2.3.4. OBSERVATIONS ON NUMBER SYSTEMS AND SEMANTICS

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2.3.4.1. NUMBER SYSTEMS

Number systems can be studied as philosophical systems in their own right, or as guides to ethnic thinking on number concepts. What is clear, however, is that number systems, at least in the New Guinea area, afford few indications of genetic relationship of languages; closely-related languages may show widely-differing systems. The ease with which number systems as a whole may be borrowed can be seen in non-Austronesian languages such as Miriam (Torres Straits), which as early as 1898 had begun to adopt English numerals (Ray 1907:86), and which nowadays uses Motu numerals (in place of the original binary system). Other languages, such as Yele (Rossel Island) use numerals borrowed from neighbouring Austronesian languages almost in their entirety.

The number systems of the New Guinea area have been discussed in two extensive (and rare) publications by Kluge (1938, 1941), and more briefly by Schmidt (1929), as well as in the various publications cited below. Wolfers (1969) also has a valuable unpublished paper on the subject, which was kindly made available to the author by the Institute of World Affairs. In this paper, however, examples are taken from primary rather than secondary sources, including a number of recent publications.

Firstly one must distinguish between true 'number systems' and 'tally systems'; the latter are used only for direct counting, or 'mapping' of a set of objects against some other measuring code. There are no 'numerals' in a tally system, so that one may not receive a reply to the question 'how many?', or find the points of the tally-system qualifying nouns, as do true numerals. The typical tally-systems of languages of the New Guinea area are the 'body-parts' counting systems. All such systems recorded behave in similar ways. Counting begins on the fingers

- usually those of the left hand, and commencing with the little finger (but see below for exceptions) - with the index of the other hand being used as a pointer; counting continues up the arm and across the top half of the body, each point in the system being an identifiable 'body-part'. In almost all recorded systems, there is a central point (usually the top of the breastbone, or the top of the nose-ridge), after which counting continues down the other side, duplicating the points already named (usually with a marker indicating *second* or *again*); this means that most systems culminate in an odd number. (The exceptions are discussed below).

Aufenanger (1938), describing the Gende system, pointed out that named 'body-parts' from the lower half of the body do not occur: 'Andere Körperteile, z.B. die Beine, Füsse, oder Zehen, werden nie in die Zahlenreihe mitaufgenommen'. The 'lowest' point recorded appears to be *navel*, given by Ray (1907:86) as point *14* in a system whose total is *29*. However, there are a number of discrepancies in this data which make its evidence doubtful. Firstly, the system has three central points: *14... navel*; *15... top of chest*; *16... front of throat* - a schema which seems unlikely. Secondly, the order skips backward at points *10* and *11*, in that *10... shoulder* is given before *11... armpit*, while on the right side the same order is followed (instead of the mirror-image order) for *19... shoulder* and *20... armpit*. Thirdly, a second informant gave a different system, with a total of *25* (omitting the points *7... back of wrist* and *9... [outside] elbow* of the first informant) and reversing the order of a number of other points. Accordingly the Miriam evidence should not be used to counter the general statements on body-parts systems in the New Guinea area. (Current Miriam evidence is lacking, as the system is no longer in use).

The lack of occurrence of named points on the lower half of the body led Laycock (1970a, 1970b) to express the view that the 'body-parts' tally systems are related to the measurement of rope-like objects such as shell-money or rattan, where one end is held in the left hand, while the other hand stretches the length to obvious tally-points such as (inner) elbow, shoulder, top of breastbone, and finally to the extended arm-span; the western equivalents of such units are the 'cubit', and 'ell', and the 'fathom'. A number of named tally-points, used in the counting/measuring of shell-money, have been collected for the Buin language (Laycock 1976), and probably exist in many other languages of Melanesia.

The highest 'number' reached in any body-parts system is *47* (Kewa:

Franklin and Franklin 1961); other established totals are *37* ('Kutubu' (Foe): Williams 1941); *31* (Gende: Aufenanger 1938); *27* (Telefol: Kienzle and Campbell 1938, Kirschbaum 1938; 'Elema' (Orokolo): Ray 1907; Sibil: Galis 1960; Namau: Chalmers 1897, Ray 1907); *23* (Maramuni Enga: Kirschbaum 1938; Yuri, Anggor: Laycock - fieldnotes), *19* ('Jibu' (Gidra), 'Kunini' (Bine): Ray 1907). Franklin and Franklin (1961) also report totals of *23* for Dumut Mandobo, and *15* for Pole; Ray's (1907) doubtful totals of *29* and *25* for Miriam have been mentioned above. Even-number totals include *18* for 'Bugi' (Nambu) (on one interpretation of Ray's (1907:296) somewhat doubtful data) and for Awyi (Galis 1960) and Baibai (Laycock - fieldnotes), and a reported *14* for Huli and Duna (Franklin and Franklin 1961). The *18*-total systems are identical with that of Gidra (*19*-total), with the central point (top of breastbone) omitted.

The starting point of most systems is the left little finger; Galis (1960) records a starting point on the right side, but he notes the case as exceptional: 'Vermoedelijk moet de telling beginnen bij de linkerpink, zoals elders; dit is een kwestie van "aanzien" door de beschouwer'. Kirschbaum (1938) reports that his sole informant for Maramuni Enga also started on the right hand. The left thumb is given as the starting point for the Hewa system described by Steadman (1971:24). The Hewa system is unusual in other ways also; basically it is a *27*-total system identical with that of Orokolo, but the system can be extended to a total of *49* by continuing back up the right side, and down the left side, ending at the left thumb. Three sets of prefixes identify the point reached in the system; the names for the first (left) side are unmarked.

A further difference among systems is the question of symmetry. Some systems are asymmetrical, in that the fingers on both right and left hands are always counted in the same order (usually little finger to thumb, but reversed in Hewa): so recorded are Hewa, Awji, Sibil, and Gende. The symmetrical systems (beginning and ending on the little finger) are, as far as is recorded, Kutubu, Orokolo, Yuri, Anggor, Gidra, Miriam, and Baibai (sources as above).

In spite of such minor differences between body-parts systems, it is evident on comparison of them that they all relate to each other, and perhaps derive from a single source. Table I compares the best-documented systems, as treated in this essay; it will be seen that essentially the same-body-parts are selected, and systems with lower totals simply omit certain points. (The names for the body-parts used are not always those of the sources, but are believed to refer to approximately the same points).

It seems common for languages with body-parts tally-systems to possess a numeral system as well, often binary (so Miriam (Ray 1907), Namau (Chalmers 1897 and Ray 1907), and Gende (Aufenanger 1938), but also ternary, as in Hewa (Steadman - personal communication), quaternary, as in Kewa (Franklin and Franklin 1961) and quinary, as in Abau (Laycock - fieldnotes). Probably all languages with tally-systems still require at least two true numerals, although in some of them the first five points of the tally-system, which are invariably finger-names, may serve this function.

The true numeral systems of languages of the New Guinea area have been called various names, many of them inaccurate. It seems that we have to recognise the terms binary, ternary (trinary), quaternary, quinary, senary, decimal, and vigesimal - but rarely as descriptions of complete number systems. The majority of number-systems in the New Guinea area are mixed in various ways.

Taking the 'pure' systems first, we have the widespread binary (or 'Australian') system, where only the first two numerals are expressed by separate roots; higher numerals are compounded from these, as 2+1 (3), 2+2 (4), 2+2+1 (5), and so on. Counting in such systems rarely exceeds seven, unless the system is a mixed one in which an expression for *ten* or *twenty* occurs.

Unmixed ternary systems are rare or non-existent; but Lyle Steadman (formerly Australian National University - personal communication) obtained three root numbers in Hewa - *1* tabak^{h}ali, *2* yiya, *3* yumilia - and was unable to find higher numbers of any kind (apart from the body-parts system described above). Nevertheless, I would be inclined to suspect that the system is really quinary (as in other languages of the Sepik Hill Family) and that communication difficulties prevented the eliciting of at least one more root numeral, that for *five*. Laycock (1970b:1157) cites the view of Anthony Forge (personal communication) that the original Ndu family system was ternary, but the system is now mixed (see below).

A quaternary system is described by Franklin and Franklin (1961), where the same word (ki) is used for *four* and *hand*, and higher numerals are expressed by adding units (verbalised as 'thumbs') and by multiplying the 'hand' words, thus, *seven* is [kina] kode repo [*hand plus*] *three thumbs*, and *eight* is ki lapo *two hands*. This system exists in conjunction with a body-parts tally system. Other quaternary systems ('tetrad-type') are mentioned for a small area of western New Guinea by Galis (1960), citing Kluge (1942), 'namelijk in de Humboltbaai- en Skodorpen en over de oostelijke grens (Leitere, Vanimo, Wewak, etc.)'.

LANGUAGE	Kewa	Gende	Sibil	Orokolo Telefol Hewa	Yuri Kalam	Anggor	Namau	Enga (Maramuni)	Gidra	Bine Awyi
little finger (thumb)	1	1	1	1	1	1	1	1	1	1
ring (index) finger	2	2	2	2	2	2	2	2	2	2
middle finger	3	3	3	3	3	3	3	3	3	3
index (ring) finger	4	4	4	4	4	4	4	4	4	4
thumb (little finger)	5	5	5	5	5	5	5	5	5	5
'heel of palm'	6	–	–	–	–	–	–	–	–	–
palm	7	–	–	–	–	–	–	–	–	–
wrist	8	6	6	6	6	6	6	–	6	6
forearm	9	7	7	7	7	7	7	6	–	–
radius	10	–	–	–	–	–	–	–	–	–
ulna	11	–	–	–	–	–	–	–	–	–
elbow (inner)	12	–	8	8	8	8	8	7	7	7
lower upper arm	13	8	–	–	–	–	–	–	–	–
biceps	–	–	9	9	9	9	–	–	–	–
upper upper arm	14	9	10	–	–	–	–	–	–	–
armpit	–	–	–	–	–	–	–	–	8	8
edge of shoulder	15	–	–	–	–	–	–	–	–	–
top of shoulder	16	10	11	10	10	10	9	8	–	–
neck muscle/clavicle	17	11	–	–	11	–	–	9	–	–
side of neck	18	12	–	11	–	–	10	–	9	–
nipple	–	–	–	–	–	11	11	–	–	9
side of jaw	19	–	–	–	–	–	–	–	–	–
ear	20	13	12	12	–	–	–	10	–	–
cheek/temple	21	14	–	–	–	–	–	–	–	–
eye	22	15	13	13	–	–	–	11	–	–
inside of corner of eye	23	–	–	–	–	–	–	–	–	–
* top of breastbone	–	–	–	–	12	12	12	–	10	10
* nose-bridge	24	16	14	14	–	–	–	12	–	–
TOTAL	47	31	27	27	23	23	23	23	19	19

TABLE 1: Body-Parts Counting Systems in the New Guinea Area

(Asterisk denotes central point)

The occurrence of such a system seems established for at least three languages of the Sko Phylum (Sko, Wutung, and Vanimo), but certainly does not extend as far east as Wewak (Boiken-speaking).

Quinary systems are also widespread in the New Guinea area, but in their purest (unmixed) form - five distinct roots for the first five numbers, and no higher numerals - are rare, or perhaps non-existent. It is difficult to be sure, as many systems that have been recorded as quinary have in fact numerals for *10* and *20*, but the investigator has often given up before counting so high. Ray (1907:466) cites the Austronesian language Wedau as an example 'of the purely quinary method of counting to twenty' - but in this system, *fifteen* is not *three fives* (or *three hands*), but *two hands and one foot*, while *twenty* is *one man is finished*, which indicates, as Ray acknowledges, a rudimentary vigesimal system.

A senary (six-based) system is called the 'Melanesian type' by Kluge (1942) and Galis (1960), but they state it to be rare in the New Guinea area, occurring only on Frederik Hendrik Island, among the Kanum, and in the Milne Bay area; I have not been able to confirm these claims. However, a separate numeral for *six* occurs in some languages whose basic system is quinary (see below).

Pure decimal systems characterise many Austronesian languages of Island Melanesia, Polynesia, and Indonesia, but are rarely found within the New Guinea area itself; the only examples known to me are the Austronesian languages of Biak, Numfoor, and neighbouring areas, cited by Galis (1960). Decimal systems do not appear to exist at all in the non-Austronesian languages of the New Guinea area; the apparent decimal system recorded for Busa (Laycock 1973:52) is most likely to be interpreted as the first ten numbers of a body-parts system, and Galis (1960) reaches the same conclusion about an apparent decimal system recorded (but rather unreliably) for Kaeti.

No vigesimal 'systems' exist anywhere in the New Guinea area, but the term is a handy one for use in describing the mixed systems which have a word or expression for *twenty*. The commonest of such mixed systems - perhaps the most widespread number system in the New Guinea area - is the 'mixed quinary/vigesimal' system. In this system, separate numerals are normally expressed up to *five*; the word for *five* most frequently also means *hand*, so that *ten* is *two fives* or *two hands*, *fifteen* is *three fives*, *three hands*, or *hand and foot*, and *twenty* is usually (but not always) some word or phrase that implies *one man*.

A separate expression for *twenty* may also occur in languages that are usually described as 'imperfect decimal' or 'quinary with word for ten' - that is, 'mixed quinary/decimal'. A typical system of this nature is that of the Austronesian language of Môr (Geelvink Bay, West Irian: data from fieldnotes of Laycock) (not to be confused with the non-Austronesian, i.e. Papuan, Mor language in the Bomberai Peninsula which is a stock-level isolate in the Trans-New Guinea Phylum (see 2.6.2.3.2.)); in this language, na'u means *man*:

1	tata	*6*	rimo ma'a tata	*11*	ta'ura ma'a tata	*16*	ta'ura ma'a rimo ma'a tata
2	ruro	*7*	rimo ma'a ruro	*12*	ta'ura ma'a ruro	*17*	ta'ura ma'a rimo ma'a ruro
3	oro	*8*	rimo ma'a oro	*13*	ta'ura ma'a oro	*18*	ta'ura ma'a rimo ma'a oro
4	a'o	*9*	rimo ma'a a'o	*14*	ta'ura ma'a a'o	*19*	ta'ura ma'a rimo ma'a a'o
5	rimo	*10*	ta'ura	*15*	ta'ura ma'a rimo	*20*	na'u tata

The 'mixed quinary/decimal' systems, in which the word for *twenty* is *two tens*, is one of the commonest systems in Austronesian languages in Melanesia; Ray (1907:465) cites the example of Sinaugoro for Papua New Guinea, and Laycock (1974) gives the numerals in the Austronesian language of Ali.

A 'mixed binary/quinary' system occurs, with numerals expressing *one*, *two*, and *five* only; instances of higher numerals are rare in this system, of which examples are given for Warapu (non-Austronesian) and Sera and Sissano (Austronesian) by Laycock (1974). Aufenanger (1959) gives the binary system of the Gants language, which includes not only a word for *five*, but also a term for *ten*, and one expression for *twenty* that is not derived from the words for *five* or *ten*.

Other mixed systems do not permit of easy categorisation. In languages of the Ndu family, one finds, essentially, a quinary/vigesimal system; but one finds *four* in Abelam and Yelogu expressed as *two plus two* (binary system), and an additional numeral *six* in Abelam. When this numeral occurs, *seven* may be expressed as *six plus one* or *five plus two*; but *five plus two* is homophonous with *two fives* for *ten*, so there is a certain amount of confusion in the system, which looks like a senary system yielding to the pressure of a quinary system. Boiken informants explained to A. Forge (Australian National University, personal communication) that they 'count the finger that has not grown yet' to field the numeral *six*; however, the word used in the closely-related Abelam (kayk) appears to mean something like *fist* or *closed hand*. Confusion between the quinary and senary systems is also seen in the fact that, in normal Abelam counting, *seven* is expressed as *six plus two*

(using the morpheme kayk *six*) rather than *five plus two* - and similarly for *eight* (*six plus three*) and *nine* (*six plus four*).

The number system of Buin (Bougainville) is also unusual. Numerals vary with the class of the noun they qualify, but in all 'number-sets' there are only six true numerals; *seven* is expressed as *three less*, *eight* as *two less*, while *nine* in almost all number-sets is an invariable morpheme meaning something like *completed*. *Ten* is then the first number in a number-set for counting *tens*, as *hundred* is the first in a set for counting *hundreds*, as can be seen in the following example:

Count: *things*		Count: *tens*		Count: *hundreds*	
1	nonumoi	*10*	kiipuro	*100*	pore
2	kiitako	*20*	kiikoko	*200*	kiporigo
3	paigami	*30*	paimaku	*300*	paiporegi
4	korigami	*40*	korimaku	*400*	koriporegi
5	upugami	*50*	upumaku	*500*	upuporegi
6	tugigami	*60*	tugimaku	*600*	tugiporegi
7	paigami tuo	*70*	paimaku tuo	*700*	paiporegi tuo
8	kiitako tuo	*80*	kiikoko tuo	*800*	kiporigo tuo
9	kampuro	*90*	kampuro	*900*	kampuro

The Buin counting system goes much higher than most in the Papua New Guinea area; separate numerals express *thousand* (kukurei) and *ten thousand* (taarina).

Mixed systems are also found in Austronesian languages; Ray (1907:465) gives examples of multiplication in Roro (otherwise a quinary/decimal system), in which *six* is *two threes* and *eight* is *two fours*. The phenomenon of subtraction that we have seen in Buin is also met with in Hula and other Austronesian languages of Papua; thus, Hula mapere-kaula-vaivai *seven* is analysable as *one less than two fours*, and mapere-ka-gahalana *nine* is *one less than ten*. Further variations on the same themes are met with, in both Austronesian and non-Austronesian languages, but do not seem to involve any processes beyond those mentioned.

The semantics of the numerals have not really been analysed. In 'body-parts' systems, the names of the points of the system are the same as the names of the relevant body parts (though there are sometimes minor variations). In the other number systems, numerals other than *five*, *ten* and *twenty* - when they occur - have no meaning other than that of pure numeral; the only exception seems to be Boiken nʌwarʌ *four*, which can be interpreted as being a contraction of napʌ warʌ — *one dog* (because a dog has four legs?). Also worthy of remark is the widespread occurrence in the Sepik region, in genetically unrelated

languages, of a root *BT for *two*; compare Seta pəla, Aruop piya (Torricelli Phylum), Purari hɔndi (Sko Phylum), Baibai nɛmbɛli (Kwomtari Phylum), Waris sampəla[1] (Border Stock, Trans-New Guinea Phylum), Namie pəli, Abelam vətik (Sepik-Ramu Phylum); also Abelam bət, Manambu bər *they two*. The resemblance to Common Australian *bula(dj) *two* may not be entirely accidental.

The number *five* almost invariably means *hand* in all systems involving a quinary component; it does not appear to do so when the system is basically decimal. In Austronesian languages, one also finds that, where a reflex of POC *lima *hand, five* occurs, it is certain to mean the numeral *five*, whether or not it also means *hand*; but reflexes of other *hand* words occur, and may mean *five*.

Ray (1907:477) suggests that PAN *puluh *ten*, or at least its reflexes in Papua, means *handful*, while *twenty*, as has been mentioned above, is usually a word meaning *man*, (perhaps *crocodile* in some Ndu family languages). No other numerals appear to have any assignable meaning, except for Buin kukurei *thousand*, which also means *domestic fowl*.

2.3.4.2. SEMANTICS

Holmer (1966) has written the only comprehensive work on semantic features of 'Oceanic' languages (in this case, Australian and Austronesian); many of the features he cites for these languages are also common in non-Austronesian languages in the New Guinea area, which raises the question of areal features in language, and also of linguistic universals. For instance, he cites the following morphological and syntactic features, which are widely found in non-Austronesian languages of Papua New Guinea: lack of a singular-plural distinction in nouns; nominal inflexion expressing local relation only; comparison in adjectives often only intensification; relative clause markers usually absent; 'reason' clauses often lacking; time and place undifferentiated in the morphology. On the lexical side, Holmer mentions the use of the lexeme *eye* to mean *origin, hole, focal point*, in the same way that *arm* is extended to mean *branch, addition, thing held in the hand*; these features are also found in non-Austronesian languages. Holmer also attacks the view that 'Oceanic' languages are lacking in abstracts, and makes the point - equally valid for all languages of the area under discussion - that the basis of this view is the fact that the distribution of concrete and abstract between languages of widely differing types seldom coincides.

A popular article on the linguistic world of speakers of non-Austronesian languages of Papua New Guinea is that by Laycock (1970a), but no data are given. Otherwise, most data on the semantic make-up of languages of the New Guinea area, in the lexical area at least, has come from experience with eliciting from standard wordlists, in that the areas of semantic disparity between the eliciting language and the elicited language become immediately apparent. For instance, McElhanon (1967) gives the following reasons for omitting 75 items from the Swadesh lexicostatistical list of 215 items:

> 'Some [items] were obviously non-cultural in all the languages (e.g. ice, freeze and snow). Others were non-cultural in many of the languages (e.g., fish, sea, salt and swim) and consequently involved borrowings. A large number of items were omitted because they involved repetitions of the same vernacular term (e.g., dirty-black, far-long, near-short, feather-hair, fog-cloud, narrow-thin-little, wide-thick-big, river-water, sharp-tooth, here-this, there-that, wife-woman, husband-man, lie-sleep, wipe-wash, hear-know and kill-hit).'

Laycock (1970b) extended the analysis of lexicostatistical lists, and indicated a number of additional sets of concepts which are frequently expressed by a single vernacular item in the New Guinea area: **bark-skin, day-sun, egg-eye-fruit-testicle, egg-seed-testicle, fingernail-claw, hand-arm, fire-tree-wood, flower-feather, salt-poison, red-blood;** to these we may add also **tree-Vitex cofassus (garamut)-slitgong (garamut)**. It seems that some of these distributions may be highly regional, and may prove, if charted on the language map of the New Guinea area, to be useful in the establishment of linguistic groupings. Such a use of semantic domains for linguistic taxonomy is a new approach which is as yet untried, but which shows signs of promise for the future. Other common semantic features of the lexicon of New Guinea area languages include the expression of *blind* as *eye dead, eye bad, eye blocked*; *deaf* as *ear bad, ear blocked*; *elbow* and *knee* as *arm joint* and *leg joint* respectively; and the association of *good* with *correct, right hand, straight,* and *true*; and of *bad* with *incorrect, left, crooked,* and *untrue*. Semantic shifts between related languages also provide clues; thus, cognate forms can be seen to mean *sun* and *moon*; or *dog* and *pig*; or *bird* and *cassowary,* in pairs of related languages.

The last-cited semantic shift (*bird - cassowary*) (in languages of the Upper and Middle Sepik Stocks) shows that the belief that 'the cassowary is not a bird' is not found universally in the New Guinea area, although it is well-documented for speakers of Kalam (Bulmer 1967). Kalam taxonomy is further discussed in articles by Bulmer (1968), and

Pawley (1970), and further data will be eventually provided by a projected Kalam dictionary. The taxa of Enga have been analysed for Enga by A. Lang (1971, 1975), and the results incorporated into an Enga dictionary (A. Lang 1973). Further analyses of semantic domains, particularly with regard to lexicography, include the papers by Franklin (1971) and Newell (1970).

Outside of this small number of publications, however, the semasiological world of speakers of languages of the New Guinea area has hardly been explored. The increasing production of dictionaries will bring many of the noteworthy features to light, but it will be many years before they are fully understood.

N O T E

1. Unlikely to be derived from New Guinea Pidgin sampela = *some*, not only because of the widespread occurrence of the *BT forms, but also because cognate forms are found in Border Stock languages within Irian Jaya where the influence of Pidgin has not penetrated.

BIBLIOGRAPHY

AUFENANGER, H.

1938 'Etwas über Zahl und Zählen bei den Gende im Bismarckgebirge Neuguineas'. *Anthropos* 33. 273-7.

1959 'The Ayom Pygmies' myth of origin and their method of counting', *Anthropos* 55. 247-49.

BULMER, R.N.H.

1967 'Why is the cassowary not a bird? A problem of zoological taxonomy among the Karam of the New Guinea Highlands'. *Man* n.s. 2. 5-25.

1968 'Karam colour categories', *Kivung* 1. 120-33.

CHALMERS, JAMES

1897 'Vocabularies of the Bugilai and Tagota Dialects, British New Guinea. With a brief note on the Western Papuan Dialects of Sidney H. Ray', *JRAI* 27. 139-44.

FRANKLIN, KARL J.

1971 'Practical considerations of folk taxonomies'. *Kivung* 4. 133-40.

FRANKLIN, KARL and JOICE

1961 'The Kewa counting systems'. *Workshop papers of the Summer Institute of Linguistics, New Guinea Branch* pp. 11-15. Ukarumpa. Summer Institute of Linguistics. Mimeo. Also *JPS* 71.188-91. 1963.

GALIS, K.W.

1960 'Telsystemen in Nederlands-Nieuw-Guinea'. *NGS* 4/2, April 1960. 131-50.

HOLMER, NILS M.

1966 *Oceanic Semantics (a study in the framing of concepts in the native languages of Australia and Oceania).* Uppsala, A-B. Lundequistska Bokhandeln.

KIENZLE, WALLACE, and STUART CAMPBELL

1938 'Notes on the natives of the Fly and Sepik River Headwaters, New Guinea'. *Oceania* 8.463-81.

KIRSCHBAUM, F.

1938 'Über Zahlensysteme im Zentralgebirge von Neuguinea'. *Anthropos* 33. 278-9.

KLUGE, THEODOR

1938 *Die Zahlbegriffe der Australier, Papua und Batuneger, nebst einer Einleitung über die Zahl.* Berlin.

1941 *Die Zahlbegriffe der Sprachen Central- und Südost-Asiens, Indonesiens, Mikronesiens, Melanesiens und Polynesiens.* Berlin.

1942 'Völker und Sprachen von Neu-Guinea'. *PM* 88. 241-55.

LANG, ADRIANNE

1971 *Nouns and classificatory verbs in Enga (New Guinea): a semantic study.* Ph.D. dissertation, Australian National University, Canberra.

1973 *Enga dictionary with English index.* *PL*, C.20.

1975 *Semantics of Classificatory Verbs in Enga and other New Guinea Languages. PL*, 839.

LAYCOCK, DONALD C.

1970a 'Language and thought in a polyglot island'. *Hemisphere*, 14/8. 11-5. Also reprinted in the Royal Australian Army Educational Corps Newsletter 14(2). 31-4.

1970b 'Eliciting basic vocabulary in New Guinea'. Wurm and Laycock eds. 1970. 1127-76.

1973 *Sepik Languages - checklist and preliminary classification.* *PL*, B.25.

1974 *Sissano, Warapu, and Melanesian pidginisation.* Paper for the First International Conference on Austronesian Linguistics, January 1974, Hawaii.

1978 *Basic materials in Buin: grammar, texts, and dictionary.* *PL*, C.12. In preparation.

McELHANON, KENNETH A.

1967 'Preliminary observations on Huon Peninsula languages'. *OL* 6. 1-45.

1970 'Lexicostatistics and the classification of Huon Peninsula languages'. *Oceania* 40. 214-31.

NEWELL, LEONARD E.

1970 'Semantic theory and lexicography'. *PJL* 1, 2. 106-11.

PAWLEY, A.K.

1970 'Are emic dictionaries possible?' *Kivung* 3. 8-16.

RAY, SIDNEY H.

1907 *Cambridge Anthropological Expedition to Torres Straits, Vol. 3: Linguistics.* Cambridge, University Press.

SCHMIDT, WILHELM

1929 'Numeral systems'. *Encyclopaedia Britannica*, 14th ed. London.

STEADMAN, LYLE

1971 *Neighbours and Killers: residence and dominance among the Hewa of New Guinea.* Ph.D. dissertation, Australian National University. Canberra.

WILLIAMS, F.E.

1940-41 *Natives of Lake Kutubu, Papua.* *Oceania* Monograph 6.

WOLFERS, E.

1969 'Do New Guineans count?' Institute of Current World Affairs, New York. Unpublished.

WURM, S.A. and D.C. LAYCOCK eds.

1970 *Pacific Linguistic Studies in Honour of Arthur Capell.* *PL*, C.13.

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