Leeds Studies in English

THE QUARTAL SYSTEM IN INDO-EUROPEAN.

It is clear that in IndE. there was a marked distinction between the numerals from 1 to 4 and those from 5 onwards, the former being inflected but the latter indeclinable: Gk. τέσσαρ-ες,-α but πέντε (Brugmann §441.)[1] This fact establishes a ' change-point '[2] at 4/5 for PrIndE., and the presence of a change-point at 4/5 naturally leads us to suspect the existence of a one-time quartal system beside the normal IndE. decimal system.

Our suspicion receives confirmation from two IndE. formations for ' 8 ' which clearly show dual endings, and can thus only be explained as originally meaning ' 2 × 4,' viz.:—

(1) IndE. *ok'tō(u[3] with nom.acc.masc. dual ending -ō(u[4] as in *wlkʷō(u; thus Vedic aṣṭā(u ' 8 ' like nom.acc. dual vṛkā(u ' a couple of wolves.'

(2) Indian shows a formation for ' 80 ' which is quite anomalous in IndE.: Skt. aśīti-[5] (: later Av. aštāiti-[5a] Arm. utʻsun Homeric Gk. ὀγδώκοντα Lat. octōginta etc.). Skt. aśīti- is clearly one of the -ti- abstracts, normal in the higher decades of I-Ir., (thus meaning ' octade [of tens] ')[6] to a base *aśī-; Brugmann[7] plausibly explains *aśī- < IndE. *ok'ī,

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[1] Brugmann = K. Brugmann, *Kurze vergleichende grammatik der indogermanischen sprachen.*

[2] I use the word ' change-point' in the sense indicated by A. S. C. Ross, *The " Numeral-Signs " of the Mohenjo-Daro script (Memoirs of the Archæological Survey of India,* No. 57), p. 15 note 3.

[3] Brugmann, §441.6.

[4] Brugmann, §473.1.

[5] The Middle and Modern Indian forms can apparently all be explained from the Skt. form; see R. Pischel, *Grammatik der Prakrit-sprachen,* §446; and R. L. Turner, *A comparative and etymological dictionary of the Nepali Language* s.v. *assi.*

[5a] Iranian shows no trace of a formation similar to *aśīti-* (information kindly placed at my disposal by Professor H. W. Bailey).

[6] J. Wackernagel, *Altindische Grammatik* iii, §190a.

[7] *Grundriss der vergleichenden Grammatik der indogermanischen Sprachen* ii, 480.

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with the -$\bar{\imath}$ of the nom.acc. neut. dual;[8] thus *$a\acute{s}\bar{\imath}$- like Skt. $ak\d{s}\bar{\imath}$ later Av. $a\acute{s}$-i OBulg. *ochi* ' the two eyes.'[9]

Compared with systems such as the quinary, decimal and vigesimal, the quartal system is of rare occurence in the languages of the world. As an example which appears to show the system in its pristine form we may mention the Melanesian language of Ysabel (Solomon Islands), in which only the first four numerals exist.[10] Mech and Bodo (Tibeto-Burman family) count by groups of four.[11] Ross[12] is inclined to accept the presence of a one-time quartal system in Munda and Mon-Khmer and—possibly—in Burushaski also. Definite traces are found—isolated—in North America. The Chumash Indians (California) use a four system,[13] as do their neighbours the Salinan; there is a remnant of a quartal system in Cohuiltecan.[14] In New Guinea the Dagai and Fatai of the islands of Yuo and Mushu use a quartal system.[15]

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[8] Brugmann, §174.2.

[9] As to the ultimate etymology of ' 8.' It may first be pointed out that the $\d{s}$ of Vedic $a\d{s}\d{t}\bar{a}(u$ is of secondary I-Ir. origin (Wackernagel, *op. cit.* iii, §184; i, §202b), so that $a\acute{s}\bar{\imath}ti$- and $a\d{s}\d{t}\bar{a}(u$ are congruent (IndE. *$ok'\d{t}\bar{o}(u$ and *$ok'\bar{\imath}$-ti-). The relation between *$ok'\d{t}$- and *ok'-, if there be one, is obscure (for literature see Wackernagel, *op. cit.* iii, §190b note). The view that *$ok'\d{t}\bar{o}(u$ means ' two fours ' has naturally led to the suggestion that *$ok'\d{t}\bar{o}(u$ contains some form of *$kwetwor$- ' 4 ' followed by a dual ending; (for literature see Wackernagel, *op. cit.* iii, §184h note). Mr. Ross points out that Albanian $tet\varepsilon$ ($te't$) ' 8 ' should also be considered in this connection— as it has not hitherto been—if the derivation of the form from *$k'\d{t}\bar{o}$-ti-, suggested by Pekmezi, *Grammatik der albanesischen Sprache*, p. 29, be accepted. But grave difficulty is caused by the fact that *$ok'\d{t}\bar{o}(u$ has a palatal (k'), *$kwetwor$- a labio-velar (kw): later Av. *asta* but *capwar*-. (For a brilliant but rather imaginative suggestion which surmounts this difficulty see F. Muller, *Indogermanische Forschungen* xliv, 137).

[10] S. H. Ray, *A Comparative Study of the Melanesian Island Languages*, p. 532.

[11] T. C. Hodgson, " Notes on the Numeral Systems of the Tibeto-Burman dialects," *Journal of the Royal Asiatic Society* 1913, p. 333.

[12] *op. cit.*, p. 19.

[13] cf. *sit isma* ' 5', *sit isxum* ' 6', *sit masex* ' 7 ' (: *ismala* ' 1,' *isxum* ' 2,' *masex* ' 3 '); see R. Dixon and A. L. Kroeber " Numeral Systems of California," *American Anthropologist* ix, 668, 682.

[14] cf. *puguantzan-co-ajticpil* ' 7 ' (: *puguantzan* ' 4,' *ajtic-pil* ' 3 '); see W. C. Eells " On the formation and use of numerals in Indian Languages of North America," *Bibliotheca Mathematica* xiii, 218.

[15] E. Fettweis, *Das Rechnen der Naturvölker*, p. 48.

In his recent detailed survey of the numerals of the Sudan-Guinea group of languages,[16] Th. Kluge assumes the quartal system to have been wide-spread in Africa. In seven of the sixteen groups into which the 976 languages he considers are divided he finds traces of this system,[17] viz.:—in Nile-Congo (V), Shari-Wadai (VII), Niger-Chad (IX), Niger-Cameroons (X), Volta (XII), Ivory Coast—Dahomey (XIII), Senegal-Guinea (XVI). His work is however open to criticism (cf. particularly the review by M.Cohen, *Bulletin de la Société de Linguistique de Paris* xxxviii, 198-200).

I must leave to the anthropologist the problem of deciding how far—if at all—these various quartal systems are related, and how far autochthonous.

The quartal system is one which might easily arise, but in its pure form it could hardly suffice for the needs of a highly civilized people.[18] There has been all too little work done on the numeral systems of primitive peoples; for instance, South American languages are in this respect, as in many others, almost uninvestigated; and in the case of language-groups still without a comparative philology secondary numeral systems have naturally escaped notice. In his survey of the numerals of the Sudan-Guinea languages, Kluge concludes that the present predominating quinary system must have been preceded by a quartal system.[19] All our evidence seems to support this view for other languages also. McGee holds that a quinary system, or counting by means of the hands, could not arise until five had been reached by some other method,[20] and supports this with the statement that the Australian aborigines cannot count their fingers without the aid of marks on the ground, and often depict too few or too

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[16] *Zahlenbegriffe der Sudansprachen* (1937).
[17] *ibid.*, p. 254. He adopts the classification into sixteen groups of M. Delafosse in A. Meillet and M. Cohen, *Les Langues du Monde*, pp. 463-560.
[18] Cf. Ross's remark on Primitive Munda, *op. cit.*, p. 20.
[19] *op. cit.*, pp. 255 ff.
[20] *American Anthropologist* 1899, p. 875.

many fingers in their drawings.[21] The hand, moreover, can be conceived of as consisting of *four* fingers (cf. the Egyptian measure 1 cubit = 7 palms or 28 fingers).[22]

In conclusion I may call attention to the following point. The large number of elements, both lexicological and morphological, common to Indoeuropean and Uralian (i.e. Finno-Ugrian + Samoyede) forces us to conclude one of two things: either IndE. and Uralian are related, or PrIndE. and PrUralian were in contact at an exceedingly early period.[23] It is therefore highly significant that Samoyede presents an expression of ' 8 ' as ' 2 × 4 ' (thus identical with our postulated formation of IndE. *ok'tōu*) which is quite anomalous from the Uralian point of view; cf. Nenets (Yurak-Samoyede) *sidntet* ' 8 ' : *sida* ' 2,' *tet* ' 4 '; Iganasan (Tavgij-Samoyede) *sitidata* ' 8 ': *siti* ' 2,' *tata(teata)* ' 4 '; Enets (Yenisei-Samoyede) *sidiheto* ' 8 ': *side* ' 2,' *teto* ' 4 ' (but Sel'kup [Ostyak-Samoyede] shows a subtractive expression of ' 8 ' and ' 9 ' as ' 10 - 2,' ' 10 - 1 ').[24]

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[21] McGee, " Primitive Numbers," 19*th Annual Report of the Bureau of American Ethnography*, p. 833.

[22] A. H. Gardiner, *Egyptian Grammar*, §266.

[23] See B. Collinder, *Indo-Uralisches Sprachgut*; A. S. C. Ross, *Bulletin of the School of Oriental Studies* viii, 227-34.

[24] See *Jazyki i pis'mennost' narodov severa* i; 35, 67-8, 85, 106.