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INTERNAL DIVERSITY IN UTO-AZTECAN: I

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0. Introduction

1. Languages used in test
2. Method of cognate determination
3. Separation dates and groupings

0. The purposes of this paper are (1) to group, on the basis of lexicostatistics, a sampling of Uto-Aztecan languages and (2) to present a method for determining whether the items in a given comparison are cognate.

Lexicostatistics, variously called glotto-chronology or the Swadesh method, is a method whereby the time of separation of related languages can be ascertained in an approximate number of years. A basic list of 215 relatively culture free items was first developed which exhibited, on an average, 81 retentions out of 100 for a period of 1,000 years. By the law of chance, the percentage of retention for two related languages of the same time level was 81 % of 81 %, or 66 %.¹ Later, in 1955, a new list of 100 items was developed which exhibited a higher rate of retention ($r = 86\%$) which, for two related languages of the same time level, raised the retention rate per 1,000 years to 86 % of 86 %, or 74 %.² In the present paper, the second list was used. To determine the time of separation (denoted by t) of a pair of languages, the list was translated into the two languages, and the lists were compared to determine the percentage of cognates (denoted by C). The date was then worked out on the basis of the formula: $t = \log C \div \log r^2$.³

¹ Morris Swadesh, *Lexico-Statistic Dating of Prehistoric Ethnic contact*, APSP 96.452-463 (1952).

² Morris Swadesh, *Towards Greater Accuracy in Lexicostatistic Dating*, IJAL 21.121-137 (1955).

³ Ibid.

1. Seventeen languages of the Uto-Aztecan stock were examined for the present study. The languages were selected purely on the basis of availability; no attempt was made to concentrate on any one area or to pre-group the languages on the basis of work already done in the Uto-Aztecan field.

The following languages were used: Northern Paiute (Np), Southern Paiute (Sp), Ute (U), Shoshone (Sh), Comanche (Cm), Tübatulabal (Tu), Cahuilla (Ca), Hopi (Ho), Papago (Pa), Pima (Pi), Tepecano (Tp), Mayo (Ma), Tarahumara (Ta), Cora (Co), Póchutla (Po), Mecayapan (Me), Zacapoxtla (Za).⁴

⁴ I wish to express my gratitude to the authors of the various sources which I used to obtain data for the test lists. I also want to thank Stanley Newman for his criticism and help.

The data are taken from the following sources: Np—from a tape of Swadesh's Penutian Survey List in the Archives of the Languages of the World, Indiana University; Sp—Edward Sapir, *The Southern Paiute Language*, *Proceedings of the American Academy of Sciences* 65.1-730 (1930); U—J. P. Harrington, *The Phonetic System of the Ute Language*, *University of Colorado Studies* 8.199-222 (1911); Sh—D. B. Shimkin, *Shoshone I: Linguistic Sketch and Text*, IJAL 15.175-188 (1949); Shoshone is also taken from tape in my possession; Cm—Joseph B. Casagrande, *Comanche Linguistic Acculturation*, IJAL 20.140-151, 217-237, 21.8-25 (1954-1955); Tu—Charles F. Voegelin, *Tübatulabal Grammar*, UCPAAE 34.55-190 (1935); Ca—A. L. Kroeber, *Shoshonean Dialects*, UCPAAE 8.235-269 (1909); Ho-Pa-Pi—from data of my own; Tp—J. A. Mason, *Tepecano, A Piman Language of Mexico*, *Annals of the N. Y. Academy of Science* 25.309-416 (1916); Ma—Howard Collard and J. Dedrick, *Cahita*, *Instituto Lingüístico de Verano*, 1955 (Swadesh list, unpublished); Ta—K. S. Hilton, *Tarahumara*, *Instituto Lingüístico de Verano*, 1955 (Swadesh list, unpublished); Co—K. Preuss, *Wörterbuch Deutsch-Cora*, IJAL 8.81-102; Po—F. Boas, *El Dialecto de Póchutla, Oaxaca*, IJAL 1.9-43 (1917);

The test lists for the various languages were obtained mainly from published word lists, grammars and texts. For inclusion of a language in the test, a lower limit was arbitrarily set at 70 vocabulary items in the Swadesh 100 word list. Due to the rather low limit, certain pairs of languages yielded dates of separation which were inconsistent with other pairs. But it was hoped that the number of languages tested would act as a corrective measure so that diagramming of the splits would be possible regardless of certain aberrant dates. This proved to be the case.

Changes in the original transcriptions were introduced only to make the data more uniform and easier to print. No attempt was made to phonemicize data which was not already phonemic.

2. Items in a given comparison were marked plus on the basis of attestable phonetic correspondences. A tentative reconstruction of proto-Uto-Aztecan was made using only the data available in the test lists; the relevant parts of compared items were marked plus only if they exhibited reflexes of a common proto-form. No improvement of reconstructions by inclusion of data outside the lists was made.

The value of this method lies in the fact that a controlled method of cognate determination may be applied when available data are limited to those which occur in the Swadesh list. The ideal situation, in which a great deal is known of the comparative linguistics involved, is seldom forthcoming for most of the languages of the world.

By use of this method, it is also possible to isolate borrowings, coincidental similarities, and irrelevancies. For example, Np *tohá-* *white* and Pa *túha* *white* are considered too uncertain to be accepted as cognate,

since only *t* and *a* are attestable correspondences. Two items exhibiting a difference in length are considered cognate if part of one of the items shows correspondence to a part or the whole of the other. Thus, Ca *puš* *eye* and Za *iištootoolo* *eye* are considered cognate, since *puš* and *iiš-* exhibit a one to one correspondence. This solution is enhanced by the comparison of Me *iiš* *eye* to the Za form.

2.1. A tentative reconstruction of proto-Uto-Aztecan phonology is presented in this section. Because of the limited range of vocabulary which could be admitted as evidence, and because of the variety of transcriptions in which the evidence occurred, it has been necessary in certain instances to accept unconditioned multiple reflexes of a single proto-phoneme. Two consonants in a given daughter language whose difference is one of a single manner of articulation have been admitted as possible reflexes of a single proto-phoneme. Unconditioned multiple vowel reflexes may differ in tongue height from high to mid or from low to mid, but not from high to low. Vowel reflexes may also differ in tongue position from front to back and in manner from rounded to unrounded. Consonantal correspondences are given higher rank than vowel correspondences. If, in a given comparison, all the consonants correspond and some or none of the vowels do, the items are considered cognate, but if all the vowels correspond and some or none of the consonants do, the items are considered too uncertain to be included as cognates. Thus Pa *háahagi* *leaf* and Me *šiwit* *leaf* are considered cognate, since the relevant parts show consonantal correspondence. That is, the morphology of the Pa form shows the initial syllables *háaha-* of which *h* corresponds to *š* in Me which includes a final *-t*, presumably a suffix, external to the comparison; but Pa *-g-* corresponds to Me *-w-*.

Each of the following reconstructions is followed by its reflexes in the daughter languages. Multiple reflexes are followed,

Me—H. W. Law, *Nahua de Mecayapan*, Instituto Lingüístico de Verano, 1955 (Swadesh list, unpublished); Za—Harold and Mary Key, *Vocabulario Mejicano de la Sierra de Zacapoxtila*, Puebla, 232 pages, 1953.

where possible, by a brief, parenthetical reference to the conditioning factor. The numbers at the end of each paragraph refer to the reconstructed forms in 2.2.

Consonants: *p: Np p; Sp p; U p; Sh p; Cm p; Tu p (initially), b (finally); Ca p; Ho p; Pa-Pi w (initially), p (medially); Tp b, w (initially), p (medially and finally); Ma p, b (initially), bb (medially following single *v*); Ta b; Co h; Po \emptyset , Me \emptyset (initially), p (medially); Za \emptyset . Examples: 1-5.

*t: Np t; Sp t (initially), r (medially); U (initially), r (medially); Sh d (initially), r (medially); Cm t (initially), r (medially); Tu t (initially), l (medially); Ca t (before a, u), \check{e} (before e); Ho t (before a, i), q (before \ddot{o}); Pa-Pi t (before a, o), \check{e} (before i, i, u); Tp t, D; Ma t (initially), tt (medially); Ta r, t; Co t; Po t; Me t; Za t. Examples: 5-18.

*k: Np k (initially), q (medially); Sp q (initially and following consonants), γ (medially); U k; Sh g (before a), k (elsewhere); Cm k; Tu h (initially and medially), g (finally); Ca k (initially and medially), x (finally); Ho q (before a), k (before i); Pa-Pi k; Tp k; Ma k, kk; Ta k; Co k; Po k; Me k (initially), γ (finally); Za k. Examples: 10, 20, 22-26.

*c: Ho c; Ma c; Co c; Po c; Me c; Za c. Examples: 19, 49.

*q: Np q; Sp q; Tu k; Ho k; Pa-Pi-Tp k; Ma k; Ta k; Za k. Example: 27.

*k^w: Np k^w; Sp qw; U k^w; Sh g^w, k^w; Cm k^w; Ca qw; Ho k^w; Pa-Pi-Tp b; Ma b^w; Ta w; Co k (before i), k^w (elsewhere); Po k^w; Me k^w; Za kw. Examples: 12, 19, 28, 29.

*?: Np ?; Sp ?, \emptyset ; U ?, \emptyset ; Sh \emptyset ; Ho ?; Pa-Pi ?; Tp ?, \emptyset ; Ma ?; Ta \emptyset ; Co \emptyset ; Po \emptyset ; Me \emptyset ; Za \emptyset . Examples: 16, 30-32.

*s: Np s; Sp š, s; U s (initially), š (medially); Sh s (initially), š (medially); Cm s; Tu š; Ca s (initially), š (finally); Pa h; Pi h (initially), \emptyset (medially); Tp h (initially), \emptyset (medially); Ma s (initially), ss (medially following single *v*); Ta s; Co s; Po s; Me s, š; Za s, š. Examples: 4, 13, 28, 33-36.

*h: Np h; Sp \emptyset ; U ? (initially and between identical *v*), \emptyset (medially); Sh h; Cm h; Tu \emptyset , ?; Ca h (initially), \emptyset (medially); Ho h (initially), \emptyset (medially); Pa-Pi-Tp h (initially before a), ? (initially before i), \emptyset (medially); Ma h; Ta h; Co h (before a): \emptyset (before i); Po \emptyset ; Me \emptyset ; Za \emptyset . Examples: 14, 30, 31, 37, 38.

*m: Np m; Sp m (initially), mw (medially); U m (initially), mw (medially); Sh m; Cm m; Tu m; Ca m[?]; Ho m; Pa-Pi-Tp m; Ma m; Co m; Po m; Me-Za m (initially), n (finally). Examples: 9, 15, 18, 23, 24, 35, 39, 40, 43.

*n: Np n; Sp n (initially), m (before bilabial stops), n[?] (medially between vowels); U n; Sh m (before bilabial stops), n (elsewhere); Cm n; Tu n; Pa-Pi n (before a, o), n (before i, i, u); Tp n; Ma nn (medially following single *v*), n (elsewhere); Ta n; Co n; Po n; Me n; Za n. Examples: 7, 21, 41-44, 49, 50.

*ŋ: Sp ŋ; U ŋ; Sh n; Tu ŋ; Ca m[?]; Ho ŋ (initially), m (medially); Pa-Pi n; Tp N; Na n (initially), nn (medially); Ta n; Co n; Me n; Za n. Examples: 8, 45.

*w: Np w; Sp w; U w; Sh w; Cm w; Tu w; Ca w; Ho l (before a, \ddot{o}), w (before i, i); Pa-Pi g; Tp g (initially), G (finally); Ma w; Ta \emptyset (before o), w (elsewhere); Co w; Me w; Za w. Examples: 26, 32, 34, 44, 47, 48.

*y: Ho y; Pa-Pi d (before a), ž (before u); Tp d; Ma y; Ta \emptyset ; Po y; Me y; Za y. Examples: 22, 25.

In the following list of vowel reconstructions, length and stress (both are probably phonemic in all the languages examined) are not marked, since it has not been considered necessary for the purposes of this paper. In citing the reflexes in the daughter languages, length and stress have been omitted.

*i: Np i; Sp i; U i; Sh i; Cm i; Tu i; Ca i; Ho i; Pa-Pi-Tp i; Ma e (following k or h), i (elsewhere); Ta u (following k), i (elsewhere); Co i; Po i; Me i; Za i. Examples: 1, 9, 12, 19, 23, 25, 26, 28, 48.

*e: Np i, u; Sp i; U i, u; Sh i, i, e, ē; Cm

i, u; Tu i; Ca e, u; Ho i; Pa-Pi-Tp í; Ma e; Ta i; Co e; Po e, u; Me e; Za e. Examples: 4, 10, 16, 17, 27, 33, 40, 41, 43, 44, 47.

*ε: Ca a; Pa-Pi i; Tp u; Ma i; Co a; Po e; Za e. Example: 50.

*a: Np a; Sp a; U a; Sh a; Cm a; Tu a; Ca a; Ho a; Pa-Pi i (finally following stops), a (elsewhere); Tp a; Me e (following y), a (elsewhere); Ta a; Co a; Po a (finally), e (elsewhere); Me a; Za e (following y), a (elsewhere). Examples: 2, 6, 9, 10, 12, 13, 15, 16, 18, 20-22, 24, 26, 28, 29, 31, 32, 34, 35, 37, 39, 45.

*u: Np i, o; Sp u; U i, u; Sh u; Cm u; Tu u; Ca u; Ho o; Pa-Pi-Tp u; Ma u; Ta u; Co i; Po e, u; Me i; Za i. Examples: 1, 14, 23, 25, 36.

*o: Np ɔ; Sp ɔ; U o, u, i; Sh ɔ; Cm o, u; Tu o; Ca i; Ho ɔ; Pa u (either contiguous to a, or separated from a by ?, h), o (elsewhere); Pi-Tp o; Ma o; Ta o, u; Co i, u; Po u; Me o; Za o. Examples: 3, 5, 13, 30, 31, 39, 42.

*ɔ: Np a; Sp a; U a; Sh a; Cm a; Tu o; Ca a; Ho a, ɔ; Pa-Pi-Tp o; Ma o; Ta o; Co u; Me a; Za a. Examples: 8, 46.

Clusters: *mk: Sp ɲʷ; U ʷ; Sh ɲgw; Ho q; Po k; Me g; Za k. Example: 6.

*nk: Np q; Sp ɲq; U ɲk; Sh ɲk; Cm k; Tu ɲh; Ca qʷ; Ho q; Pa-Pi k; Ma kk; Ta k; Co k; Po k; Me k; Za k. Example: 21.

*nt: Np Ø; Sp m; U Ø; Sh m; Cm Ø; Tu nt; Ma tt; Ta t; Co t; Po t; Me t; Za t. Example: 11.

*ns: Np Ø; Sp ʔ; U ʔ; Sh ʔ; Cm Ø; Tu nʒ; Ca š; Ho s; Pa h; Pi Ø; Tp ʔ; Ma s; Ta s; Co s; Po š; Me š; Za š. Example: 1.

2.2. There follow, in this section, 50 reconstructed items. Each of the reconstructions serves merely as an index of correspondences held in common by a number of cognate items. They are not reconstructed forms in the usual comparative sense, since total sound control was, in most cases, impossible due to limitations inherent both in the data and in the method. Each reconstructed item in the following list is followed by its counterpart in the daughter languages in which it occurs.

1. *punsí *eye*: Np pái, Sp puʔi, U piʔi, Sh púʔI, Cm pui, Tu punʒi-, Ca puš Ho póosi, Pa wúhi, Pi wúi, Tp buʔi, Ma puúsi, Ta busí, Co hisi, Po -štotolú, Me -iış, Za iıştootoolo.

2. *pa *water*: Np páʔ, Sp paʔ, U paA, Sh paʔ, Cm páʔ, Tu paʔl, Ca pal, Ho páahi, Ma baáʔa, Ta baʔwí, Co he, Po at, Me aat, Za aat.

3. *po *path*: Np póʔ, Sp pɔʔ, U piʔ, Cm puʔE, Tu poh-, Ca pit, Ho póhi, Pa wóogi, Pi woogi, Tp voi, Ma boóʔo, Ta buwé, Co huye, Po otkán, Me ihti, Za ohti.

4. *sepe *cold*: Sp šipi, U si, Tu šib-, Pa-Pi hípi, Tp hipit, Ma sébbe, Co se, Me sekti, Za seseek.

5. *top *fish*: Pa-Pi wátopi, Tp vatop, Me topo.

6. *tamka *man*: Sp taɲʔwa, U taʔwa, Sh dangwəp, Cm tenapimaʔ, Tu taʔwal, Ho táaqa, Cora taʔta, Po teket, Ma tagat, Za taakat.

7. *ten *mouth*: Np tupá, Sp tímpa, U tipa, Sh dimbI, Cm tuʔpE, Pa-Pi éɲi, Ma teéni, Ta riní, Co teni, Po ten, Me -ten, Za teen.

8. *təɲ *knee, leg*: Sp taɲa-, U táɲa-, Sh danəp, Tu toɲoʔ-, Ca tamʔi, Ho támö, Pa-Pi tóoni, Ma tónno, Ta ronó, Co tunú, Me -tankʷa, Za taanewaay.

9. *mati *know*: Tu maʔg, Pa-Pi máači, Tp máʔtik, Po metí, Me -mati, Za -mati.

10. *kate *sit*: Np katí, Sp qari-, U kariʔ, Sh gári, Cm karʔ, Tu hal-, Ho qáti, Co kaʔteI.

11. *tent *stone*: Np tipíʔ, Sp tímpi-, U tupi-, Sh dimbI, Cm típiI, Tu tínt, Ma tétta, Ta rité, Co tete, Po tot, Me tet, Za tet.

12. *kʷi- *earth*: Tp biʔD, Ma bʷíya, Ta wiʔyé.

13. *tosa *white*: Sp tɔšʔa-, U tuša, Cm tosa-, Ho qócá-, Pa túha, Pi toa, Tp toa, Ma tósali, Ta rosákami.

14. *tuh *black*: Np toho-, Sp tuʔ-, U tukʷa-, Sh túhu-, Cm tuʔ-, Ca tul-, Pa-Pi čúki, Tp tuk, Za tiiltik.

15. *tama *tooth*: Np taʔmá, Sp taɲwa,

U taṗwa, Sh damA, Cm tama-, Ca tam'a, Ho táma, Pa-Pi táatami, Tp tamo, Ma támami, Ta ramé, Me -tan, Za taan.

16. **ate louse*: Ho 'ati, Ma 'étte, Po atómt, Me atimit.

17. **te-small*: Np tí-ci?, Sh dé-či, Cm tie-, Ma teébe, Po túči.

18. **tam, -t-we*: Np támi, Sp tám-i-, U tami, Sh damē, Cm tamí, Ca čemem, Ho 'itámi, Pa-Pi 'áačimi, Tp atiV, Ma 'ítapo, Ta tamuhé, Co itam, Po tuen, Me tehmen.

19. **k'ici smoke*: Np k'í-dahA, Sp qwi-, U k'ipí, Sh k'ipu, Cm k'ipí, Ho k'í'ciṗ'i, Ma b'icia, Co kici.

20. **ka not*: Np kái, Sp qa, U ka, Sh ke, Cm ke-, Tu haš, Ca ki'i, Ho qa, Ma kaa, Ta ke-, Co ka.

21. **nanka ear, hear*: Np naqá, Sp naṗqa, U naṗka, Sh náṗk, Cm na-kI, Tu nanha, Ca naq'a, Ho náqvi, Pa-Pi náaki, Ma nákka, Ta naká, Co naka, Po nekéz, Me nakas, Za nakas.

22. **yaka nose*: Ho yáqa, Pa-Pi dáaki, Ma yékka, Ta aká, Po yekét, Me -ya?, Za yekacol.

23. **muki die*: Tu muṅ, Ca mukiš, Ho móoki, Pa-Pi múuki, Tp mui, Ma muúke, Ta mukú, Po mok, Me miki, Za -miki.

24. **maka give*: Sp maqa, Cm máka, Tu maha, Ca max, Ho máya, Pa-Pi máaki, Tp ma-, Ma miika, Po meká, Me -maga, Za maka.

25. **yuki rain*: Ho yóoki, Pa-Pi žúuki, Tp du-ki, Ma yúke, Ta ukuí, Po yekt.

26. **waki dry*: Tu wa-g, Ho láaki, Pa-Pi gáki, Ma wakía, Ta wakicéami, Co waci, Me waki.

27. **qe bite*: Np qíi, Sp qi'i, Tu ki-?, Ho kúki, Pa-Pi-Tp kíi, Ma ké'eye, Ta ikí, Za kikeeh.

28. **k'asi tail*: Np k'así, Sp qwas-i-, U k'así, Sh g'áši, Cm kwasI, Ca qwasqa, Pa báhi, Pi báí, Tp bai, Ma b'assía, Ta wasí, Co k'asi.

29. **k'a eat*: Ma -b'wa, Ta ko'wá, Co k'wa, Po k'wa, Me k'aa, Za takwaa.

30. **o'oho bone*: Np -'hó, Sp ɔ-, U o'ovI, Ho 'óóqa, Pa-Pi 'óo'oo, Tp 'ó'o, Ma

'ótta, Ta očí, Co ika, Po ot, Me oomit, Za oomit.

31. **o'oha yellow*: Np 'ahá-, Sp ɔa-, U 'oa-, Sh zha, Cm 'oha, Pa 'úami, Pi 'oámi, Tp oam.

32. **awa horn*: Npwa-, Sp 'a-pi, U 'a-, Cm 'a-, Tu a-, Ho 'aala, Pa-Pi 'áa'agi, Tp 'a'aG, Ma 'áa 'am, Ta a'wá, Co awa.

33. **se one*: Np sí'n'wi, Sp ro-, U su-, Sh sim, Cm sí-, Ca supli, Ho síika, Pa-Pi híma-koo, Tp hímaD, Ma seénu, Co sai, Po se-, Me se, Za see.

34. **sawa leaf*: Pa-Pi háahagi, Ma sáuwa, Ta sawá, Me šiwit, Za aašiwit.

35. **masa feather*: Ho mása, Ta masá.

36. **su star*: Tu šu-l, Ca suwet, Ho sóohi, Me sitalin, Za siitalin.

37. **ha-what, who*: Np haká, Sp aṗa, an'ia, Sh hága, Cm hakai, Tu agí, Ca haxi, Ho háki, Pa hásičuu, Pi hásižuu, Tp hatoV, ha-stu, Ma hábe, Co haní, haiki, Po ak, Me a'kon, Za aakoni.

38. **hi drink*: Np hívi, Sp ivi-, U 'ivi-, Cm hí-vI, Tu 'i-, Ho híiko, Pa-Pi 'ii, Tp 'i, Ma hé'oye, Ta bahí, Co i.

39. **ma, mo hand*: Np ma-i, Sp mɔ'o, U mi'i, Sh mo, Cm mo'o, Tu ma-, Ca ma?, Ho má, Ma mámma, Co moáka, Po mai, Me maa, Za maay.

40. **me kill*: Tu mi'ig-, Ca meka, Tp mí'ak, Ma mé'a, Ta mi'yá.

41. **ne I*: Np ní-, Sp ni?, U ni?, Sh nit, Cm ni'u?, Tu nik, Ca ne, Ho ni?, Pa-Pi 'áapi'i, Ma 'inapo, Ta nihé, Co ni, Po nen, Me neh, Za neh.

42. **no egg*: Cm no?, Ho nōhi, Pa-Pi nōhnaa,

43. **nema liver*: Np ní-mi, Sp niṗwi, U nupI, Sh ni'wi, Cm nim, Tu nim-, Ca nem'a, Ho níma, Pa-Pi ními.

44. **wene stand*: Np winí'o, Sp win-í, U wini-, Sh wēnē, Tu wíni-, Ho wini-, Ta wirí.

45. **pa root*: Ho gáhi, Ma náawa, Ta nawá, Me nelwayo, Za naalwal.

46. **wɔ two*: Np wa'hái'i, Sp wa-, U waiyiinI, Sh wadē, Cm wáha-, Tu wo-, Ca wi, Ho lööyi, Pa-Pi góoki, Tp gó'k, Ma woöyi, Ta okuá, Co wapo.

TABLE 1. Uto-Aztecan Dates

	Za	Me	Po	Co	Ta	Ma	Tp	Pi	Pa	Ho	Ca	Tu	Cm	Sh	U	Sp
Np	4213	4595	3992	3217	4099	3298	3702	3779	3206	2954	3206	3039	1046	1427	1328	1748
Sp	4106	4733	3992	3298	4107	3298	3504	3779	3298	2740	2802	2649	1092	1198	618	
U	4267	4214	3992	3038	3992	3038	4588	3481	3389	2879	3389	2649	954	1481		
Sh	5023	5152	4595	3481	4733	3617	4108	4107	4107	2725	3046	2229	424			
Cm	4733	4733	4099	3389	4259	3481	3519	3481	3298	2504	2641	2298				
Tu	4221	3809	3809	3046	3504	3206	3809	3617	3481	2878	2229					
Ca	3617	4466	3992	3671	3481	3672	3481	3298	3122	2878						
Ho	3885	4107	3779	3779	3992	3389	4214	3617	3779							
Pa	3916	3809	3916	3389	3298	3046	427	198								
Pi	4099	3702	4351	3581	3206	2878	695									
Tp	3481	3481	3617	3389	2878	2878										
Ma	3617	3908	2877	2878	3031											
Ta	4466	4595	3779	3779												
Co	4344	3885	3885													
Po	1252	1214														
Me	1145															

47. *we *big, long*: Ho wíko, wípa, Pa-Pi gí'íži, Tp gí, Me weyi, weyat: Za weeyi, Za weeyak.

48. *wi *grease*: Tu wípt, Ca wi, Ho wíhi, Pa-Pi gígi, Ta wí'i.

49. *con *head, hair*: Ma coónim, Po con, Me conkal, Za -coon.

50. *nen *tongue*: Ca naṇ, Pa-Pi nñi, Tp nunu, Ma nínni, Co nanu, Po nenepíl, Za nenepiil.

3.1. The dates of separation (in terms of years ago) for the 17 languages examined are contained in Table I.

Many of the inconsistent dates can be explained as being due to faulty data. The Sh test list, for example, is too brief to render consistent dates. Such inconsistencies can be readily found and accounted for. A much more disturbing problem occurs, however, when a group of languages exhibits dates which are consistently out of line. A basic assumption dictates that two closely related languages or groups of languages must be equidistant in time from a language or group of languages which is more distant in time from each of the two closely related languages than the latter are from each other. In this study, however, it has been found that Np, Sp, U, Sh, Cm, Tu, Ca and

Ho (Shoshonean) exhibit a consistently lower cognate per cent, yielding an average date of 4100, when compared to Za, Me, and Po (Nahuatlán) than do Pa, Pi, Tp, Ma, and Co (Sonoran) which yield an average date of 3800 for that comparison. But Sonoran exhibits a higher cognate per cent, yielding an average date of 3400, when compared to Shoshonean than when compared to Nahuatlán. The dates, 4100 and 3800, which, theoretically, should be the same, exhibit a discrepancy of 300 years. This discrepancy is probably not great enough to cause any concern, but, at least in the author's mind, the tenet that the rate of morpheme decay is constant and the same for different languages must be taken more liberally than he had hitherto supposed.

Another disturbing problem is presented by the Ta dates. Ta consistently exhibits a low cognate per cent for all of its comparisons except those with Pa-Pi-Tp (Pima-Tepecano) and Ma (Cáhita). The low cognate percents yield dates which are high enough to suggest that Ta constitutes a separate sub-stock equal to the Northern and Southern sub-stocks (see diagram below). The high cognate percents, however, yield dates which suggest that Ta is a Sonoran language. If Ta is Sonoran, then

the premise that different languages lose vocabulary items at the same rate is false. If Ta constitutes a separate sub-stock, then a great deal of borrowing must have occurred between Ta and Sonoran at a date before the phonological changes peculiar to Ta took place.

These problems make diagramming difficult and, in certain cases, wholly arbitrary.

3.2. The diagram in this section gives the groupings of the 17 Uto-Aztecan languages and the approximate dates of separation as indicated by the study. The major split occurred approximately 4,000 years ago dividing the Uto-Aztecan stock into two major sub-stocks, the Northern and the Southern. The Northern sub-stock is further divided into the Shoshonean and the Sonoran. The Shoshonean is divided into the Plateau Shoshonean (Np, Sh, Cm, Sp, U), the Kern River (Tu), the Pueblo (Ho), and the Southern Californian (Ca).



DIAGRAM OF UTO-AZTECAN GROUPINGS