (e.g., Indo-European). The vexing and interesting problems for Uto-Aztec are two: first, to what extent did the wave principle operate; and second, how are we to describe or represent the relationships that are difficult or impossible to represent by the traditional family-tree classification?

The Uto-Aztec family consists of about thirty languages, located in two main geographic areas: the northern one in southern California, the Great Basin, and nearby areas; and the southern one stretching from southern Arizona, through northwest Mexico, into central Mexico and beyond (see fig. 1).

Those favoring greater importance for the family-tree approach recognize three branches: Shoshonean, Sonoran, and Nahuatl or Aztec. A variant of this approach would group Sonoran and Aztec into a single branch called Southern Uto-Aztec (SUA), with Shoshonean then renamed Northern Uto-Aztec (NUA). Those favoring greater importance for the wave approach view Uto-Aztec as being composed of eight or more independent branches. The so-called Shoshonean, then, is viewed as consisting of four branches, Sonoran of three or more (the particular number varying somewhat among different investigators), with general but not universal agreement by both groups that Aztec forms an independent branch.

<sup>1</sup> An earlier version of this article was presented during the 1980 Linguistic Institute, University of New Mexico, at a symposium on Uto-Aztec historical linguistics which was sponsored by the National Science Foundation. Some of the other papers presented at the symposium were published in *IJAL* 49, no. 3 (July 1983).

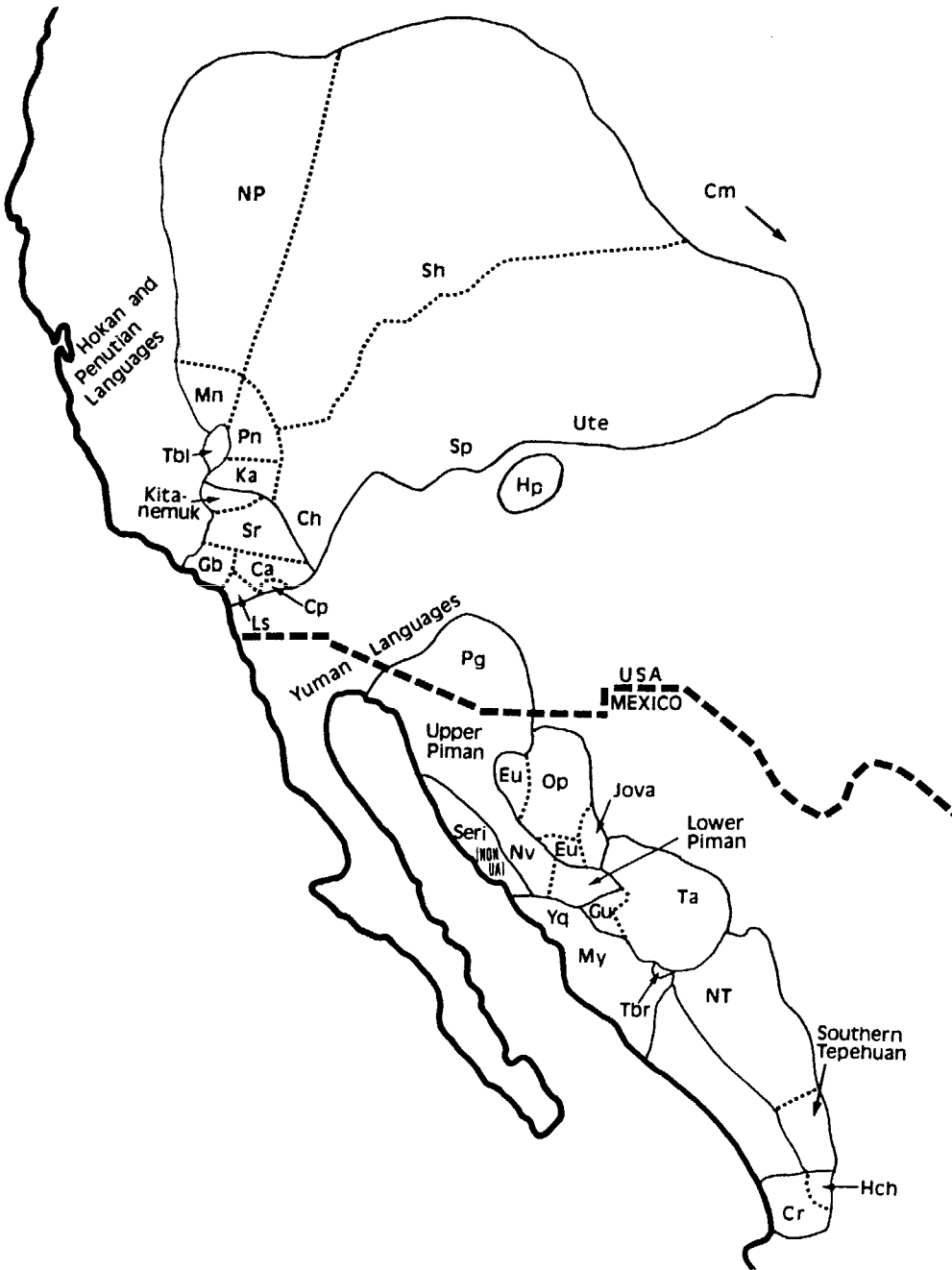


FIG. 1.—Map of the Uto-Aztecan languages, excluding the Aztecan branch.

TABLE I  
CLASSIFICATION OF SHOSHONEAN LANGUAGES\*

- |   |
|---|
| 1. Numic                                      |
| a. Western Numic (Mono, Monachi, Paviotso)    |
| b. Central Numic (Shoshoni, Comanche)         |
| c. Southern Numic (Kawaiisu, Ute, Chemehuevi) |
| 2. Tubatulabal                                |
| 3. Takic                                      |
| a. Serranan (Serrano, Kitanemuk)              |
| b. Gabrielinan (Gabrielino, Ferdanino)        |
| c. Cupan (Luiseño, Cahuilla, Cupeño)          |
| 4. Hopi                                       |

\* From Kroeber (1907:97-101). Names are changed to conform to modern usage.

**1. Historical review.** Nineteenth-century investigators, discussed by Lamb (1964), are ignored, since they were more interested in establishing the genetic groupings than in internal classification.

The recognition of Shoshonean as a classificatory unit seems to be partly a historical accident. Except for Comanche, and marginally Hopi, these languages are geographically contiguous and are wholly in the United States. Of the other Uto-Aztecan languages, only Pima and Papago are in the United States, and just barely so. They belong to the Tepiman group and are geographically contiguous to the other Sonoran languages in northwest Mexico. Major Powell's 1891 classification recognized the relationship between the Shoshonean languages, but he did not include Pima and Papago, in spite of the fact that earlier workers had recognized the relationship between the Sonoran languages and those further north. Further, Tepiman languages have undergone a series of sound shifts that initially obscured their Uto-Aztecan affiliations. Thus geography and sound changes probably conspired to keep Tepiman out of Powell's Shoshonean family.

Kroeber (1907) constructed the first comprehensive classification of the Shoshonean languages. His evidence was primarily lexical, consisting of lists of over 100 words for almost twenty languages and dialects. His classification is in table 1, but with the modern names for the language groups. Numic and Takic consist of three subbranches each. Kroeber saw no evidence for close linkage between any two of the three subbranches, or for seeing one subbranch as a "transition" between the other two. Tubatulabal, an independent branch consisting of a single language, was seen as "intermediate" between Numic and Takic. Hopi, also a single language, was viewed as the most "divergent" Shoshonean

TABLE 2  
CLASSIFICATION OF THE SONORAN LANGUAGES\*

1. Western Group
<i>a.</i> Tarahumaran: Tarahumara, Tubar
<i>b.</i> Cahitan-Opatan
<i>i.</i> Cahitan-Yaqui: Mayo, Cahita, Tehueco, plus possibly extinct languages
<i>ii.</i> Opatan: Opatá, Eudeve, Jova
2. Southern Group: Cora, Huichol (Guachichil) [modern name = Corachol]
3. Central Group: Piman languages [modern name = Tepiman]

\* From Mason (1936).

branch. That later work has mostly sustained Kroeber's classification is more a credit to Kroeber's intuition than to his method, because nowhere does he tell us how he arrived at his conclusions or how he used his evidence.

Kroeber (1934) and Mason (1936) were two of the first to provide classifications of the Mexican languages that were based on data. Whorf (1936) has a classification appended to Mason's classification. These three classifications vary in details, but are similar in broad outline. Mason's is found in table 2.

Kroeber argued that Sonoran was a geographic rather than a linguistic grouping. Whorf (1935) agreed, and further suggested that the same was true of Shoshonean as well. Thus we have the beginning of the multibranch approach. Lamb (1958:99) articulated this view as follows: "The split of Uto-Aztecan apparently took the form of a gradual spread into a complex dialect area. Closely adjoining dialects would naturally be more similar than distantly separated ones; and the same situation will hold for the families later developed out of these dialects."

In 1962, Voegelin, Voegelin, and Hale reconstructed intermediate protolanguages for Shoshonean and Sonoran, and claimed this supported the three-branch approach. It is not clear to me, however, that they have shown that the intermediate protolanguages are necessary. (See also Voegelin and Voegelin 1973:1121-24.)

In this glottochronological study of seventeen languages, Hale (1958) claimed to find support for a slightly different version of the three-branch approach. However, he cautioned his readers that his data were incomplete or faulty in some cases. Both Lamb (1964:122) and I (Miller 1964:146-47) argue that his data suggest a different conclusion.

The past few years have seen a tremendous upsurge in activity in historical Uto-Aztecan, but problems in classification have not received

much more than passing notice. One does catch mutterings that maybe there is something to the three-branch or two-branch approach (see, for example, Langacker 1977:5; Heath 1977; Steele 1979:451-54).

Sapir's name is closely associated with historical Uto-Aztecan. He was the first to present convincing evidence for the genetic unity of the family and was the first to apply the comparative method and reconstruct the major outlines of the sound system, as well as some features of the grammatical system (Sapir 1913; 1915). However, he made no contributions to the classification, though he did comment on Kroeber's classification of the more northern languages (1913:382) and the lack (at that time) of an adequate classification of the more southern languages (1913:382, 383).

**2. Kinds of evidence and its use.** If a subset of related languages shares similarities that sets it off from other groups of languages within the family, it may be because the languages share a common intermediate ancestor, thus conforming to the family-tree model, it may be because of mutual influence, thus conforming to the wave model, or it may be because of parallel development, the result of what Sapir has termed drift. Or it can be any combination of these three. The trick is to distinguish between them, or to determine their relative strength, as they apply to individual cases.

The major disadvantage to a lexical approach is that it counts only similarities. Shared innovations, shared retentions, and drift are difficult, at best, to distinguish. On the other hand, quantification is possible, a distinct advantage in trying to establish degrees of difference and influence in a family in which the wave model is more applicable.

A follow-up to this study should compare the phonological and morphological evidence to the lexical evidence, since in both cases it is possible, at least in principle, to distinguish shared innovations from shared retentions, and often from drift. The material is at hand for a phonological study, but not a morphological study, in spite of the great strides in our understanding of Uto-Aztecan grammar. There are still too many cases in which we do not know enough to distinguish between the different kinds of similarity.

**3. The data.** The data used in this study are derived from a 100-item list used with thirty-two languages and dialects. A list of the languages, along with abbreviations and sources, follows. Unless otherwise noted, the language is still spoken.<sup>2</sup>

<sup>2</sup> Special thanks are due to the people who took the time to fill in word lists for me or who filled in blanks for languages for which I otherwise would have had incomplete lists:

1. Mono (Mn): Manuscript dictionary by Sydney Lamb, of the North Fork dialect, with a few blanks filled in by Sven Liljebblad (personal communications) from the Fort Independence dialect.
2. Northern Paiute or Paviotso (NP): Mostly from Sven Liljebblad (personal communications) with some forms from John Anderson (personal communications). The Liljebblad material is general Northern Paiute, with the Anderson material specifically from the McDermitt dialect.
3. Panamint (Pn): Mostly my field notes, Beatty dialect, with a few forms from manuscript material of Jon Daley (Furnace Creek dialect) and of Sydney Lamb (Koso and Darwin dialect?).
4. Shoshoni (Sh): My field notes, Gosiute dialect.
5. Comanche (Cm): Mostly my field notes, with a few forms from Canonge (1958).
6. Kawaiisu (Ka): Manuscript dictionary by Maurice Zigmond.
7. Chemehuevi (Ch): Chemehuevi-English, English-Chemehuevi word list, which is appended to Press (1975).
8. Southern Paiute (SP): English index to Sapir's (1931) dictionary, by Miller (mimeographed), with a few forms supplied by Catherine Fowler (personal communications).
9. Ute: Dictionary of Southern Ute, edited by Givón (1979).
10. Tubatulabal (Tbl): Most of the forms are from Voegelin (1958), with a few from Voegelin (1935*a*; 1935*b*), Hale (1959), and the C. Hart Merriam manuscript collection. The language is close to extinction.
11. Serrano (Sr): Kenneth Hill (personal communications) with a few forms from my field notes. The language is recently extinct.
12. Cahuilla (Ca): Dictionary by Seiler and Hioki (1979).
13. Cupeño (Cp): Dictionary included in Hill and Nolasquez (1973).
14. Luiseño (Ls): Dictionary, by Bright (1968).
15. Gabrielino (Gb): Some forms are from Kroeber (1907), others from field notes of J. P. Harrington, made available to me by Kenneth Hill. Some Fernandino forms from Kroeber are included, on the assumption (which may or may not be correct) that Gabrielino and Fernandino are dialects. Extinct.
16. Hopi (Hp): Most of the forms are from Voegelin and Voegelin (1957), with some also from Kalectaca (1978), Hale (1959), Edward Kennard (personal communications), and Ray Freeze (personal communications).

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Sven Liljebblad, John Anderson, Catherine Fowler, Kenneth Hill, Edward Kennard, Campbell Pennington, Ray Freeze, and Eugene Casad—and particular thanks to Andrés Lionnet, who not only filled in several blanks for several of the Sonoran languages, but also caught a number of errors on my part.

17. Papago (Pg): Saxton and Saxton (1969).
18. Névome (Nv): Pima de Onava, mimeographed material by Kenneth Hale; and Pennington (1979). Pennington's material is a compilation of an anonymous Jesuit missionary manuscript, probably composed in the seventeenth century. The language is almost extinct.
19. Northern Tepehuan (NT): Rinaldini (1743).
20. Opata (Op): Manuscript vocabulary by Pennington, which is drawn from Jesuit colonial manuscript sources, along with a few forms from the Barbastro (1792) manuscript. Probably extinct.
21. Eudeve (Eu): Pennington (1981), which is drawn from Jesuit colonial manuscript sources. Extinct.
22. Guarijío (Gu): My field notes.
23. Tarahumara (Tr): Lionnet (1972).
24. Tubar (Tbr): Lionnet (1978). Thought to be extinct.
25. Mayo (My): Collard and Collard (1962), Lionnet (1977), and Ray Freeze (personal communications).
26. Yaqui (Yq): Mostly from Johnson (1962), with a few forms from Lionnet (1977) and Hale (1959).
27. Cora (Cr): Mostly from Eugene Casad (personal communications), with a few forms from Preuss quoted in Hale (1959).
28. Huichol (Hch): McIntosh (1949), with a few forms from Miller (1967).
29. Classical Aztec (CAz): Swadesh and Sancho (1966), Garibay (1940), Molina (1966), and Andrews (1975).
30. Tetelcingo (Te): Brewer and Brewer (1962).
31. Zacapoaxtla (Za): Key and Key (1953).
32. Pipil (Pp): Arauz (1960), with some forms from slightly different dialects in Lehmann (1920).

Since some of these are dialects of the same language, the total number of languages was twenty-six or twenty-seven. Languages not included are:

KITANEMUK, now extinct, and most closely related to Serrano (see Kroeber 1907; Shipley 1978). J. P. Harrington has recorded some notes on this language.

LOWER PIMAN and SOUTHERN TEPEHUAN, both extant Tepiman languages, and TEPECANO, probably extinct, and said to be a dialect of Southern Tepehuan (Bascom 1965:2).

JOVA, an extinct language of Sonora. It is usually grouped with Opata and Eudeve, but see Miller (1983). Little is known of Jova.

LOWLAND GUARIJÍO, a variety of Guarijío spoken just to the west of the Highland Guarijío (the variety included in this study). The two are closely related languages or (more likely) divergent dialects.

WESTERN TARAHUMARA and SOUTHERN TARAHUMARA. It is not clear if these are to be regarded as dialects of (Eastern) Tarahumara, the variety most fully documented to date in the literature (and included in this study), or are to be regarded as closely related languages. Comments made to me by Jesuit linguists residing in the area, and by Andrés Lionnet (personal communications), lead me to suspect that Western Tarahumara, at least, is mutually unintelligible with the eastern variety, though they may well be linked by a dialect continuum, and that the southern variety is intelligible, with difficulty. Don Burgess (forthcoming) has done extensive fieldwork with the western variety. Southern Tarahumara has received some study (Lionnet 1982).

POCHUTEC, an extinct Aztecan language, which is well known to us through the work of Boas (1917), not included in this study because there were too many blanks in the vocabulary. But its position in the Aztecan branch is clear; see Campbell and Langacker (1978).

There are a number of extinct languages, especially in northern Mexico, about which little is known and whose position in the family, or in some cases whose inclusion in the family, is unclear or in doubt. See Lamb (1964), Kroeber (1934), Sauer (1934), and Miller (1983) for further discussion.

**4. The method.** The method I used is similar to the one used in glottochronology. For each pair of languages the words defined by 100 glosses were compared, and the percentage of cognates was computed. The list is the same as the one used by Swadesh (1955*b*), but with twelve substitutions: belly button, heavy, old, rope, salt, sing, sky, snake, snow, vomit, wind, and year replace all, full, I, round, say, swim, that, this, thou, we, what, and who. With thirty-two languages and 100 items, there are a total of 3,200 possible pieces of data. Because of blanks the actual figure was 3,150. Judgments of cognate were made for each of the 100 items, the results of which are given in table 3, which is to be read as follows: if two or more languages share a cognate, they are assigned the same alphabetic symbol ("a," "b," "c," etc.). If a word is found in a language that is not cognate with a word in any other language, then an "x" is assigned.<sup>3</sup> A zero indicates missing data. If the item in question was borrowed from Spanish, the letter is capitalized, but this fact was ignored in later computations.

<sup>3</sup> This procedure depends on the accuracy of the cognition judgments, and even before that, on decisions of which word to list with a given gloss. I feel fairly confident about the cognition judgments, because the historical phonology of Uto-Aztecan is well known, and because I am familiar with the Uto-Aztecan language family. An earlier version of this article included a longer discussion of the problem as it related to specific words, which the reader may have, along with the raw data, for the cost of xeroxing it.

TABLE 3  
UTO-AZTECAN COGNATE TABLE

	Mh	Np	Pn	Sh	Cm	Ka	Ch	SP	Ute	Tbl	Gh	Sr	Cu	Cp	Ls	Hp	Pg	Nv	NT	Gu	Tr	Op	Eu	My	Yq	Tbr	Hch	Cr	CAZ	Te	Az	Pp
1.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
2.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
3.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
4.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
5.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
6.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
7.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
8.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
9.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
10.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
11.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
12.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
13.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
14.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
15.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
16.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
17.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
18.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
19.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
20.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
21.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
22.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
23.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x
24.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	x

no, not/no  
many/muchos  
one/uno  
two/dos  
big/grande  
old/viejo  
small/chico  
long/largo  
new/nuevo  
good/bueno  
heavy/pesado  
dry/seco  
cold/frío  
hot/caliente  
woman/mujer  
man/hombre  
person/gente  
fish/pez  
bird/pájaro  
dog/perro  
louse/piojo  
snake/culebra, víbora  
tree/árbol, palo  
bark/corteza, cascara



TABLE 3 (continued)

	Mn	NP	Ph	Sh	Cm	Ka	Ch	SP	Ute	Tbl	Gb	Sr	Cu	Cp	Ls	Hp	Pg	Nv	NT	Gu	Tr	Op	Eu	Mj	Yq	Tbr	Hcb	Cr	CAz	Te	Az	Pp		
83.	a	a	b	b	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	
84.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
85.	a	x	b	b	a	b	b	x	x	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
86.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
87.	a	a	b	b	x	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
88.	x	a	b	b	a	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
89.	x	a	b	b	b	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
90.	a	a	a	a	x	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
91.	a	b	a	a	a	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
92.	a	x	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
93.	a	a	b	a	x	a	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
94.	x	a	a	a	a	x	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
95.	x	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
96.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
97.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
98.	a	a	x	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
99.	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
100.	a	a	b	b	x	0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

earth/tierra  
salt/sal  
cloud/nube  
smoke/humo  
fire/fuego, lumbre  
ash/ceniza  
burn/arder  
path/camino  
mountain/cerro  
red/rojo  
green/verde  
yellow/amarillo  
white/blanco  
black/negro  
night/noche  
name/nombre  
year/año  
rope/mecate, cuerda, sogá

The cognate table constitutes the raw data from which percentage of cognate density was derived. Each pair of languages was examined for each of the 100 items. With thirty-two languages, there are 496 pairs of languages, which, with 100 items, yields 49,600 separate comparisons.<sup>4</sup> The results are given in table 4. Each cell in the chart gives the percentage (rounded off to the nearest whole number) of cognates for each pair of languages.

The word lists were incomplete for seventeen of the thirty-two languages. Most incomplete were Gabrielino, Opatá (both 89), and Tubar (94), languages for which new or additional data are not likely to emerge. In all other cases, the lists are never less than 97-percent complete, and except for pairs including Opatá or Gabrielino, comparisons dip no lower than 92 percent.

Swadesh (1955a) and Hale (1958; 1959) have also made lexical studies of Uto-Aztecan. The present study should be more accurate than these pioneer studies because data on more languages, and much fuller data, are available today than were available twenty-five years ago.

**5. The classification.** First concerning major groupings: there is no evidence for a Shoshonean or Northern Uto-Aztecan (NUA) grouping (Numic, Tubatulabal, Takic, Hopi). This is clear from a detailed examination of the figures on a language pair-by-language pair basis (table 4) or of the figures that give averages for the groups of languages (table 5). Most of the figures between pairs of northern languages in different branches run between twenty-six and thirty-nine, averaging thirty-three. Northern and southern languages run between sixteen and thirty-five, averaging twenty-six. This small range of difference seems best to be interpreted in terms of the wave or mesh effect. There is too much overlapping to draw a family tree with a Shoshonean branch.

There is, however, evidence for a Sonoran group. Table 6 shows that except for pairs involving Cora (which is a special case, discussed below), the figures are in the forties or higher. The highest figure between a Sonoran and non-Sonoran languages is forty, found between Yaqui and three Aztecan languages. Most of the figures between Sonoran and Aztecan range around thirty-five, and between Sonoran and the more northern languages, in the low twenties to the mid thirties. These figures, then, also support a grouping of Sonoran and Aztecan into Southern Uto-Aztecan (SUA).

Thus there seem to be five groups that are more or less coordinate with each other: Numic, Tubatulabal, Takic, Hopi, and SUA. Two of

<sup>4</sup> Thanks are due to Greg Howe who developed the computer program that did the computations.

TABLE 4  
COGNATE DENSITY FOR THIRTY-TWO UTO-AZTECAN LANGUAGES

Mn	77	Northern Paiute																													
NP	59	58	Panamint																												
Pn	58	87	Shoshoni																												
Sh	57	58	79	88	Comanche																										
Ch	50	56	54	55	49	Kawaiisu																									
Ka	50	55	61	58	54	75	Chemehuevi																								
SP	53	58	62	59	79	86	Southern Paiute																								
Ute	39	42	37	38	35	39	42	39	40	Tubatulabal																					
Tbl	26	26	26	23	24	27	26	27	40	Gabrielino																					
Gb	26	24	24	24	21	26	28	27	35	45	Serrano																				
Sr	29	27	27	24	27	31	31	29	38	42	50	Cahuilla																			
Ca	28	27	24	24	23	26	30	31	28	37	34	38	65	Cupeño																	
Cp	26	27	25	24	22	24	27	27	26	34	38	35	50	48	Luisefño																
Ls	33	32	27	23	22	31	33	31	32	38	29	29	31	31	26	Hopi															
Hp	23	26	25	25	23	26	28	28	30	35	25	27	31	28	25	32	Papago														
Pg	24	26	24	24	23	24	26	26	27	35	24	27	30	27	24	33	85	Névoame													
Nv	25	28	26	26	23	27	28	30	29	37	26	30	32	29	26	33	79	Northern Tepehuan													
NT	26	29	23	23	24	24	24	25	28	36	29	34	29	28	32	44	47	47	Guarijio												
Tu	23	27	21	21	22	23	22	23	26	32	28	34	33	26	28	28	41	42	83	Tarahumara											
Tr	26	29	21	20	20	20	26	24	26	31	33	26	31	33	29	24	33	40	44	40	55	54	Opata								
Op	28	27	23	23	22	24	26	27	35	26	30	34	29	25	35	45	47	45	59	52	73	Eudeve									
Eu	27	28	25	26	24	27	25	27	28	35	29	33	36	26	28	34	43	45	49	58	51	53	61	Mayo							
My	29	30	26	26	24	29	26	29	30	35	28	32	35	26	28	36	45	47	49	58	51	55	62	93	Yaqui						
Yq	28	27	27	28	27	28	27	30	31	33	24	28	29	26	23	30	40	41	46	48	44	42	51	51	53	Tubar					
Tbr	25	24	23	23	21	23	23	24	25	32	24	28	34	26	27	28	41	43	42	51	48	49	48	51	41	Huichol					
Hch	25	22	22	23	21	22	21	22	21	22	23	30	19	21	24	23	22	26	34	35	42	38	35	42	45	46	39	58	Cora		
Cr	19	18	16	16	14	16	15	16	16	16	17	25	20	22	24	20	19	24	29	30	32	33	39	40	38	39	36	39	37	Classical Aztec	
CAz	18	18	16	16	14	17	15	16	17	15	20	22	24	20	19	24	30	30	30	32	34	38	40	38	39	35	37	35	85	Telecingo	
Te	17	17	15	15	13	16	16	16	17	18	26	21	20	24	20	19	24	31	31	32	29	33	35	39	37	38	35	33	80	85	Zacapoaxtla
Za	17	17	15	15	13	16	16	16	17	18	26	21	20	24	20	19	24	31	31	32	29	33	35	39	37	38	35	33	80	85	Zacapoaxtla
Pp	16	15	14	14	12	16	16	16	17	18	26	21	20	24	20	19	24	31	31	32	29	33	35	39	37	38	35	33	80	85	Zacapoaxtla

TABLE 5  
COGNATE DENSITY OF THE MAJOR UTO-AZTECAN BRANCHES\*

Nm	Numic	Tubatulabal	Takic	Hopi	Sonoran	Aztecan
Tbl	39					
	(35-42)					
Tk	26	37				
	(21-31)	(34-40)				
Hp	29	38	29			
	(22-33)	(38)	(26-31)			
Sn	25	34	28	32		
	(20-31)	(30-37)	(19-36)	(26-36)		
Az	16	25	21	24	35	
	(12-19)	(24-26)	(19-24)	(24-24)	(29-40)	

\*Top number is the average, bottom numbers the low and high ranges.

TABLE 6  
COGNATE DENSITY OF THE SONORAN LANGUAGES, PLUS HOPI AND AZTECAN

Hp	Hopi	Tepiman	Tarahumara-Guarijio	Opata-Eudeve	Cahita	Huichol	Cora	Aztecan
Tr-Gu	32		44	55	58			
	(32-33)		(41-47)	(52-59)	(53-62)			
Op-Eu	34	44	55	58				
	(33-35)	(40-47)	(52-59)	(53-62)				
Cah	35	46	55	58				
	(34-36)	(43-49)	(51-58)	(53-62)				
Tbr	30	42	46	47	52			
	(30)	(40-46)	(44-48)	(42-51)	(51-53)			
Hch	28	42	50	49	50	41		
	(28)	(41-43)	(48-51)	(48-49)	(48-51)	(41)		
Cr	26	34	40	39	46	39	58	
	(26)	(34-35)	(38-42)	(35-42)	(45-46)	(39)	(58)	
Az	24	30	33	39	38	36	37	35
	(24-24)	(29-32)	(29-34)	(33-35)	(35-40)	(35-37)	(35-39)	(33-37)



TABLE 7

COGNATE DENSITY OF THE NUMIC LANGUAGES, PLUS TUBATULABAL

WN	Western Numic		Central Numic		Southern Numic		Tubatulabal
CN	58 (57-59)						
SN	54 (50-58)		58 (49-62)				
Tbl	41 (39-42)		37 (35-38)		40 (39-42)		

the branches, Tubatulabal and Hopi, are single languages. SUA divides into two branches, Sonoran and Aztecan.

Next the details for each of these branches: Numic forms a tight group (table 7), which is divided into the three subbranches first postulated by Kroeber (1907:97-98). Lamb (1958:98) suggested that Central and Western Numic were closer to each other. Freeze and Iannucci (1979), using phonological evidence in particular, but citing also some grammatical and lexical evidence, argue for a Central and Southern grouping. However, the data from this study do not give evidence for any special subgrouping, nor for Central Numic forming a link between the other two. This is as Kroeber originally suggested, that all three subbranches are equal distance from one another.

If one examined just the Tubatulabal and Takic figures (table 8), it would be difficult to maintain that Tubatulabal was not a Takic language. But an examination of the figures with Numic (table 7) and Hopi (table 8) shows that Tubatulabal's position cannot be represented by a family-tree diagram. Kroeber claimed it formed a link between Takic and Numic, and this study seems to link it with Hopi as well, the sort of link typical of the mesh principle. Lamb (1958:98) suggested a closer linkage between Tubatulabal and Southern Numic, based on certain unspecified shared structural features; he probably had in mind the treatment of enclitic pronouns and demonstratives, and of possessive pronouns. However, this study gives no evidence of a closer relationship with either a Numic or a Takic subbranch.

Takic consists of the three subgroups first postulated by Kroeber. There is some evidence (not overwhelming) that two of the groups, Gabrielino and Serrano, are closer to each other than either is to Cupan. Bright and Hill (1967) divided Cupan into two groups, one consisting of Luiseño, the other one of Cupeño and Cahuilla. This study arrives at the

TABLE 8

COGNATE DENSITY OF THE TAKIC LANGUAGES, PLUS TUBATULABAL AND HOPÍ

Tbl	Tubatulabal				
Gr	40 (40)	Gabrielino			
Sr	35 (35)	45 (45)	Serrano		
Cup	36 (34-38)	38 (34-41)	45 (35-50)	Cupan	
Hp	38 (38)	29 (29)	29 (29)	29 (26-31)	Hopi

same grouping. Cahuilla seems to form a link between Cupan and Serrano. Perhaps the most interesting result of the total study is the fact that there is more internal diversity within Takic than within all of Sonoran, and almost as much as within all of SUA. At one time Hill and Hill (1973) suggested that there was no Takic, that each of the Takic branches were separate branches of Uto-Aztecan. They later recanted (personal communications), but it is easy to see how they could entertain such a notion.

Kroeber's statement that Hopi is the most "divergent" branch makes sense if one looks only at the northern languages. Viewed in a larger context, Hopi is simply one of the branches of Uto-Aztecan, no more divergent than any other. Nor is it transitional between the north and the south.

Sonoran consists of a central core of Taracahitian plus three other groups: (1) Tepiman (Papago, Nevome, Northern Tepehuan), (2) Tubar (a single language), and (3) Corachol (Cora, Huichol). The Taracahitian core consists of three groups, which are slightly closer to each other than they are to the other three Sonoran groups: (1) Tarahumara (Tarahumara, Guarijío), (2) Opatan (Opata, Eudeve), and (3) Cáhitan (Mayo, Yaqui). Cáhitan forms a link between Tubar and Corachol. Corachol is the most diverse of the six Sonoran subgroups. Cora is the most divergent, and is linked to the other Sonoran languages through Huichol. The lowest figures are between Cora and Tepiman languages, the two extremes within the Sonoran subfamily. No Sonoran language or subgroup is in a special relationship with any non-Sonoran group. Specifically, Tepiman is not transitional between Sonoran and the northern

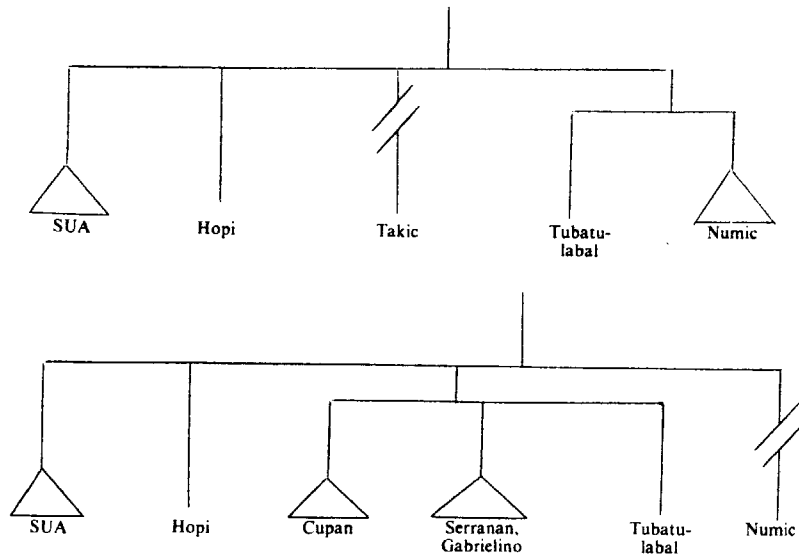


FIG. 2.—The position of Tubatulabal in a pruned Uto-Aztecan tree.

languages, nor is Cora or Huichol transitional between Sonoran and the Aztecan languages.

The Aztecan languages form a very tight group, even more closely related to one another than the Nomic languages. We know from other evidence (Campbell and Langacker 1978:87) that Pipil is coordinate with the three other varieties of Aztec used in this study; this fact is reflected in the figures, but not overwhelmingly so.

Nomic and Aztecan stand out as the most divergent members of the Uto-Aztecan language family. Takic is not far behind.

**6. Discussion of the classification.** The nature of the interrelationships within Uto-Aztecan is such that they cannot be accurately represented by a family-tree diagram without distortions. Some groupings, such as Nomic, are clear and make neat branches. But in other cases, such as Tubatulabal, we have languages that are transitional. With pruning, we can get a more treelike effect. If the Takic languages did not exist, Tubatulabal and Nomic would be two coordinate branches of a far northern subgroup (see fig. 2). Or if Nomic were pruned, Tubatulabal would go with Takic, probably as a Takic language, rather than coordinate with it. Similarly, if Huichol were pruned, Cora would appear to be

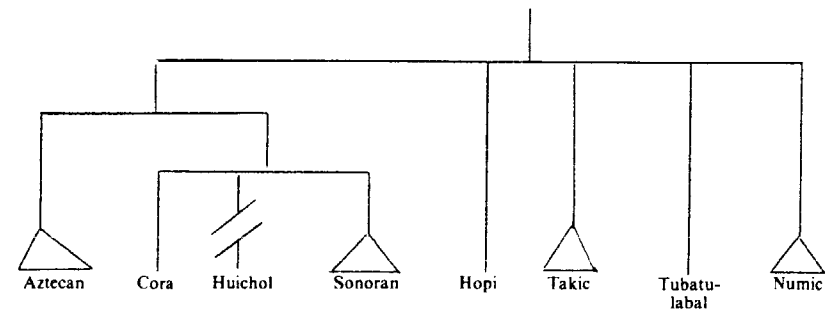


FIG. 3.—The position of Cora in a pruned Uto-Aztecan tree.

coordinate with Sonoran, rather than a part of it (fig. 3). The linguistic center of gravity for SUA, which already is a bit to the south, would seem even more southern.

All this makes one wonder: has there been some natural pruning that has taken place in Uto-Aztecan? Is it possible that the family was really a vine, which has been pruned to look more like a tree? Three areas in particular are worth looking at: (1) the gap between the northern languages and Sonoran, (2) the gap between Sonoran and Aztecan, and (3) the central core of Sonoran.

There is a geographic discontinuity between the northern and the Sonoran languages, which is now filled by Yuman languages. This family has a shallower time depth than Uto-Aztecan. There is evidence that they expanded north and east, from a point near the lower Colorado or at its mouth, causing the geographic break between the northern and the SUA languages (Hale and Harris 1979:172-73, 175-76). Likely there was once a connecting chain of transitional languages in western Arizona between these two groups (Fowler 1983:242).

The lack of transitional languages between Sonoran and Aztecan might be explained in a similar fashion. We know that the Aztec languages expanded with the Aztec Empire, and they could very well have swallowed up other Uto-Aztecan languages. Further a number of languages became extinct early in the colonial period. Could some of these have been transitional languages?

The Taracahitian central core seems to form a definable subbranch within Sonoran. Another explanation is that the three Taracahitian groups (Opatan, Tarahumaran, and Cáhitan) share more with each other through mutual influence, and less with the other three Sonoran groups (Tepiman, Tubar, Corachol), because they are peripheral. Cáhitan is

transitional between the central core, and between Tubar and Corachol, placing it linguistically more to the south. But there is no language or subgroup forming a link between Tepiman and the rest of Sonoran, which means that its present anomalous geographic position is still anomalous.

If my interpretation is correct, we would have had a chain of dialects developing into interlinking languages, distributed roughly north to south, or northwest to southeast. Then the chain broke in two places. The break between the northern languages and SUA is more profound than between Aztecan and Sonoran. Numic and Aztec represent the extremes of the chain. The Takic languages, off in a pocket, have probably been in their present location longer than any other Uto-Aztecan group. All this puts the center of linguistic gravity in the north, perhaps in an area that today is Yuman rather than Uto-Aztecan country. Fowler (1983:234) discusses this same problem, using lexical rather than classificatory evidence, and arrives at the same conclusion.

The center of linguistic gravity of SUA is in the southern part of their range. The present location of the Sonoran language may represent a slight back migration, with the speakers of these languages ooching northward with the spread of agriculture.

**7. The role of geography, population density, and society in Uto-Aztecan language diversification.** The ancestral Uto-Aztecan speakers, of more than 5,000 years ago, were hunters and gatherers. I have argued (Miller 1970) that in such a society, represented today by the Numic and Takic speakers, an individual is in contact with a relatively small group of people, but who are linguistically heterogeneous. This maximizes the wave effect, minimizes the family-tree effect (see also Miller 1971 and Voegelin et al. 1963). The wave effect can be further maximized if the developing languages stay put over longer periods of time and occupy a more restricted territory. A large proportion of the speakers can be bilingual, thus influencing the direction of change even if the languages they speak are no longer dialects or closely related languages. Just such a situation obtained in California for the Uto-Aztecan as well as non-Uto-Aztecan languages. Contrast this with the Numic languages covering huge areas in the Great Basin. Only those along the linguistic borders could be bilingual.

All of the present-day Sonoran groups are farmers, and likely have been at least since shortly after the breakup of Proto-Sonoran. With farming comes greater population density and more settled communities, and hence a smaller geographic network for mutual influence to operate, but a network that includes more people. This should minimize the wave effect. Those living in the mountains seemed to have a sparser and less settled population, creating conditions more like that found for their

TABLE 9

## LIST OF THE UTO-AZTECAN LANGUAGES

- 
- 
1. Numic
    - a. Western Numic: Mono, Northern Paiute (or Paviotso)
    - b. Central Numic: Panamint, Shoshoni, Comanche
    - c. Southern Numic: Kawaiisu, Ute (Chemehuevi, Southern Paiute, Ute)
  2. Tubatulabal
  3. Takic
    - a. Serrano-Gabrielino
      - (1) Serranan: Serrano, Kitanemuk
      - (2) Gabrielino (Gabrielino, Fernandino)
    - b. Cupan
      - (1) Cupeño, Cahuilla
      - (2) Luiseño
  4. Hopi
  5. Southern Uto-Aztecan
    - A. Sonoran
      - a. Tepiman: Upper Piman (Papago, Pima, Nevome), Lower Piman, Northern Tepehuan, Southern Tepehuan (Southern Tepehuan, Tepecano)
      - b. Taracahitian
        - (1) Tarahumaran
          - (a) Tarahumara (Eastern Tarahumara, Western Tarahumara, Southern Tarahumara)
          - (b) Guarijío (Highland Guarijío, Lowland Guarijío)
        - (2) Opatan: Opata, Eudeve, Jova?
        - (3) Cahíta (Mayo, Yaqui)
      - c. Tubar
      - d. Corachol: Cora, Huichol
    - B. Aztecan
      - a. Pochutec
      - b. General Aztec: Pipil, Aztec (Classical Aztec, Tetelcingo, Zacapoaxtla, and others)
- 

Numic and Takic relatives. Still further south are the Aztec, who took part in the high civilization of Mesoamerica. There we find the kind of language shifting typical of a society involved in empire building and in far-flung trading.

The nature of Uto-Aztecan societies, both past and present, is, then, mirrored in the nature of the language diversification.

**8. List of languages.** The classification can be summarized in either tree form or net form. In either case certain relationships, different ones in each case, are either distorted or ignored. I have chosen to put it in outline form (table 9), which is an implicit tree. I have also listed languages and dialects not included in this study, but for which we have adequate evidence for their placement (see 3 for references and authority).

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## GRAMMATICAL VOWEL LENGTH AND THE CLASSIFICATION OF QUECHUA DIALECTS

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**0. Introduction.**<sup>1</sup> Torero (1964:458-61) proposed the existence of phonemic vowel length in Proto-Quechua, based on the occurrence of long vowels in a number of modern Quechua dialects.

Long vowels are widely found in Quechua I, one of the two main groups into which Torero divides the Quechua dialects.<sup>2</sup> The second main group in Torero's classification, Quechua II, is further subdivided into Quechua IIA, IIB, and IIC. Long vowels occur in several Quechua IIA dialects (Pacaraos, Lincha, Laraos), or indications of their existence at an earlier stage can be found (Ferrefañe). In the remaining Quechua II dialects, including all dialects of the subgroups IIB and IIC, vowel-length distinctions are lacking (Torero 1974:22).

The question of why no trace of long vowels can be found in such a large number of Quechua dialects, while they occur frequently in others, is still to be answered. Most, but not all, of the long vowels in Quechua I can easily be interpreted as the result of innovations. The remaining cases support Torero's view that vowel length may have been phonemic in Proto-Quechua.

In this article I intend to examine two instances of vowel length used for grammatical purposes. I shall argue that both cases are due to innovations, a conclusion which would further reduce the number of occurrences of long vowels to be reconstructed for Proto-Quechua. The cases of vowel length discussed are suffix-final and root-final *a*: in verb forms, and the indication of the first-person subject or possessor with verbs and nouns.

For the discussion of grammatical facts that are typical for either Quechua I or Quechua II, I make use of data from the dialects of San Pedro de Cajas (province of Tarma, Junín) and of Ayacucho, respectively. Both are conservative representatives of the dialect groups to

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<sup>2</sup> Quechua I and II are called Quechua B and A, respectively, by Parker (1963). I ignore the terminology introduced by Torero in some of his later publications.