

TABLE 1. *English, Totomayan and Huave*

	ZOQUE	TOTONAC	YUCATEC	HUAVE
all	<i>mumu</i>	<i>paks</i>	<i>tulakal</i>	<i>meawan</i>
ashes	<i>kuy-ham</i>	<i>lka?ka?</i>	<i>ta?an</i>	<i>ngwiat</i>
bark	<i>naka</i>	<i>qu?cqa?</i>	<i>u-pac-ce?</i>	<i>o-pang</i>
belly	<i>ʔek</i>	<i>paan</i>	<i>nak</i>	<i>o-tʔeng</i>
big	<i>mʔha</i>	<i>ʔanka?</i>	<i>nohoc</i>	<i>na-tang</i>
black	<i>yʔk</i>	<i>ʔi?ʔa?qa</i>	<i>ek</i>	<i>na-mbeor</i>
blood	<i>ni?pin</i>	<i>qa?l-ni?</i>	<i>kik</i>	<i>kieh</i>
bone	<i>pak</i>	<i>lukut</i>	<i>bak</i>	<i>o-laaʔ</i>
burn	<i>ne?m-</i>	<i>lkuy</i>	<i>elēl</i>	<i>nkatitit</i>
cloud	<i>?o?na</i>	<i>puk-lni?</i>	<i>muyal</i>	<i>oik</i>
cold	<i>pakak</i>	<i>qa?wi?wi?</i>	<i>si?is</i>	<i>na-kind</i>
come	<i>min-</i>	<i>min</i>	<i>talel</i>	<i>(im)iin</i>
die	<i>ka?-</i>	<i>ni-</i>	<i>kimil</i>	<i>ndeow</i>
drink	<i>?uk</i>	<i>qu?ta</i>	<i>ukul</i>	<i>-nganeow</i>
ear	<i>kowi</i>	<i>taqaan</i>	<i>ʔikin</i>	<i>o-laag</i>
earth	<i>nas</i>	<i>ti?ya?t</i>	<i>lu?um</i>	<i>iit</i>
eat	<i>wi?k-</i>	<i>wa?-</i>	<i>hanal</i>	<i>iet</i>
egg	<i>poka</i>	<i>qaa?hwaa?t</i>	<i>he?</i>	<i>o-mb</i>
eye	<i>witim</i>	<i>laqastapu</i>	<i>wic</i>	<i>o-niiag</i>
fat	<i>ʔanga?</i>	<i>mantiika (Span.)</i>	<i>ʔaʔ</i>	<i>ʔapay</i>
feather	<i>piʔk</i>	<i>pa?qa?</i>	<i>kukum</i>	<i>o-limb</i>
fire	<i>hukitʔik</i>	<i>lkuyat</i>	<i>ka?ak</i>	<i>biimb</i>
fish	<i>koke</i>	<i>s-kii?ti?</i>	<i>kay</i>	<i>kiet</i>
five	<i>mohsa?y</i>	<i>kifis</i>	<i>ho?</i>	<i>kokiaw</i>
fly	<i>sitiht</i>	<i>qusa</i>	<i>ʔiknal</i>	<i>-hli</i>
foot	<i>ne?y</i>	<i>tuwan</i>	<i>ok</i>	<i>o-leah</i>
give	<i>ʔi?-</i>	<i>maa?staa?-</i>	<i>ʔa</i>	<i>ie</i>
good	<i>?oye</i>	<i>ʔaan</i>	<i>uʔ</i>	<i>na-hneah</i>
green	<i>ʔuhʔuh</i>	<i>stagni?nki?</i>	<i>ya?af</i>	<i>na-teaik</i>
hair	<i>way</i>	<i>ya?hni?</i>	<i>ʔo?oʔ</i>	<i>o-ndeaʔ</i>
hand	<i>ks?</i>	<i>makan</i>	<i>kab</i>	<i>o-wif</i>
head	<i>ko-pak</i>	<i>a?q-faaqa</i>	<i>pol</i>	<i>o-mal</i>
hear	<i>matoŋ-</i>	<i>qaʔ-mata</i>	<i>u?yik</i>	<i>-ngeay</i>
heart	<i>ʔokoy</i>	<i>naku?</i>	<i>pukʔiikal</i>	<i>o-meeaf</i>
heavy	<i>hemeʔ</i>	<i>ʔinka</i>	<i>aal</i>	<i>na-im</i>
I	<i>?ih</i>	<i>kii</i>	<i>te-n</i>	<i>ʔike</i>
ice	<i>ʔatuh</i>	<i>miki</i>	<i>yelo (Span.)</i>	<i>yelo (Span.)</i>
know	<i>mus-</i>	<i>ka?ʔii-</i>	<i>ohel</i>	<i>ndiy</i>
leaf	<i>?ay</i>	<i>tu?waa?n</i>	<i>le?</i>	<i>op</i>
lie	<i>?iŋgek</i>	<i>ma?-</i>	<i>cital</i>	<i>peaaw</i>
liver	<i>pa?t</i>	<i>-l-wa?ka?ka?</i>	<i>taman</i>	<i>ik</i>
long	<i>piy</i>	<i>lmaa?n</i>	<i>cowak</i>	<i>na-hal</i>
man	<i>pin</i>	<i>ci?ʔku?</i>	<i>ʔb</i>	<i>na-fey</i>
many	<i>wiwi</i>	<i>luwua?</i>	<i>ya?ab</i>	<i>fowiy</i>
meat	<i>sis</i>	<i>lii-wa?</i>	<i>bak</i>	<i>o-nih</i>

TABLE 1—Continued

	ZOQUE	TOTONAC	YUCATEC	HUAVE
mountain	<i>po?mna</i>	<i>sipih</i>	<i>pu?uk</i>	<i>peat</i>
mouth	<i>?aynaka</i>	<i>kitni?</i>	<i>ci?</i>	<i>o-mbeay</i>
name	<i>nʔy</i>	<i>tapaa-kuwiiit</i>	<i>kaba?</i>	<i>nit</i>
neck	<i>kini</i>	<i>piʔ-ni?</i>	<i>kal</i>	<i>o-nik</i>
new	<i>home</i>	<i>saasti?</i>	<i>tumben</i>	<i>hayaʔ</i>
night	<i>ʔu?</i>	<i>ci?sni?</i>	<i>akab</i>	<i>o-ngwiiat</i>
nose	<i>kini</i>	<i>kinkan</i>	<i>ni?</i>	<i>o-ʔing</i>
not	<i>ha?n</i>	<i>niinta?</i>	<i>ma?</i>	<i>ngo</i>
one	<i>lumʔ</i>	<i>-lum</i>	<i>hun</i>	<i>nop</i>
person	<i>pin</i>	<i>cifku?</i>	<i>winiʔk</i>	<i>nipilan</i>
rain	<i>ih</i>	<i>siin</i>	<i>ca?ak</i>	<i>na-hoet</i>
red	<i>ʔapas</i>	<i>ʔu?ʔu?qu</i>	<i>caʔk</i>	<i>na-kanʔ</i>
river	<i>ni?</i>	<i>galtuucuquh</i>	<i>ukum</i>	<i>lam</i>
road	<i>tuŋ</i>	<i>tihʔ</i>	<i>be</i>	<i>tiʔd</i>
root	<i>waʔi</i>	<i>tanqa-ʔiiqa</i>	<i>moʔ</i>	<i>o-ʔiic</i>
sand	<i>wa?na</i>	<i>kukuh</i>	<i>sus</i>	<i>wiiit</i>
say	<i>nim-</i>	<i>-wan</i>	<i>wa?alik</i>	<i>-sah</i>
see	<i>ken</i>	<i>u?kʔila</i>	<i>wiʔik</i>	<i>-haw</i>
seed	<i>o-mb</i>	<i>talʔi?</i>	<i>nek</i>	<i>o-saab</i>
short	<i>tim-buh</i>	<i>a?k-ʔuu</i>	<i>kom</i>	<i>tokoʔ</i>
sit	<i>kono</i>			
skin	<i>pok-</i>	<i>wila-</i>	<i>kutal</i>	<i>ʔotoh</i>
sleep	<i>naka</i>	<i>fuuwa?</i>	<i>oi</i>	<i>o-taag</i>
small	<i>?iŋ-</i>	<i>l-tata-</i>	<i>wenel</i>	<i>-meay</i>
smoke	<i>ciks</i>	<i>a?k-ʔuu</i>	<i>cican</i>	<i>kiceec</i>
	<i>hokoh</i>	<i>hini?</i>	<i>buʔ?</i>	<i>na-sop</i>
snake	<i>ʔan</i>	<i>luwua?</i>	<i>kan</i>	<i>ndiik</i>
stab	<i>toʔ</i>	<i>l-tukuuni-</i>	<i>lom-</i>	<i>-hʔol</i>
stand	<i>tenay-</i>	<i>kahyah</i>	<i>wa?tal</i>	<i>lomboh</i>
star	<i>maʔa</i>	<i>sta?ku</i>	<i>ek</i>	<i>o-kas</i>
stone	<i>ʔa?</i>	<i>ciwif</i>	<i>tunic</i>	<i>kong</i>
sun	<i>hama</i>	<i>ci?cini?</i>	<i>kin</i>	<i>nit</i>
swim	<i>hem-</i>	<i>f-kiwaatnam</i>	<i>tahal ha?</i>	<i>-hrok</i>
tail	<i>ye?ŋu</i>	<i>s-tahan</i>	<i>ne</i>	<i>o-wil</i>
that	<i>te?a</i>	<i>aa?ma?h</i>	<i>lelo?</i>	<i>ayin</i>
this	<i>yi?wi</i>	<i>yu?ma?</i>	<i>lela?</i>	<i>aag agiy</i>
thou	<i>mih</i>	<i>wi?ʔ</i>	<i>te-c</i>	<i>i-ke</i>
three	<i>tuka?y</i>	<i>-tu?tu</i>	<i>of</i>	<i>aroh</i>
tongue	<i>toʔ</i>	<i>si?ma?qaat</i>	<i>ak</i>	<i>o-niw</i>
tooth	<i>tiʔ</i>	<i>taʔan</i>	<i>ko</i>	<i>o-liēk</i>
tree	<i>kuy</i>	<i>ki?wi?</i>	<i>ce?</i>	<i>ʔiil</i>
two	<i>meʔa</i>	<i>-tu?y</i>	<i>ka?</i>	<i>ih-</i>
walk	<i>wit-u?</i>	<i>tuwanii?-a?n</i>	<i>ʔimbal</i>	<i>-hiy</i>
warm	<i>pih-</i>	<i>ci?ci</i>	<i>ki?nal</i>	<i>neoraar</i>
wash	<i>ʔe?-</i>	<i>ca?qaa?</i>	<i>po?</i>	<i>-hanʔ</i>
water	<i>ni?</i>	<i>cu?cut</i>	<i>ha?</i>	<i>iyow</i>

TABLE 1—Continued

	ZOQUE	TOTONAC	YUCATEC	HUAVE
what	<i>tiyí</i>	<i>ntuu</i>	<i>baʔaf</i>	<i>ngin</i>
where	<i>nhula</i>	<i>nii</i>	<i>tuʔuf</i>	<i>níng</i>
white	<i>popo</i>	<i>s-napapa</i>	<i>sak</i>	<i>raan</i>
who	<i>ʔiwí</i>	<i>tii</i>	<i>mqʔaf</i>	<i>hane</i>
wing	<i>sah</i>	<i>paqan</i>	<i>ʃik</i>	<i>o-limb</i>
woman	<i>yomo</i>	<i>puskaat</i>	<i>čup</i>	<i>na-htah</i>
yellow	<i>puʔí</i>	<i>s-mukuku</i>	<i>kan</i>	<i>maril</i> (Span.)

One omitted comparison may be pointed out to illustrate the use of the strict semantic criterion. Zoque *ken* 'see' is compared with English 'see' and not with the archaic and dialectal *ken*, a variant of *know*. We recognize that a semantic change from 'see' to 'know' is fairly natural and that *ken: ken* represents a better comparison than most of those listed above. It probably was one of the 200 English-Zoque similarities found by Wonderly, but we pass it by because it does not meet the requirements of our test.

As against the 10 approximate similarities in Zoque-English, we find a number perhaps only slightly larger between Zoque and Totonac, but they include several which show simpler and more complete agreement, to wit:

come	<i>min-</i>	<i>min</i>
eat	<i>wiʔk-</i>	<i>waʔ-</i>
feather	<i>pík</i>	<i>paʔqaʔ</i> (cp. also Tot. <i>paqaan</i> 'wing')
fish	<i>koke</i>	<i>skiiʔti</i>
hear	<i>matoy</i>	<i>qaf-mata</i>
nose	<i>kiná</i>	<i>kinkan</i>
one	<i>tumí</i>	<i>-tum</i>
pierce	<i>toʔ</i>	<i>-tukumi-</i>
this	<i>yiʔwi</i>	<i>yuʔmaʔ</i>
tooth	<i>tiʔ</i>	<i>toʔan</i>
tree	<i>kuy</i>	<i>kiʔwiʔ</i>
wash	<i>čeʔ-</i>	<i>caʔqaaʔ</i>

The list is not only more convincing in appearance but contains within it some first suggestions of a plausible phonologic theory. *p t m n w y* correspond exactly. Both *i* and *a* of Zoque correspond to *a* of Totonac, and *Z. o u* correspond to *T. u*. *Z. k* equals *T. g*, except before *i* where *T.* has only *k*, and there may be other valid cases of *k = k*. *Z. č* may correspond either to *T. č* or *k*. From these relationships we can reconstruct three consonants *č k q* for the presumed common period, which in most positions remain distinct in Totonac but give respectively *č k k* in Zoque; in addition there may have been an original rounded *kʷ* which gives *k* in both languages but may be reflected in a rounding influence on vowels (*Z. koke* 'fish' from reduplicated **kʷakʷay*, *T. kii-* from **kʷay*). A general search of the Totonac and Zoque vocabularies corroborates and only slightly amends these phonologic formulations. By corroboration of a phonologic theory is meant the discovery of still other elements in the compared languages whose phonemes correspond according to the formulations being tested. In the case of Zoque-

Totonac, the total number of presumptive cognates, found by the author in vocabularies of perhaps 2000 words, hardly exceeds sixty (as compared with Wonderly's 200). Some of the phonologic correspondences are represented by a number of examples, others by very few, for example only three good instances of *č = k*. The important thing is not so much the number of examples as their phonologic consistency. Nor need we be concerned that an examination of 20 times the vocabulary gives only six times as many cognates, since our first list of 97 items of meaning covers precisely the area of maximum conservatism.

We do not need proof of correct phonologic formulas in order to test the validity of the historic connection between the languages. All we need is concrete assumed equivalences whose statistical weight can be reckoned in the computation of the chance factor. The method of accomplishing this can now be explained and demonstrated. For the strictest calculation of the chance factor, we would need to obtain statistics on the relative frequency of each phoneme of each language or to otherwise allow for the differences. For the present purposes, a method of safe approximation will be used, that is, a calculation which errs on the side of discounting rather than emphasizing possible relationship.

Our first problem is to calculate the chance factor, granted the circumstances of the present case. The typical minimum stem form in both languages is CVC, with only demonstratives and formative elements falling below it. Some of our vocabulary elements are more complex. For the sake of uniformity, we can disregard any elements which fall below a CVC complexity and consider only the first CVC of elements which go beyond this. We need to know how many different possible distinct CVC formations may enter into our comparisons. This is determined partly by the number of consonants and vowels in each language and partly by the phonologic correspondences which are assumed to be possible.

Zoque has six vowels, *a e i o u í*, and 11 independent consonants, *p t č k ʔ s h m n w y*; six others, *b d g ŋ c ʃ*, occur as the result of certain phonologic assimilations and contractions. Totonac has three vowels, *a i u*, and 17 consonants, *p t k q č c ʃ ʔ h s ʃ l m n l w y*, some of which may interchange in response to augmentative-diminutive symbolism. Because of diminutive symbolism—e.g. *kinkan* 'nose' may be a diminutivized form derived from reduplicated **qinqan*—it is safe to count only 10 independent consonant phonemes, with an eleventh, namely glottal stop, independent except in the post-vocalic position.

In making comparisons between the two languages either *í* or *a* of Zoque may correspond to Totonac *a*. The Zoque contrast between *í* and *a* therefore has no significance for comparative purposes. We can state this as *í + a = a*, and may call such a set of phonemes a synophon. There are two other vocalic synophons, *e + i = i* and *o + u = u*. The consonantic synophons are ten: *p t m w y ʔ h s, n = n + l, č + k = č + k + q*. The number of possible CVC complexes, in terms of synophons, is therefore $10 \times 3 \times 10$, or 300.

Given an item of meaning expressed by a given CVC in one of the compared languages, there is 1 chance in 300 that the same meaning will be expressed by the same CVC in the second language. Or, at least, this would be the case if all the consonantic synophons were of approximately equal frequency and if the