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## I. AUFSÄTZE

### A Lexico-Statistical Inquiry into the Diachrony of Hittite<sup>1</sup>

The degree of lexical relationship between Hittite and Indo-European may be determined by using the theory and techniques as set forth in the main by Morris Swadesh (1952) and Robert B. Lees (1953). No such lexico-statistic inquiry has been forthcoming, due to the lack of an adequate word-list.<sup>2</sup> In spite of Friedrich's Hittite-German dictionary (1952), the time has not yet arrived for a thorough-going lexicographical treatment of the language.<sup>3</sup> Many common Hittite words are still only known by their Sumerian or Akkadian logogram. Of those written phonetically, some are of questionable interpretation. Large areas of the lexicon will remain obscure considering that scarcely half of the texts excavated have so far been published.

The starting point for assembling the Hittite material was Rea's (1958) list, said to be well-tested. The following items were found to be unsuitable for our purposes: 2. ashes, 4. belly, 6. bird, 13. claw, 18. dog, 20. dry, 24. egg, 26. fat-grease, 29. fish, 30. to fly, 35. green, 50. louse, 53. meat-flesh, 58. neck, 61. nose, 63. one, 64. person, 69. round, 70. sand, 73. seed, 75. skin, 81. stone, 83. to swim, 84. tail, 85. that, 89. tooth, 90. tree, 99. woman, 100. yellow. Alternants were chosen from Gudschinsky's list of 200 items wherever possible. The task of choosing alternants was entrusted to two non-Hittologists to

<sup>1</sup> This work was supported by a grant from McGill University 943.00.84.

<sup>2</sup> Wittmann (1964b) used the semantic field ANIMAL as a basis for a lexicostatistical comparison of Hittite with Gothic. For other statistical profiles of Hittite with different methods and goals, see Kroeber & Chrétien (1939), Cowgill (1963), Wittmann (1969).

<sup>3</sup> Earlier word-lists were Sturtevant (1936) and (1939). Professor A. Goetze apparently is preparing a Hittite Dictionary. Word-lists of Luwian and other Anatolian languages are not considered here at all.

avoid the etymological biases of this author.<sup>4</sup> The results are presented in Table I.

In setting up the list of Hittite equivalents, a minor problem was to eliminate all partial synonyms. These were found for the following items: 6. *asariya-* 'anbinden', *hamenk-* 'verbinden', *kaleliya-* 'fesseln'; 8. *hanzana-* 'black (?)' (rare); 9. *mani-* 'light colored blood'; 14. *kammara-* (Wittmann, 1964a., p. 146f.); 16. *ar-* 'hinkommen, gelangen'; 17. *hark-* 'umkommen (by accident)', *mer-* 'absterben'; 19. *nink-* 'sich betrinken', *sarap-* 'nippen (?)'; 20. *salpa-* 'excrement (of dogs)'; *kamarsuwant-* 'excrement', derivative of *kamars-* 'cacare'; 21. *hazzizzi-* 'Verstand'; 22. *daganzipa-*, derivative of *tekan-*; 23. *ispai-* 'sich satt essen', *karap-* 'fressen'; 25. *titita-* 'pupil'; 27. *pittar-* 'wing'; 28. *happina-* 'flame'; 34. *lazzai-* 'in good condition'; 36. *ishiyani-* 'body hair'; 38. *halanta-*, occurs only once in the texts; 41. *sawatar-* 'horn (as a musical instrument)'; 43. *hullai-* 'to combat, fight (tr.)', *hulhuliy-* (intr.); 45. *kaness-* 'to recognize'; 47. *ses-* 'to sleep, lie down'; 51. *antuhsa-*, *antuwahha-* 'human being', *danduki-* 'ephemeral; human being'; 55. *sarazziyatar-* 'mountain ridge'; 58. *maninkuwan* (adv.); 60. *nekut-* 'evening'; 66. *esharwant-* 'blood-red', derivative of *eshar-* 'blood'; 67. *urki-* 'track'; *palsa-*, of doubtful conjecture; 69. *ishimana-* 'strap'; *suil-* 'cord'; 70. *piddai-* 'to flee, fly'; 71. *lalai-* 'to articulate', from *lala(n)-* 'tongue'; *mema-* 'to speak'; 72. *aus-* 'sehen, erleben, träumen, lesen'; 73. *galgalinai-*, to sing in some way, possibly by using a *galgalturi-* 'tambourine'; 74. *sesd-* '(sitzend) ruhen, gedeihen'; 76. *supp-* (*suppariya-*), of rare occurrence; both have impeccable IE. etymologies; 77. *ammiyant-* 'tiny, weak'; *tepu-* 'little, few'; 78. *kammara-* (Wittmann, 1964a., p. 146f.); 79. *arai-* 'zum Stehen bringen'; 82. *Istanu-* 'sun-god'; 84. *taggani-* 'breast'; 90. *nai-* 'lenken', *anda wart-* 'eindrehen, flechten', *weh-* 'sich drehen'.

It is assumed here that the relationship of Hittite to Indo-European is a parallel one instead of being successive. Sanskrit, Greek, Germanic, Latin, and Lithuanian were selected to reconstruct the lexical profile of Indo-European. Table II assembles

<sup>4</sup> I am indebted here to two ladies, A. M. and C. P.

those items of Hittite and Indo-European with identical surface and deep structures.<sup>5</sup> As can be seen, 45 Hittite words have perfect cognates in Indo-European. In setting up Table II, the following considerations were relevant:<sup>6</sup> 2.02. *sēi*-<sub>3</sub> in Pokorny (1959). 2.03. Cf. Ernout & Meillet (1951) p. 92. The grid made it necessary to choose lexical items from the most archaic texts available. Cf. also 2.05, 2.19. 2.05. Early Latin *scerda* only attested in the archaic compounds *bucerda*, *mūscerda*, *ovicerda*, *sūcerda*, the loss of *s* being due to the analysis of original *mūs-scerda* as *mūs-cerda*. Later *merda* from *mūscerda*, the latter only attested in Festus. *Stercus* 'manure' is unrelated. 2.06. In support of metathesis, see also Sturtevant (1951) p. 59. 2.09. See 2.29. 2.10. Cf. Ernout & Meillet (1951) pp. 97, 862—864. Beside the lallword formations *tata*-, *nana*-, *papa*, and *māmā*, Indo-European had two words for 'father' and 'mother' respectively. IE. *pāter* denoted father as the tribal and religious leader of the family-clan, in contrast to *atta*- as the father by birth; *mater* denoted the biological mother, in contrast to *amma*- as the wet-nurse or nanny, the latter function often taken by the grandmother. Of these, only *atta*- and *amma*- were reflected in Hittite. On lallword formations, cf. 2.33. 2.12. Wittmann, forthcoming a, § 19. 2.14. Wittmann, forthcoming b. 2.16. With dissimilation from *k* to *gh* in Sanskrit. Cf. 2.24. 2.19. Gk. *phēnō*; cf. 2.03. 2.21. *kei*-<sub>1</sub> in Pokorny (1959). 2.23. IE. *ōis*- 'mouth' ≠ *ōus*- 'ear', with interferences. Cf. the IE. alternant for 'mouth' in Gk. *stōma* 'mouth', Av. *staman*- 'mouth (of dog)': Hitt. *istamana*- 'ear'. 2.24. With dissimilation from *n* to *l* in Hittite. Cf. 2.16. 2.29. Sturtevant (1933) pp. 120, 140f., 151.66, 133. 2.30. Benveniste (1962) pp. 10, 88; Wittmann, forthcoming a,

<sup>5</sup> In reading the grid, the following symbols are relevant: (+) = coinciding in deep and surface structure with Hittite; (—) = coinciding in surface structure alone; (0) = not cognate to Hittite in any way. The contrast of IE. *r*, *l*, *m*, and *n* with their syllabic counterparts is not indicated. Similarly, IE. *k<sup>w</sup>*, and Hitt. *h*, *s* are noted *kw*, *h*, *s* respectively. The customary asterisk for Indo-European forms is consistently omitted.

<sup>6</sup> References already noted in Friedrich (1952) and supplements or in Pokorny (1959) are not repeated here.

§ 15. 2.31. Some scholars derive from *es-* (because of interferences with *es-* 'to be') *sed-* 'to sit', Hitt. *sed-* 'to rest (in a sitting position)', the latter with reduplication. 2.32. *ster-*<sub>2</sub> in Pokorny (1959). 2.33. Pokorny (1959, p. 1056) claims here lall-word formation, linking TEAT to *tata-* 'father'. This all seems rather far fetched, considering that a concept like TEAT should turn up tabooed, if at all. Hitt. *titan-* is probably unconnected to Hitt. *tittiya-* 'to suckle', which should be compared to IE. *dhēi-* 'to suckle, suck'. The gemination in *tittiya-* is due to reduplication, from earlier Hitt. *\*tai-*. 2.41. Vocalism *i* replaced in Skt., Gmc., and Lith. by *e/o*. 2.43. See 2.41.

Whereas the Indo-European material used here can be checked by most linguists, only a few are sufficiently familiar with Hittite to do so. For the sake of completeness, the fate of the 55 remaining Hittite items is therefore listed below. 19 are of presumably non-Indo-European origin: 1, 11, 13, 29, 36, 38, 46, 48, 50, 51, 54, 55, 65, 68, 77, 78, 82, 85, 88. The other 36 have formal cognates in Indo-European:<sup>7</sup> 2 (Sturtevant, 1951, p. 50f.), 3 (Benveniste, 1962, p. 125f.), 5 (Wittmann, forthcoming a, fn. 17), 7 (Sturtevant, 1933, p. 62), 8, 12 (IE. *wer-*<sub>12</sub>), 14 (Sturtevant, 1951, p. 46), 15 (IE. *yeg-*), 16, 17, 18 (?), 19, 21 (Sturtevant, 1933, p. 93), 27 (Goetze, 1954, p. 403; cf. Pokorny, 1959, p. 850), 32 (Goetze, 1954, p. 404 & fn. 13), 33, 35 (Benveniste, 1962, pp. 96—98), 39 (derivative of 21), 45 (related to 25 [2.09], Sturtevant, 1933, p. 120, 1951, p. 133), 52 (Sturtevant, 1951, p. 30 fn. 4, Benveniste, 1962, pp. 111—112; Pokorny, 1959, p. 709, erroneously gives the meaning of *mekki-* as 'big'), 53 (see note on 2.10.), 58 (Ernout & Meillet, 1951, p. 720), 60 (IE. *kwsep-* 'darkness (of night)'; the regular IE. word *nekw(t)-*, Skt. nom. sg. *nak*, adv. *naktam* changed in Hitt. *neku-* its meaning to 'evening'), 63 (contains *da-* 'two'), 64 (Wittmann, forthcoming b), 66, 69, 70 (Sturtevant, 1933, p. 94), 71 (Benveniste, 1962, pp. 119—122, Sturtevant, 1951, pp. 120, 121; *tar-* is only suppletive to *te-*), 75, 76 (Hitt. *ses-/sup-*, both 'to sleep', reflects Skt. *sásti/svápiti*, both 'sleeps', etc. However, the frequency ranges unfortunately

<sup>7</sup> Again, references already noted in Friedrich and Pokorny are not repeated.

do not coincide at all), 79, 81 (Wittmann, 1964, p. 147), 83 (Sturtevant, 1951, p. 51), 90 (Sturtevant, 1951, p. 50), 93 (etymology under *handais*- 'heat'; prefix *ha-*, Wittmann, forthcoming b).

On the basis of 45 perfect cognates for Hittite and Indo-European, the time depth was computed by using Lees' (1953) formula:

$$t = \frac{\log c}{2 \times \log r}$$

Assuming a rate of retention of 80.5% per thousand years, we arrive at a time depth of 1,841 years. Consequently, Hittite and Indo-European may have separated at about 3,600 B.C. Trager & Smith (1950) placed this event at about 3,500 B.C., and in Wittmann (1964 b), this date was set at approximately 3,900 B.C. Although the three dates coincide very closely, some will prefer to calculate lexical relationships in terms of dips by using the formula:

$$d = .014 \frac{\log c}{2 \log r}$$

The degree of lexical relationship of Hittite with Indo-European may thus be assumed to be 25.774.

The results achieved here will not be satisfactory to everyone. However, the lists established in Tables I and II are not bound to the preconceptions of this author and may be used in different contexts.<sup>8</sup> Those who wish to compare Hittite directly with any of the Indo-European languages, may do so by simply developing a formula to compute the time differentials. Of course, not all will disagree on the use of the lists alone, and some even object to any numerical expression of genetic relationships.<sup>9</sup>

The following observations are relevant to our theory. Lexico-statistics deals not with single morphemes but with morpheme masses. The reaction of one morpheme can be forecast by no known mathematics; the reaction of masses is something else

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<sup>8</sup> Readers need not feel bound by the obvious Indo-Hittite biases of this author.

<sup>9</sup> Cf. Teeter (1963) for the former and Fodor (1965) for the latter.

again. Since the internal structure of the morpheme is unstable, there must be decomposition; and since masses of morphemes are constantly involved in decomposition, the rate of decomposition must be predictable. The same is incidentally true for the decomposition of radioactive (i.e. unstable) nuclides. However, the rate of change in carbon 14 dating is 'constant' only if the environment remains so. Carbon 14 dating is therefore relative. It can predict only probabilities, and no certainties. There is always a margin of error, and as time passes that margin increases in geometric progression. If outside variables which are not part of the theoretical framework of carbon 14 dating interfere, then this 'law' of change becomes relative in the context of those outside variables. In other words, the rate of decomposition of radioactive nuclides can be accelerated or slowed down by independent variables; the nuclide may even be 'destroyed' and cease to 'exist', a change too radical for us to describe in any other way. No one has as yet suggested to abolish numerical expression here to accommodate the whims of a few. Similarly, a theory of diachronic morpheme replacement cannot predict the effect of environmental factors which have undergone a mutation caused by variables the quantification of which was not included in the theory's underlying assumptions.

TABLE I

|            |           |               |           |
|------------|-----------|---------------|-----------|
| 1. ALL     | dapiya-   | 12. TO BURN   | war-      |
| 2. ANIMAL  | hwitar    | 13. CHILD     | hammasa-  |
| 3. TO BARK | wappiya-  | 14. CLOUD     | alpa-     |
| 4. BEARD   | zamangur- | 15. COLD      | ekuna-    |
| 5. BIG     | uri-      | 16. TO COME   | uwa-      |
| 6. TO BIND | ishiya-   | 17. TO DIE    | akk-      |
| 7. TO BITE | wakk-     | 18. TO DIG    | padda-    |
| 8. BLACK   | dankwi    | 19. TO DRINK  | eku-      |
| 9. BLOOD   | oshar     | 20. EXCREMENT | sakkar    |
| 10. BONE   | hastai-   | 21. EAR       | istamana- |
| 11. BREAST | taggani-  | 22. EARTH     | tekan-    |

|              |                 |                  |              |
|--------------|-----------------|------------------|--------------|
| 23. TO EAT   | ed-             | 62. NOT          | natta        |
| 24. EAGLE    | hara(n)-        | 63. OTHER        | damai-       |
| 25. EYE      | sakwi-          | 64. TO PULL      | hwittiya-    |
| 26. FATHER   | atta-           | 65. RAIN         | he(ya)u-     |
| 27. FEATHER  | partawar        | 66. RED          | miti-        |
| 28. FIRE     | pahhuwar        | 67. ROAD         | itar         |
| 29. FLOWER   | alil            | 68. ROOT         | surki-       |
| 30. FREE     | arawa-          | 69. ROPE         | summanza(n)- |
| 31. FOOT     | pata-           | 70. TO RUN       | huwai-       |
| 32. FULL     | swu-            | 71. TO SAY       | tar-/te-     |
| 33. TO GIVE  | pai-            | 72. TO SEE       | sakuwai-     |
| 34. GOOD     | assu-           | 73. TO SING      | ishamai-     |
| 35. TO GRAZE | wesiya-         | 74. TO SIT       | os-          |
| 36. HAIR     | tetana-         | 75. SKY          | nepis-       |
| 37. HAND     | kessar          | 76. TO SLEEP     | ses-         |
| 38. HEAD     | harsan-         | 77. SMALL        | kappi-       |
| 39. TO HEAR  | istamass-       | 78. SMOKE        | tuhhuwai-    |
| 40. HEART    | ker, kardiyas   | 79. TO STAND     | ar-          |
| 41. HORN     | karawar         | 80. STAR         | astira-      |
| 42. I        | uga             | 81. TO STING     | sai-         |
| 43. TO KILL  | kwen-           | 82. SUN-DISK     | sittar       |
| 44. KNEE     | genu-           | 83. TO SWALLOW   | pas-         |
| 45. TO KNOW  | sekk-           | 84. TEAT         | titan-       |
| 46. LEAF     | hurpasta(n)-    | 85. THICK        | harsi-       |
| 47. TO LIE   | (kik)ki-        | 86. THIS         | ka-          |
| 48. LIVER    | lissi-          | 87. THOU         | ziga         |
| 49. LONG     | daluki-         | 88. TONGUE       | lala(n)-     |
| 50. LUNG     | hahressar       | 89. THREE        | teri-        |
| 51. MAN-MALE | maya-           | 90. TO TURN (IT) | wahnu-       |
| 52. MANY     | mekki-          | 91. TWO          | da-          |
| 53. MOTHER   | anna-           | 92. TO WALK      | iya-         |
| 54. MOON     | arma-           | 93. WARM         | ant-         |
| 55. MOUNTAIN | kalmara-        | 94. WATER        | watar        |
| 56. MOUTH    | ais             | 95. WE           | wes          |
| 57. NAME     | laman-          | 96. WHAT         | kwit         |
| 58. NEAR     | maninku- (adj.) | 97. WHITE        | harki-       |
| 59. NEW      | newa-           | 98. WHO          | kwis         |
| 60. NIGHT    | ispant-         | 99. WIND         | huwant-      |
| 61. NUDE     | nekumant-       | 100. WOOD        | taru-        |



TABLE II

|     | Skt. | Gk. | Gmc. | Lat. | Lith. | Hitt. | reconstruction of IE. |
|-----|------|-----|------|------|-------|-------|-----------------------|
| 1.  | +    | 0   | 0    | 0    | —     | 4.    | smekru-               |
| 2.  | +    | —   | —    | 0    | —     | 6.    | sēi-                  |
| 3.  | +    | +   | 0    | +    | 0     | 9.    | esr, esnés            |
| 4.  | +    | +   | 0    | +    | 0     | 10.   | osth-                 |
| 5.  | 0    | +   | —    | +    | —     | 20.   | skerd-                |
| 6.  | +    | +   | —    | +    | +     | 22.   | dh(e)ḡhom-/ḡh(e)dhom- |
| 7.  | +    | +   | +    | +    | +     | 23.   | ed-                   |
| 8.  | 0    | —   | +    | 0    | +     | 24.   | er(n)-                |
| 9.  | +    | +   | +    | +    | +     | 25.   | (s)okwi-              |
| 10. | —    | —   | +    | +    | 0     | 26.   | atta-                 |
| 11. | 0    | +   | +    | 0    | 0     | 28.   | pewōr, punés          |
| 12. | —    | 0   | 0    | 0    | +     | 30.   | arwo-/aryo-           |
| 13. | +    | +   | +    | +    | —     | 31.   | ped-                  |
| 14. | +    | +   | —    | 0    | 0     | 34.   | (w)esu-               |
| 15. | +    | +   | 0    | —    | —     | 37.   | ḡhesor-/ḡhesto-       |
| 16. | +    | +   | +    | +    | +     | 40.   | ker, kerdyos          |
| 17. | +    | +   | +    | +    | —     | 41.   | ker- ( . . . )        |
| 18. | +    | +   | +    | +    | +     | 42.   | eḡ(h)-                |
| 19. | +    | +   | —    | —    | —     | 43.   | gwhen-                |
| 20. | +    | +   | +    | +    | 0     | 44.   | ḡenu-                 |
| 21. | +    | +   | —    | —    | —     | 47.   | kei-                  |
| 22. | +    | +   | +    | +    | +     | 49.   | dl(on)gho-            |
| 23. | +    | 0   | —    | +    | —     | 56.   | ōis-                  |
| 24. | +    | +   | +    | +    | 0     | 57.   | nomn-                 |
| 25. | +    | +   | +    | +    | +     | 59.   | newo-                 |
| 26. | +    | +   | +    | +    | +     | 61.   | nogw(no/dho)-         |
| 27. | +    | —   | +    | +    | +     | 62.   | ne(-)                 |
| 28. | —    | —   | —    | +    | —     | 67.   | iter, itenos          |
| 29. | +    | +   | +    | —    | —     | 72.   | (s)e/okw-             |
| 30. | —    | +   | 0    | 0    | 0     | 73.   | sōm-                  |
| 31. | +    | —   | 0    | 0    | 0     | 74.   | es-                   |
| 32. | +    | +   | +    | +    | 0     | 80.   | ster- ( . . . )       |
| 33. | 0    | 0   | +    | 0    | 0     | 84.   | did(n)-               |
| 34. | 0    | —   | +    | —    | +     | 86.   | kō-                   |
| 35. | +    | +   | +    | +    | +     | 87.   | tu(-)                 |
| 36. | +    | +   | +    | +    | +     | 89.   | trei-                 |
| 37. | +    | +   | +    | +    | +     | 91.   | dwo(u)-               |
| 38. | +    | +   | —    | +    | +     | 92.   | ei-                   |
| 39. | +    | +   | +    | —    | +     | 94.   | wedōr, udnés          |
| 40. | +    | 0   | +    | 0    | +     | 95.   | we(i)-                |
| 41. | +    | +   | +    | +    | +     | 96.   | kwid                  |

|     | Skt. | Gk. | Gmc. | Lat. | Lith. | Hitt. | reconstruction of IE.      |
|-----|------|-----|------|------|-------|-------|----------------------------|
| 42. | +    | +   | —    | —    | 0     | 97.   | arg-                       |
| 43. | +    | +   | +    | +    | +     | 98.   | kwis                       |
| 44. | +    | —   | +    | +    | —     | 99.   | wento-                     |
| 45. | +    | +   | +    | —    | —     | 100.  | deru-                      |
|     | 36   | 32  | 28   | 27   | 20    | —     | Total of perfect cognates  |
|     | 4    | 8   | 10   | 8    | 13    | —     | Total of formal cognates   |
|     | 5    | 5   | 7    | 10   | 12    | —     | Total of zero cognates     |
|     | —    | —   | —    | —    | —     | 12    | Generalized perf. cognates |

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