TOWARD A LINGUISTIC PREHISTORY OF THE SOUTHWEST: "AZTECO-TANOAN" AND THE ARRIVAL OF MAIZE CULTIVATION

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Advances in research on the prehistory of the Southwest provide new opportunities for linguists. This survey of major questions about the prehistory of the Southwestern language families focuses on the earliest period of the transition between hunting and collecting and cultivation, suggesting that the radiations of the major families in the region date to this era. A case study of the relationships between Uto-Aztecan and Kiowa-Tanoan suggests an episode of contact between Proto–Northern Uto-Aztecan and Proto-Kiowa-Tanoan, documented in a suite of ten loan words between the two proto-language communities. Such contact, perhaps about three thousand years ago, could have explained the spread of maize agriculture from Mexico into parts of the U.S. Southwest, one of the most significant problems in the prehistory of the latter region.

THE WEALTH OF ARCHAEOLOGICAL and ethnographic research on the U.S. Southwest presents a matchless opportunity for linguists to contribute to cross-disciplinary work on the prehistory of the region. A linguistic prehistory of the Southwest must treat the prehistory of five distinct language families: Yuman, Uto-Aztecan, Zuni, Keresan, and Kiowa-Tanoan. Since I focus here on linguistic evidence from the period of the transition from hunter-gatherer to cultivator adaptations that occurred more than three thousand years ago, I omit a sixth family, the Apachean branch of Athabaskan. The ancestors of these groups may have arrived in the Southwest only a few hundred years ago (cf. Towner 1996).

I review briefly the five Southwestern language groups with deep prehistoric roots in the region and the major questions that each poses for the linguistic prehistorian. I then present evidence for an episode of contact between the ancestors of Northern Uto-Aztecans and speakers of Kiowa-Tanoan at a remote date, at least three thousand years ago, around the time of the first evidence for maize cultivation on the Colorado Plateau. I argue that data presented by Whorf and Trager (1937) and Davis (1989) in support of a genetic connection between Uto-Aztecan and Kiowa-Tanoan is better explained within this areal-contact framework.

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THE MAJOR LANGUAGE FAMILIES, THE DATES OF THEIR DIVERSIFICATION, AND THE ARRIVAL OF MAIZE CULTIVATION

For every language family in the Southwest, a host of fascinating problems in prehistory might be explored using historical-linguistic methods. Here I focus on only one question, the possibility that the radiation of Yuman, Uto-Aztecan, and Kiowa-Tanoan is the result of a single sequence of events, the spread across the Southwest of maize cultivation. Zuni and Keresan may not have participated in important ways in this period and may represent communities that continued to practice hunter-gatherer subsistence patterns, perhaps in the Mogollon Highlands (cf. LeBlanc 2002), after the ancestral communities of the three major families had adopted cultivation.

For glottochronological divergence dates for the Southwestern language families, in most cases I rely on Hale and Harris (1979). Starostin (1999, 2000) has recently proposed revisions of glottochronological method. Applied to Afro-Asiatic by Militarev (2000), these yield a date of great antiquity, 9700 B.C., interestingly close to the early Neolithic date that we might expect for the beginnings of the radiation of this family. Preliminary work suggests that most published glottochronological dates for the Old World language families are at least a thousand years too young (Starostin 1999). A recalculation of glottochronological dates for the major Southwestern language families using the new methods should be undertaken.

Yuman

Hale and Harris (1979) state that time depth for Yuman, with a probable homeland on the lower Colorado River, should not exceed two millennia. They do not include in this estimate Kiliwa, the most distant outlier within Yuman itself, or Cochimi, a close sister to proto-Yuman. A Cochimi-Yuman breakup might date to about 3,000 B.P.

While Yuman has not been definitively shown to be related to any other group of languages (Campbell 1997:295), it may have wider affinities in California and Mexico. Exactly where these wider affinities might be is important for a central question: Were the Yuman groups, who all cultivated maize in the ethnohistoric period, cultivators with Meso-American affiliations, or did they have more northerly hunter-gatherer origins? The strongest connections of Yuman have usually been seen to be with a "Hokan" center in northern California. Langdon (1979) has argued for affinities within Hokan between Yuman and Pomoan. This would imply that the ancestral Yumans were hunter-gatherers who borrowed maize cultivation. However, this focus may be due to the strong Californianist bias and training of most of the linguists who have worked on the problem.

One reason that a possible connection between Yuman and Mesoamerican languages such as Tequistlatecan (Campbell 1997) or even Oto-Manguean by way of Tlapanec-Subtiaba (a proposal rejected by Campbell 1997) has not been given much attention is that the Seri, the nearest putative "Hokan" group to the south of Yuman, are not today cultivators. Bowen (1983:237) states that the Seri "have

never practiced agriculture." Given what we now know about hunter-gatherer ethnogenesis in other parts of the world (cf. Balée 1994), I do not think we can maintain this confidence. The Seri fought the Spanish and their Piman allies during the whole colonial period and were devastated by these wars. Today's Seri should probably be regarded as a refugee population. Ethnohistoric Seri range as mapped by Bowen (1983) extended into what is today thought of as Lower Piman territory on the Rio Sonora, and it seems entirely possible that at least some Seri have been cultivators. Thus, if the Yuman languages are distantly related to languages like Seri and more southern groups, it is possible that maize cultivation among Yuman speakers has ancient Mesoamerican roots. This is of course a highly speculative proposal, but nonetheless I believe that this question should be kept open.

Uto-Aztecan

Uto-Aztecan is represented in the Southwest proper by the Upper Piman languages (Tohono O'odham, formerly "Papago," and Akimel O'odham, or "Pima"), Hopi, and the Southern Numic dialect continuum (Chemehuevi-Southern Paiute-Ute). Until very recently, all students of the Uto-Aztecans have assumed that the proto-community consisted of archaic hunter-gatherers and was probably located in the Gila River drainage system (Fowler 1983). Glottochronological dates have been evaluated within the framework of this "northern origin" hypothesis, with Miller (1983) proposing a break-up date of 6000 B.P. and Fowler (1983) 5000–4500 B.P. Hale and Harris prefer the later date (1979:171).

I support a "southern origin" hypothesis: that the Uto-Aztecan ancestors were cultivators with a homeland in the northwestern part of Mesoamerica (Hill 2001a). Evidence for this "southern origin" hypothesis includes the reconstruction of maize-cultivation vocabulary for Proto-Uto-Aztecan (Hill 2001a), evidence for cultivation among ancestral Numic peoples (Hill 2002a), and linguistic evidence for the presence in languages of the northern Uto-Aztecan periphery of features usually associated with Mesoamerican languages, such as ceremonial couplets (Hill 2001b). Within this "southern origin" framework, the earliest date of the Uto-Aztecan radiation should not be earlier than the earliest dates for sedentism in Mesoamerica, currently dated at around 4500 B.P. The break-up process would then coincide with the northward migration of some Uto-Aztecan groups into the Southwest and would take place between about 4500 and 3500 B.P., later than the dates proposed by Fowler (1983).

The "southern origin" proposal for Uto-Aztecan resonates with a consensus, building among archaeologists, that migration must have played a role in the origins of Southwestern agriculture. Such a scenario was proposed early by Berry (1982), Berry and Berry (1986), and Matson (1991) and is supported now by very early dates for maize cultivation in the Southwest, now as far back as 3650 B.P. (uncalibrated ^{14}C) in the Tucson Basin (Jonathan Mabry, personal communication, May 2002) and perhaps at 2000 to 1800 B.C. in the Mogollon Highlands and on the Colorado Plateau (Wills 1995).

The major problems for the prehistory of the Uto-Aztecans are the following. Is the "northern origin" or the "southern origin" hypothesis correct? If the Uto-

Aztecans were migrants, what was the nature of their relationship with autochthonous Southwestern peoples? New research on the genetics of Uto-Aztecan groups shows that the mitochondrial DNA signatures of contemporary Uto-Aztecan-speaking populations in the Southwest and the Great Basin are much more closely related to those of neighboring non-Uto-Aztecan groups than to any populations in Mesoamerica. Members of both northern and southern branches of Uto-Aztecan, however, seem to carry a clear Mesoamerican signature in the form of a rare mutation at the Albumin locus, "Albumin* Mexico" (Smith et al. 2000; Malhi et al. 2001). These data suggest that if there was a Uto-Aztecan migration, it was dominated by males—and Malhi et al. consider this an unlikely scenario for a migration of cultivators. However, these genetic data may conform to the model of "farmaging" proposed by Diehl (2002). Diehl points out that early agricultural sites in the Southwest show a heavy dependence on wild foods. Among contemporary Uto-Aztecans, cultivation is done by males (as in Mesoamerica). Local females might have been recruited by early migrants to contribute the important wild-food component of the diet. The collection of wild foods, a female specialty, depends very heavily on local knowledge and would have made autochthonous females a very valuable resource. Linguistic research might be able to contribute to this problem by exploring whether non-Uto-Aztecan, local, vocabulary can be identified for important local wild plants. I discuss below a possible example, a Kiowa-Tanoan source for the Northern Uto-Aztecan word for "pine nut."

Kiowa-Tanoan

While the name "Kiowa-Tanoan" suggests that Kiowa and Tanoan are sister branches of a family, the current consensus is that the group consists of four coeval branches: Kiowa, Towa (Jemez), Tiwa (Northern, at Taos, and Southern, at Sandia and Isleta), and Tewa (with two major groups: Santa Clara versus the other Rio Grande pueblos of San Juan, San Ildefonso, Nambe, Tesuque, and Pojoaque) (Hale and Harris 1979:171). Arizona Tewa seems to be descended from a variety spoken in the Galisteo Basin, and other varieties may have been spoken in pueblos that were depopulated prior to the formation of our linguistic record. Hale and Harris (1979) suggest maximum dates of separation for Kiowa versus the rest of Tanoan of between 2,600 and 3,300 years ago.

The most important question for Southwestern prehistory is the nature of the relationship between Tanoan and Uto-Aztecan. Whorf and Trager (1937) argued that the two families were descended from a single common ancestor, "Aztec-Tanoan," and this proposal is often cited as if it were solidly accepted. I will argue below that it is far more likely that the relationship between Uto-Aztecan and Tanoan is one of contact between ancestral Tanoans and Northern Uto-Aztecans.

Cultivation and Linguistic Radiations: A Coincidence of Dates?

Emerging from the survey above is an interesting coincidence of the breakup dates for the major protofamilies: Uto-Aztecan between 4500 and perhaps 3500 B.P., Tanoan by 3300–2600 B.P., Cochimi-Yuman by 3000 B.P. These dates are

suspiciously close to the period, between about 4,000 and about 3,000 years ago, when maize cultivation spread across the Southwest and onto the Colorado Plateau. While all these dates should be considered tentative (Starostin 1999 suggests that new glottochronological methods will push the dates back in time), their coincidence strongly suggests that cultivation, whether it arrived by migration or by diffusion, precipitated episodes of linguistic differentiation of the major Southwestern language families. Most probably, there was even greater diversity in all three families in the prehistoric period than is visible today.

THE SMALL SOUTHWESTERN LANGUAGE FAMILIES: LATECOMERS TO CULTIVATION?

The absence of deep radiations of Zuni and Keresan suggests that the ancestors of these groups were not involved in the set of events, probably associated with the arrival of cultivation, that precipitated the deep radiations of Yuman, Uto-Aztecan, and Kiowa-Tanoan. Thus they may have become part of the Southwest cultivation complex at a later date.

Zuni

Zuni is a linguistic isolate. Newman's (1964) proposal of an affiliation between Zuni and Penutian is riddled with methodological problems. Furthermore, Lynn Nichols (personal communication 2001) has been accumulating evidence that Newman intended this proposal as a hoax on Carl Voegelin, the editor of the *International Journal of American Linguistics*, in which Newman's article was published. Both Catherine Callaghan (personal communication to Lynn Nichols, October 2001) and David Shaul (personal communication to Hill, October 2001) recall that Mary Haas told them that the paper was a hoax. Haas (along with George Trager) is cited in an endnote to Newman's paper as endorsing it, so must be considered a co-hoaxer.

As an isolate, Zuni poses special problems for the linguistic prehistorian. The reconstructed lexicon of a proto-language is one of the most important clues that historical linguistics brings to the study of prehistory, but the technique of reconstruction cannot be applied in the case of a linguistic isolate.

Earlier stages of Zuni might be sought by identifying Zuni loan words in neighboring languages, or loan words from neighboring languages in Zuni. A few such loans can be identified (Hill 2002b; Shaul and Hill 1998). They suggest that Zuni becomes "visible" linguistically only at a relatively late date, in a period when Zuni exchanged loan material with Upper Piman, perhaps in the late thirteenth and early fourteenth centuries (Shaul and Hill 1998).

Keresan

Keresan consists of seven almost mutually intelligible languages arrayed in a dialect continuum that Davis (1959) argued broke up no more than five hundred years ago. The two most distant forms of Keres are Cochiti in the east and Acoma in the west; Davis suggests a distinction between Western (Acoma and Laguna)

and Eastern Keresan dialects. Application of the Comparative Method yields little of interest for deep prehistory, since the languages are so closely related. Rood (1973), based on analysis of a very few examples, tentatively supported a proposal by Swadesh for a remote relationship between Keresan and the Caddoan languages.

As with Zuni, the method of linguistic prehistory most likely to yield interesting results is the investigation of loan words. The most important loan word from Zuni into Upper Piman, *siwañ* 'lord of a Hohokam Great House', is ultimately from Keresan *shiwanna* 'rain deity' (Shaul and Hill 1998), so the loan from Keresan into Zuni should predate the loan from the latter into Upper Piman. Nonetheless, Keresan speakers may be relatively recent as major participants in Southwestern prehistory.

LeBlanc (2002) states that maize cultivation is late in the Mogollon Highlands, the area nearest to where Zuni and Western Keresan are found today. While archaeologists argue for a very important role for Zuni and Keresan during the Puebloan period (ancestors of both groups may have been players in the Chacoan complex), the linguistic evidence hints that these groups may have been among the latecomers to cultivation noted by LeBlanc.

NORTHERN UTO-AZTECAN AND TANOAN: AN ANCIENT LANGUAGE CONTACT?

Whorf and Trager (1937), following an undocumented suggestion by Sapir (1956 [1929]), assembled data that they believed demonstrated a genetic relationship—descent from a single common ancestor—for Uto-Aztecan and Kiowa-Tanoan. They felt that the relationship between Kiowa and Tanoan was not established. Since this label is anachronistic in connection with their work, I will use the term "Tanoan" when discussing it. Their "Aztec-Tanoan" (or "Azteco-Tanoan," Davis 1989) is frequently cited in textbooks and manuals and was adopted without challenge by Greenberg (1987). However, this proposal must continue to be regarded as controversial in the highest degree. Campbell (1997:269) rates it as "0 probability, 50% confidence," and I concur.

At the time of his writing, Whorf had undertaken primary description of two Uto-Aztecan languages, Hopi (cf. his grammatical sketch [1946a] and many papers in Whorf 1956) and Nahuatl (1946b), as well as highly competent work on Uto-Aztecan historical linguistics (cf. Whorf 1935, 1937). A rich range of published and unpublished sources on many Uto-Aztecan languages, as good a set as could possibly have been assembled at that period, is cited in Whorf and Trager 1937. Whorf's Uto-Aztecan reconstructions in Whorf and Trager 1937 pose interesting challenges and should be reexamined carefully. The Tanoan data available to Whorf and Trager were not nearly so rich. Trager had done firsthand work on one language, Northern Tiwa at Taos (Trager 1946). Harrington's 1928 dictionary of Kiowa was used only as a source of data for Tanoan languages and not for Kiowa material, since Whorf and Trager considered Kiowa to be more distantly related to Tanoan than Uto-Aztecan! Otherwise the Tanoan lexical items in Whorf

and Trager 1937 are extracted from Harrington's ethnobiological studies and his redaction of a nineteenth-century vocabulary of Piro, with a few Southern Tiwa forms from notes taken by Newman in 1930. In contrast to Whorf's detailed reconstructions of Uto-Aztecan forms, Trager's Tanoan reconstructions are minimal, generally consisting only of CV sequences.

Whorf and Trager confidently claim to have identified about 140 cognate sets for Uto-Aztecan and Tanoan, "of which only about 10 are doubtful" (Whorf and Trager 1937:619). They fully illustrate 67 of the sets. For 34 additional sets they give only the "Aztec-Tanoan" reconstructions, without exemplification from the purported daughter languages.

Davis (1989) reanalyzed Whorf and Trager's data, finding that only "about half" of their cognate sets "seem to be plausible" (Davis 1989:378). Davis added new resemblant sets of his own, for a total of 107. Davis suggested, however, that the evidence does not permit us to conclude that Uto-Aztecan and Kiowa-Tanoan are more closely related to each other than either is to a number of other candidate language families.

Campbell (1997) has undertaken a detailed review of Whorf and Trager (1937) and of Davis's (1989) follow-up work. Here, I repeat many of Campbell's criticisms, adding some details of my own. I then turn to a new approach to the resemblances between Uto-Aztecan and Tanoan, suggesting that some of these must be due to language contact.

Problems with Comparisons of Uto-Aztecan and Tanoan by Whorf and Trager and Davis

The problems with Whorf and Trager's (1937) work fall into several subclasses. Most of these problems persist in the work of Davis (1989).

A. Whorf and Trager's (1937) proposal requires that they establish regular sound correspondences between words reconstructed for Proto-Uto-Aztecan (PUA) and words reconstructed for Tanoan. For many of their sets, the PUA form cannot be sustained. Among the cognate sets in Whorf and Trager 1937 with this problem are 3, 4, 6, 9, 10, 14, 21, 22, 25, 28, 40, 54, 57, 61, 62, 63, 67. An example of the problem is their item (54), where they reconstruct PUA *cu^x-. The only attestation for such an item is found in Tepiman, and Shaul and Hill (1998) have shown that it is probably a loan from Colorado River Yuman. Davis's (1989) Uto-Aztecan reconstructions also have many problems and consist usually only of CV sequences that neglect recent scholarship.

B. Many of Whorf and Trager's (1937) Proto-Tanoan forms cannot be sustained. For instance, Davis (1989) rejects (7) and (17) as failing to recognize morphological complexity in the Tanoan forms, resulting thus in their picking the wrong morpheme for comparison. Many of their reconstructions are based only on a single form in Trager's data from Taos; this is methodologically untenable.

Nichols (1994) has pointed out that many glottalizations, voicings, losses of consonants, etc., in Tanoan may be the result of secondary ablaut processes and should not be reconstructed. She mentions the sets for 'see' (34), for 'sit' (64), and for 'bathe' (65), reconstructed with initial **m, *0,* and **0* (by "0" I mean that no

initial consonant is reconstructed). Nichols (1994:98) states that "the [Kiowa-] Tanoan forms should instead be reconstructed with the initial consonants *p, *k, *k respectively." If Nichols is correct, the whole edifice of Whorf and Trager's sound correspondences between Uto-Aztecan and Tanoan, the most convincing dimension of their presentation (and that of Davis 1989, where the problem persists), will collapse, leaving us with a set of merely "resemblant," not "cognate," lexical items.

C. Campbell (1997:270) points out that at least 41 of the Whorf and Trager comparisons, and at least 74 of Davis's, match in only a single consonant-vowel (or single vowel) sequence. When we compare such short sequences, we run an enormous risk of admitting chance resemblances. The complexity of vowel shifts in Tanoan is such that reconstructions of Proto-Tanoan vowels must be regarded as no more than tentative. The "sound laws" that Whorf and Trager propose involve mainly a single process: the neutralization of the diverse Tanoan complex stop releases to plain releases in Uto-Aztecan. If Nichols (1994) is correct that many of these complex stop releases should not be reconstructed to Proto-Tanoan, then most of the putative "sound correspondences" will disappear, and we will be looking only at the sort of superficial initial-consonant resemblances in short words that have misled generations of incautious comparativists.

D. The same Uto-Aztecan etymon is used twice, in set (29) and (31). The item in (31) was one of the 5 resemblances that survived Campbell's (1997:273) critique; it is not valid. There is no Uto-Aztecan word **siwa*; this is only seen in Nahuatl *siwa:tl,* which has as its first syllable a reflex of PUA **su-,* having to do with mature women and seen also in (29). Thus Nahuatl (not Uto-Aztecan) *siwa:-* 'woman' and Kiowa-Tanoan **siu* 'woman' (Davis 1989:372) is in fact a chance resemblance.

E. Two of the sets involve "pan-American" (Campbell 1997) pronouns, 'I' (37) and 'you' (66). Many other "so-called pan-Americanisms" (Campbell 1997:257), such as words for 'water' and 'hand', appear in their lists. This problem persists in Davis (1989) and may be one source of his opinion that Uto-Aztecan and Tanoan may not resemble each other more than they do several other American language families.

F. The words for 'older brother' (38) and 'father' (89) are primary kin terms in *pa-* and *ta-,* respectively, belonging obviously to the notorious set of nursery words that should be avoided in long-range comparison. Davis (1989) adds a similarly problematic word for 'older sister'. Campbell dismisses also Davis's form for 'grandmother' (D 42).

G. At least seven items (5, 8, 15, 23, 45, 46, 55) are sound imitative words like 'blow', 'breathe', 'suck', the word for 'wild canine', which involves the sound for 'bark', and bird names. I believe that bird names should never be used in long-distance comparison in Native North America (and perhaps elsewhere). Not only are they sound imitative, but they are very easily borrowed, quite possibly as euphemisms because of the sacred associations of birds and feathers throughout North America. Some of the bird names included by Whorf and Trager (1937) also show up in Newman's Zuni-Penutian hoax (1964).

This problem persists in Davis's (1989) list of sets, which adds items such as (4) for 'drum', (11) for 'to smoke' (almost certainly related to 'blow'), (61) for 'to blow, of wind', and (87) for 'owl'.

H. In several cases, the semantic association seems very loose; among the many examples pointed out by Campbell (1997:271–72) is (36) where Uto-Aztecan 'spin, twirl' is compared to Tanoan 'turn, return'.

In summary, upon close examination, almost nothing survives of Whorf and Trager's proposal. Campbell (1997:273) admits only 5 survivors from the sets published by them and by Davis (1989); I recognize only 4 (since I reject WT31/D85). In contrast, for Uto-Aztecan and Mixe-Zoquean, Wichmann (1994, 2002), author of the major comparative dictionary of the latter group (Wichmann 1995), has identified 43 cognate sets, including 5 inflectional markers, linked by some strong sound correspondences with multiple attestations. I believe that the future lies with this proposal.

Evidence for Contact between Proto–Northern Uto-Aztecan and Proto-Tanoan

Shaul (1985) pointed out that one group of phonological correspondences in Whorf and Trager (1937), those involving /l/, /n/, and /r/, can only be due to borrowing. I follow Shaul in believing that Whorf and Trager's (and Davis's) data suggest, not descent of Uto-Aztecan and Kiowa-Tanoan from a single common ancestor, but the residue of a contact situation, amplified in their article into a genetic relationship by an incautious comparative methodology.

Probably the most important clue to the fact that Whorf and Trager (1937) and Davis (1989) are looking at least partly at loan words is that their resemblant sets include several items for maize and its cultivation. Of course Whorf and Trager (1937) could have made only the most general guess about the chronology of maize in the Southwest. However, by the time that Davis was writing, the general opinion among Southwest prehistorians was that intensive use of maize in the region was probably no more than two millennia old. These dates have since been pushed back to between three and four thousand years ago, but any common ancestor of Uto-Aztecan and Tanoan would have to date to a period far more ancient even than the earliest dates for cultivated maize in the Southwest. This anachronism, along with other evidence, points toward a complex of loan words, not to a genetic affiliation.

I believe that we can identify a very old layer of loan words between Kiowa-Tanoan and Uto-Aztecan—but only Northern Uto-Aztecan. That is, contact took place not between the Proto-Uto-Aztecans and Proto-Kiowa-Tanoans, but between the latter and that subgroup of the Uto-Aztecans that probably led the northern edge of the Uto-Aztecan expansion.

First, I review briefly the evidence for "Northern Uto-Aztecan." The exact structure of the Uto-Aztecan family is still in dispute. I have suggested (Hill 2001a) that we recognize at least five major branches: Corachol-Aztecan (following Campbell and Langacker 1978), Tubar, Taracahitan (perhaps including Opatan, perhaps separate from it), Tepiman, and Northern Uto-Aztecan (NUA). The NUA languages are Hopi, Numic, Tubatülabal, and Takic. Following Heath (1977, 1985) and Manaster Ramer (1992), I believe that we must recognize these as

descendants of a single common ancestor, Proto–Northern Uto-Aztecan (PNUA), which probably took shape in the northernmost reaches of the Uto-Aztecan range by about 3000 B.P. At the time of this formation, I suggest that their nearest neighbors to the east were ancestral Kiowa-Tanoans.

The lexical evidence for this proposal is presented below. For each resemblant set, I give the number that it has in Whorf and Trager 1937 (WT) and/or Davis 1989 (D). I give the most recent Uto-Aztecan reconstruction and Davis's (not Whorf and Trager's) reconstruction for Proto-Kiowa-Tanoan.

The first group of resemblant sets involve maize and cultivation and presumably represent loans from PNUA into Proto-Kiowa-Tanoan (KT).

1. D 99: PNUA **i̇ya* 'to plant', KT **ʔa* 'corn' (Davis 1989:373)

This very interesting pair is noted by Davis (1989). In Tanoan, it is attested in Kiowa *é:* and Northern Tiwa (Taos) *ʔa-*. The relevant Tanoan forms include the following:

a. Taos *ʔa-ʔane* 'corn' (Trager 1946:204 says this is reduplicated from *ʔa; -ne* is a "gender" suffix)
b. Kiowa *é:-t^{h}âl* 'grain of corn' (Harrington 1928)[1]
c. Kiowa *é:-góp* 'corn plant, corn stalk' (Harrington 1928)
d. Kiowa *é:-t^{h}âl-k^{h}ɔ̨y* 'corn cob, corn husk' (Harrington 1928)
e. Kiowa *é:-gɔ́, é:-bɔ́* 'fruit, seed, bread' (Harrington 1928; this stem also occurs in *zɋ́:-é:-gɔ́* 'seed of a corn variety.'
f. Kiowa *é:-k'óp* 'to plant' (Harrington 1928)

If this resemblance can be supported, it is a very important one, because it would demonstrate that the contact between Uto-Aztecan and Tanoan involved only speakers of Northern Uto-Aztecan. The sound change that defines Northern Uto-Aztecan (Manaster Ramer 1992) is PUA **c→ PNUA *y. That is, Proto-Uto-Aztecan 'to plant' is ***i̇ca*, not **i̇ya*, and so would not be a likely source for the Tanoan word.

2. WT 21, D 47: UA ***ka-ʔoʔra* 'corn', "Proto-Tanoan" **kʔu̧, *khë* 'corn, seed' (Whorf and Trager 1937:621; Davis 1989:370)

This set involves resemblance in only a single consonant. However, when it is considered as part of the suite of related vocabulary items given here, rather than in isolation, the possibility that the resemblance involves a genuine historical relationship, not mere chance, is enhanced. If the resemblance is the result of a historical relationship, this must be one of contact, a loan from PNUA into KT. There are two reasons for this. The first is that the word has to do with 'corn' in both sets of languages and thus is unlikely to be descended from a common ancestral form, given the late date of cultivation. The second is that this example illustrates the classic evidence for the detection of a loan word, where an item has an etymology in one language (Uto-Aztecan), but not in the other. The Uto-Aztecan etymology (Dakin and Wichmann 2000; Hill 2001a) is PUA ***ka-oʔra,* literally, 'hard-seed.head' (the dried maize ear), where the ***ka-* component means 'hard'. That element is also attested in Hopi *qaro-* 'to get hard, brittle'. The 'corn' etymon

is the second part, *o ʔra,* probably itself deriving from an original Uto-Aztecan stem **o ʔo* 'gravel, small round object' plus an increment *-ra.* It is seen in forms like Tumpisha Shoshone *onno(-cci)* 'pine cone harvesting hook'; Hopi *qaa-ʔö* 'dried ear of corn' and *öö-vi-* 'butt end of the corn cob, proximal end of cob' (probably from *öö* 'cob' + *pii-* 'breast, teat', with combining form *–vi,* a common compounding element for the blunt end or corner of some object); Tarahumara *o ʔna* 'corncob'; and Nahuatl *ooloo-* 'corncob with kernels removed'. This etymology needs more work, but the general point is clear. The item has a morphological analysis in Uto-Aztecan but does not have one in Kiowa-Tanoan. Furthermore, the ancestral Kiowa-Tanoans borrowed the salient first syllable, *ka-*, which does not mean 'corn' at all.[2] Thus we must assume that Uto-Aztecan is the donor language. In Uto-Aztecan the complex form **qa-ʔo:* is attested only in Hopi and Southern Paiute-Ute (in the latter language the word means 'ripe pine cone'). Hence the loan must be from NUA.

While in the above paragraph I have discussed the resemblant set proposed by Whorf and Trager (1937), there is a second possible source for the Proto-Tanoan form, which again is almost certainly NUA in origin. This is PNUA **kuma* 'corn', seen in Hopi *kokoma* 'dark red, almost purple corn', Kaibab Paiute *qumia* 'corn', Uintah Ute *kuma* 'corn', and probably Comanche *kukɨme-pɨ* 'toasted corn'. In this case the PNUA form is a more likely source for the Tanoan word on semantic grounds, since the PUA reconstruction is a verb, ***ku:mi/u* 'to nibble small pieces of food, especially corn on the cob or popcorn'.

3. D 17: PUA ***pa ʔci* 'corn, corn kernel, seed' (Hill 2001a), KT **p ʔëa* 'fresh corn' (Davis 1989:369)

This item does not appear in Whorf and Trager (1937) but is proposed as a resemblant set by Davis (1989). Like (2), above, the resemblance is only in the first consonant. As with (2), if there is anything to the resemblance, it must be a loan word, because 'corn' is not ancient enough to have been part of any "Azteco-Tanoan" cultural repertoire.

Campbell (1997:271) criticizes this item as having a disputed etymology in Uto-Aztecan. I have recently presented additional arguments for the Uto-Aztecan etymology, including a solid cognate in Hopi (*paacama* 'hominy'; Hill 2001a). Campbell believes that this item may be ultimately part of a suite of Mesoamerican loan items and thus not original to Uto-Aztecan; Wichmann (1998) disputes Campbell's account. However, this dispute is irrelevant to the present argument: the item could certainly have originally come into a very early stage of Uto-Aztecan from a neighboring Mesoamerican language yet still be a loan from PNUA into KT.

4. WT 50: PUA ***wika* 'planting stick, dibble', "Proto-Tanoan" *xwiya* 'hoe' (attested in Northern Tiwa [Taos] *xwia-d-;* Whorf and Trager 1937:622)

Davis (1989) does not include this set, since it is attested only in Northern Tiwa and so should not be reconstructed for KT. The Uto-Aztecan form is found in the southern languages and in Hopi. Here the resemblance involves the first

consonant and vowel. If there is anything to the resemblance, this is most likely a loan from PNUA into KT. While a 'dibble' could very well have been part of a hunting and collecting cultural repertoire, where the Uto-Aztecan word is attested, it means 'planting stick'.

5. WT 59: PUA ****kwɨsɨC** 'to carry, take', Tanoan **xwiya* 'to harvest' (attested only in Taos *xwia*; Whorf and Trager 1937:623)

As with (4), this set is attested in KT only in Northern Tiwa and so is rejected by Davis. In Uto-Aztecan, the meaning is not part of the cultivation complex but simply means 'bring, take, carry'. A possible semantic specialization to cultivation is only found in the Taos word. This item is interesting, however, in that the closest resemblance to the Taos form is found in Numic **kwɨha*. Hopi has *kwɨsí-* 'to bring'. This suggests that in Northern Uto-Aztecan there was a variant pronunciation, [h/s]. This variable is attested elsewhere in Uto-Aztecan. The shape of the KT borrowing, if it is indeed a borrowing, may suggest the geographic distribution of this variable at a very early stage of NUA development. It suggests that the KT ancestors, at the northeastern edge of the PNUA expansion, encountered Numic ancestors with the /h/ variant in this word.

In summary, five of the resemblant sets noted by Whorf and Trager (1937) and/or Davis (1989) involve words that were probably part of the Uto-Aztecan cultivation complex. If these resemblances are valid, they must be loan words, and their source is almost certainly Northern Uto-Aztecan.

In addition to the forms in the cultivation complex, several other items deserve serious consideration as possible loans from Uto-Aztecan into Tanoan.

6. WT 53, D 36: PUA **tɨho* 'man', KT **t?oi* 'person' (Davis 1989:36)

This item is listed in Miller's cognate sets (1988) as attested only in the southern Uto-Aztecan languages. However, Hopi provides a probable Northern Uto-Aztecan reflex. The Hopi word is an irregular one: *tiyo* 'boy', with irregular reduplicated plural *tootim*. Hopi *ti* is always evidence for a lost PUA vowel, since PUA did not have the sequence /ti/. The plural form in Hopi attests to this lost vowel; the underlying form is something like /toi-/ (the *-yo* is probably a suffix). By the theory of Internal Reconstruction (cf. Anttila 1989), this is the 'Pre-Hopi' or early Hopi—and quite possibly the PNUA—way of saying this word. This is a very likely development from a PUA form like **tɨho-i*. Of great interest for our purposes is the very close resemblance between the Pre-Hopi singular form *toi-* and Davis's KT reconstruction, **t?oi*.

The sceptic might ask, why would such a basic vocabulary item be borrowed? One possibility is that the word had a special use in religious practice, indicating, for instance, the ritual "godson" who is initiated into a secret society by an adult male sponsor. Similar kin terms appear as loan words between other Southwestern languages, such as Upper Piman *kihɨ* 'brother-in-law, some kind of brother' and Zuni *kihe* 'ceremonial brother' (Shaul and Hill 1998).

7. WT12, D 59: PNUA **wɨnɨ* 'stand', KT **gwi-* ~ **kwi-* 'stand' (Whorf and Trager

1937:620; Davis 1989:59)

Item (7) provides additional evidence for the Northern Uto-Aztecan source of a suite of loans into KT. This resemblant set is one of Campbell's (1997) survivors, since it exhibits more than a single CV resemblance. While Davis reconstructs only the first syllable of the KT word, the Tanoan forms given by Whorf and Trager exhibit /n/, as seen in Taos *wi:ne:* and Piro *-wien.*

**wɨnɨ,* as pointed out by Shaul (1985), is a Northern Uto-Aztecan etymon. The southern Uto-Aztecan languages have reflexes of PUA **r, not *n, in this word. It must be pointed out that Kaufman (1981, cited in Campbell 1997) reconstructs the Proto-Uto-Aztecan form as **n. If Kaufman is correct, then my (and Shaul's) argument collapses. However Voegelin, Voegelin, and Hale (1962), Langacker (1977), and Dakin (2001) all prefer to reconstruct PUA **r. I would argue in favor of **r, because I do not think that the southern languages, which all exhibit reflexes of **r, constitute a single subgroup (Hill 2001a). If this is the case, then **r is the archaic form, and PNUA *n represents an innovation shared throughout the group.

8. WT 39, D 2: PUA **pahi* 'three', KT **poʒu(a), *pocua* 'three' (Whorf and Trager 1937:622; Davis 1989:368)

This is a very plausible loan word from a language originating in Mesoamerica into a hunter-gatherer language of the Southwest. Languages in the latter type of community often have number systems where the only salient forms are 'one, two, many'. If Proto-Tanoan was a language of this type, a word for 'three' would have been a likely loan from Northern Uto-Aztecan, a group of cultivators. Possible Uto-Aztecan sources for other Tanoan numerals should also be explored. Like (7), this item survives Campbell's (1997:273) critique of Whorf and Trager (1937) and Davis (1989).

I turn now to two resemblant sets that seem to me to offer good candidates for loans from Proto-Tanoan into Proto–Northern Uto-Aztecan.

9. WT 16, D 43: PNUA **kuhcuN* 'buffalo, cow', KT **kon* 'buffalo' (Whorf and Trager 1939:620; Davis 1989:43)

Presumably speakers of Uto-Aztecan languages were moving from the south, where buffalo were rare, into regions where they were an important game animal. The etymon above is found only in the Northern Uto-Aztecan languages and among them only in Numic (the Hopi word for 'buffalo' is probably a loan from Keresan). Campbell (1997:271) points out that "terms for 'buffalo' are widely diffused in the Plains languages"; he notes Atakapa *cokoñ.* However, given the other evidence presented here, a KT source for the Numic item seems probable.

10. WT50, D 35: PNUA **tɨpat* 'piñon, pine nut', KT **tʔou* 'pine nut' (Whorf and Trager 1937:622; Davis 1989:370)

This item is another likely loan from KT into PNUA. The etymon involved, PNUA **tɨpat,* is found in every language in NUA including the California languages. It has no cognates in the southern Uto-Aztecan languages. In the southern languages, each group has its own local item for 'pine nut'. Among the

Northern Uto-Aztecans, the nuts of the piñon pine were one of the most important wild foods. The KT form has a labial element (Whorf and Trager 1937:622 reconstruct *w rather than *u) that could easily be a source for the intervocalic labial in the NUA word. The final *-t* in the NUA word is probably a Uto-Aztecan absolutive suffix (it does not appear in Hopi). This loan would fit nicely into the model discussed above, suggested by the work of Smith et al. (2000), Malhi et al. (2001), and Diehl (2002), in which non-Uto-Aztecan women are recruited to male-dominated Uto-Aztecan migrant groups as providers of wild foods.

In summary, I have proposed ten lexical items that I believe are likely candidates for loan words between Northern Uto-Aztecan and Proto-Kiowa-Tanoan. These include five items in the cultivation complex where I believe the source language is PNUA, two items for wild food sources (buffalo and pine nuts), where I believe the source language to be KT, and three items in other parts of the lexicon that are probably Uto-Aztecan in origin. I have recently compiled an inventory of the Northern Uto-Aztecan maize vocabulary (Hill 2002a), and this list should be checked carefully by Kiowa-Tanoanists and Tanoan speakers to see if any additional items from the cultivation complex can be identified. Similarly, the NUA inventory of wild plant names (cf. Fowler 1972, 1983) should be examined by Kiowa-Tanoanists and speakers for possible additional loan items.

The Location and Timing of the Proto–Northern Uto-Aztecan/Proto-Tanoan Contact Zone

If Proto–Northern Uto-Aztecan and Proto-Tanoan were indeed in contact, where and when did this take place? Archaeologists may have pinpointed the site of this early contact to within a few miles. Matson (1991) identified a major cultural boundary in the upper drainage of the San Juan River, between the Western and Eastern variants of the Basketmaker II culture. He argues that Western Basketmaker II has no obvious Archaic antecedents in the region. In contrast, Eastern Basketmaker II, according to Matson, does have Archaic antecedents and thus exhibits continuity with the record of hunting and gathering societies on the Colorado Plateau. LeBlanc (2002) summarizes research suggesting a biological difference between the two groups as well, with dental traits linking the Western Basketmaker II people to Mexico, but the Eastern Basketmaker II people to autochthonous Archaic groups.

Matson (1991) further believes that Western Basketmaker II represents an in-migrating group of cultivators. He hypothesizes (and is echoed in this view by LeBlanc 2002) that Eastern Basketmaker is the probable ancestor of the Fremont culture of the eastern Great Basin. The Tanoans, with a probable origin in the San Juan Basin in southern Colorado (Campbell 1997), may have been a component of the Fremont. In contrast, the Western Basketmaker people are considered to be ancestors of the Anasazi or Ancestral Puebloan culture.

The date of the earliest maize cultivation on the Colorado Plateau is disputed. Wills (1995) believes that it may date as far back as 4,000–3,500 years ago, while LeBlanc (2002) and Matson (2002) favor much later dates, as late as 300–500 B.C. Smiley (2000) recently announced uncalibrated ^{14}C dates of 3300 B.P. from maize

in southeastern Utah. While the dating situation is in flux, it seems likely that maize cultivation appeared on the Colorado Plateau by the beginning of the first millennium B.C.

Any of the dates within this disputed range for the Western Basketmaker-Eastern Basketmaker contact period are fairly close to the dates proposed by Hale and Harris (1979) for a breakup of Kiowa-Tanoan at 3,300–2,600 years ago. Fowler (1983:239) proposed a breakup of Northern Uto-Aztecan at about 3,000 years ago. Thus the linguistic evidence is consistent with the hypothesis of Matson (1991) that the Western Basketmaker II people brought cultivation to the Colorado Plateau as migrants and that they are probable ancestors of the Uto-Aztecans who live in the region today. The linguistic evidence presented here suggests that the Eastern Basketmaker II people were ancestral Kiowa-Tanoans.

LeBlanc (2002) has argued that the period of contact between the advancing front of cultivators and the autochthonous hunter-gatherer communities probably involved a good deal of violence. However, the linguistic evidence attests to a calmer side of the contact, including even some bilingualism—a prerequisite for an exchange of loan vocabulary. Shaul (1985) has argued that the situation of contact involved considerable borrowing of "core vocabulary" (such as the word for 'stand', (7) in the list of loans above). This, he suggests, is consistent with a situation in which language is not an important marker of ethnic differentiation and would contrast sharply with the present-day situation in the Southwest, where many communities exhibit what Kroskrity (1998) has called "indigenous purism," a strong reluctance to borrow words from other languages.

The great precision of the cultural boundary in the Upper San Juan Basin, as reflected especially in the record of perishables, makes this region an ideal place for the archaeological study of the primordial moment of contact between an advancing front of cultivators and a well-established and highly competent group of autochthonous hunters and collectors. I hope to have shown in the present article that linguistic evidence can contribute to our understanding of these important events in Southwestern prehistory.

CONCLUSION

Students of Southwestern prehistory have long benefitted from an unusually rich record of archaeological and ethnological research, and rapid advances in archaeology today provide exciting new challenges. Linguists should be contributing to our changing views of the region's prehistory. In this article, I have focused on only one time period, the era when cultivation first appears in the Southwest. I have reviewed general issues and developed in detail one case study. This case study involved two components. First, I argue that Whorf and Trager's (1937) proposal for "Azteco-Tanoan" is both methodologically untenable and incompatible with the understanding of Southwestern prehistory that we have today. Second, I showed that a model of language contact between Proto–Northern Uto-Aztecan and Proto-Kiowa-Tanoan is compatible with new models from archaeology, especially Matson's (1991) proposal of a zone of contact between the

Western and Eastern Basketmaker II in the Upper San Juan Basin at the period when maize cultivation first appears there. I hope that this case study will suggest the kinds of opportunities that are available today for linguists within a holistic framework for the study of Southwestern prehistory.

NOTES

1. I thank Laurel Watkins for providing transcriptions of the Kiowa words.

2. More familiar examples are Spanish loans from English like *beis* 'baseball' and *basquet* 'basketball', where the English compound has the destressed head word 'ball', lost in the Spanish borrowings.

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