TALLY SYSTEMS
OF THE UPPER SEPIK AND
CENTRAL NEW GUINEA

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1. The Languages

The languages in the study area are numerous with the greatest diversity in the upper Sepik basin and relative homogeneity in the central highlands. Although there have been recent challenges (eg. Foley 2005) to the classifications of Sepik languages made by Laycock (1973) and Wurm and Hattori (1981), these have not significantly affected the taxonomy of the languages in the study area.

The major divisions are:

Border Mountains: the Amanab language of the Bewani Family and the Anggor language of the Senagi Family in the Trans New Guinea (TNG) Phylum; plus the Yuri Phylum-level Isolate;

Upper Sepik Basin: the Abau and Namie languages of the Sepik Phylum; the Kwomtari and Biaka languages of the Kwomtari Phylum, and the Nagatman and Busa Phylum-level Isolates;

Sepik Hills: the Dulanmin/Asabano, Tuwari, Sanio and Hewa of the Sepik Phylum;

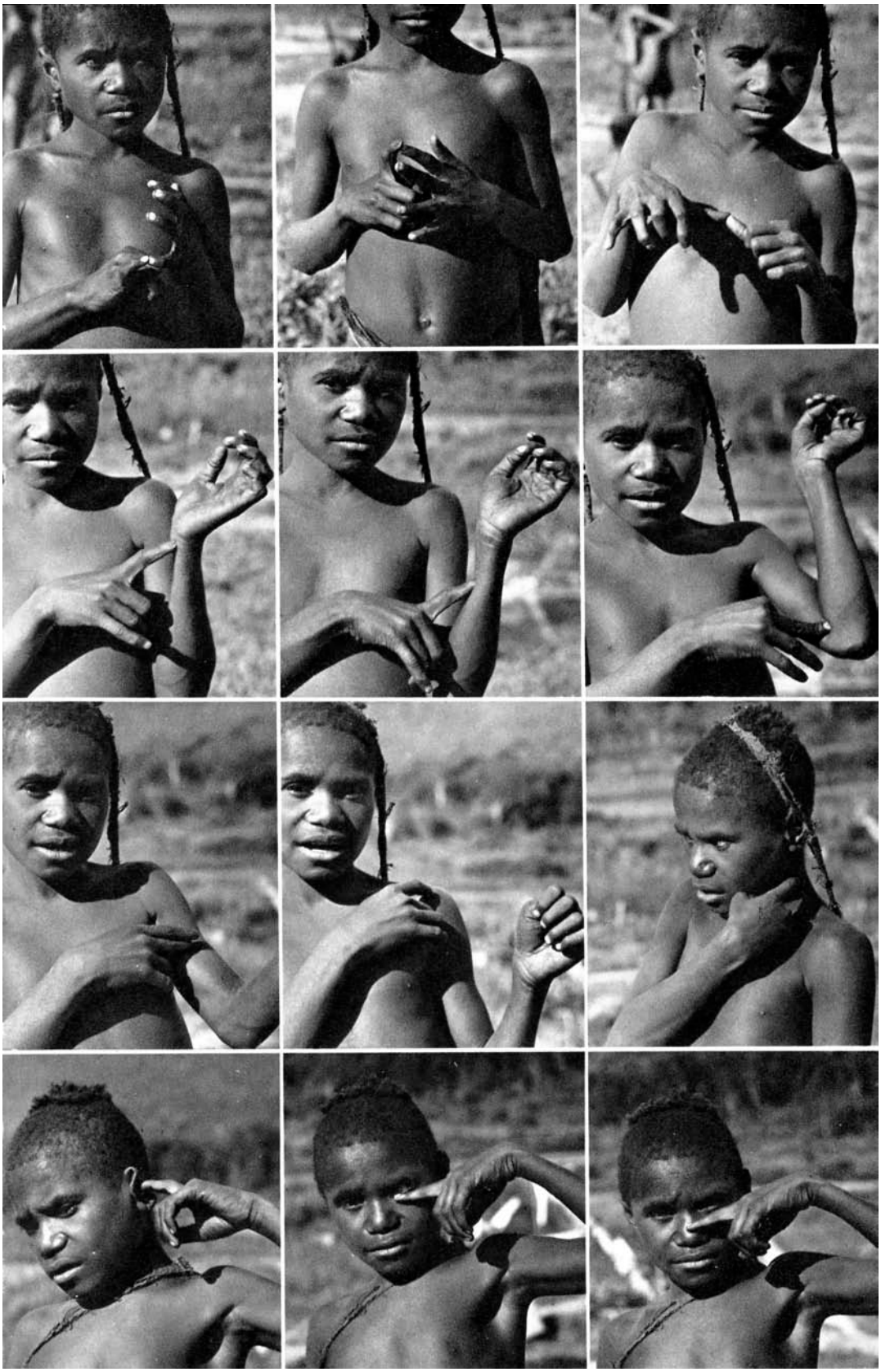
West Range: the Amto Phylum-level Isolate and the Ama of the Left May Phylum-level Family;

Central Highlands: all in the TNG Phylum – the Mianmin, Telefol, Tifal, Ngalum, Faiwol and Bimin languages of the Mountain-Ok Sub-Family; the Oksapmin Sub-Phylum level Isolate; and the languages of the Mek[1] Family.

Southern lowlands: all in the TNG Phylum – the Yonggom, Ninggirum, Iwur and Kati languages of the Lowland-Ok Sub-Family, and the Awin and Pa of the Awin-Pa Family.

2. Body-part tally systems

As pointed out by Lean (1992, Ch.1.7)[2], body-part tally systems occur uniquely in Australia and New Guinea. These systems utilise the fingers of the hands and points along the arms and upper body to provide a base count between 18 and 68 (ibid., Table 12). They are usually symmetrical (up one side and down the other) with a mid-point (nose or top of head), giving an odd number as the full count. The cycle can be started again to indicate higher numbers than the total of one cycle.



Body-part tally of the Sibil Valley people, (former) Dutch New Guinea. Brongersma & Venema 1962: 85 and Plate 21. Left to right, top to bottom: one, four, five, six (wrist), seven (forearm), eight (elbow), nine (upper arm), ten (shoulder), eleven (neck), twelve (ear), thirteen (eye), fourteen (nose). The tally then continues to 27 down the right side of the body.

Other methods of tallying exist in New Guinea, such as the digit-tally that uses the fingers and toes for a base count of five, ten or twenty. There are also non-body part numeration systems, such as the 2-cycle system with a word for one, a word for two, and all other numbers formed from these two, ie. 3=2+1, 4=2+2, and so on. Yet other systems may have words for one, two, four, five, ten etc.

In New Guinea, the body-part tally system is found only in certain regions, mainly the central interior and southern coast (Lean 1992, Map 7). There is some overlap with the 2-cycle systems (compare Lean 1992, Map 6), especially in the upper Sepik, the eastern part of central New Guinea, and the upper Fly River. Thus the first few counts in the body-part tally may not be the words for those fingers but a word for one, a word for two, and 3=2+1, sometimes 4=2+2, but usually the word for five is the same as for 'thumb' or a cognate of 'hand'. Some peoples keep the two systems separate so that they use the body-part tally for enumerating relatively large numbers of items in, for example, a bride wealth transaction or to indicate the number of days relating to an initiation ritual, but when speaking of smaller numbers of items, such as 'two men went hunting' or 'I got four pieces of taro from the garden', the 2-cycle system of counting is used (Lean 1992, Ch.5.7).

The data for this complication, sometimes resulting in a hybrid of 2-cycle and body-part tally systems, is not consistently reliable for the area being reported in this paper. Therefore I will consider only some of the attributes of the body-part tallies; that is, the total tally of one cycle, the location on the body of the mid-point of the count, the direction of the count (left to right or right to left), and the finger on which the count starts and finishes (see Table 1).[3]

Table 1 indicates that the body-part tally systems of central New Guinea are closely related. In the west, two of the Mek groups (#13, 14) use a 25-cycle tally compared to a 27-cycle elsewhere, but all three Mek groups (#12-14) use the top of the head as the midpoint of the tally rather than the nose. Those that tally from the right (#4, 6), or from either side (#1, 3) are in the east, whereas those that tally from the left side (excepting #2) are in the central and western areas. For groups in the east and north of the region (#1-5), counting starts on the thumb and ends on the small finger (#2, 3, 5), the thumb (#4), or either (#1). All the others commence and end the tally on the small

finger. The groups that share identical attributes are the Telefol, Tifal, Faiwol, Wopkeimin and Ngalum.

Language (east to west)	Total tally	Midpoint	Direction	Start	Finish
1. Oksapmin	27	nose	either	thumb	either
2. Bimin	27	nose	L to R	thumb	small finger
3. Kwermin	27	nose	either	thumb	small finger
4. Asabano	27	nose	R to L	thumb	thumb
5. Mianmin	27	nose	L to R	thumb	small finger
6. Baktaman	27	nose	R to L	small finger	small finger
7. Telefol	27	nose	L to R	small finger	small finger
8. Faiwol	27	nose	L to R	small finger	small finger
9. Tifal	27	nose	L to R	small finger	small finger
10. Wopkeimin	27	nose	L to R	small finger	small finger
11. Ngalum	27	nose	L to R	small finger	small finger
12. Sela Mek	27	top of head	L to R	small finger	small finger
13. Bime Mek	25	top of head	L to R	small finger	small finger
14. Eipo Mek	25	top of head	L to R	small finger	small finger

Table 1. Attributes of body-part tally systems of Central New Guinea

The broader regional context of these Central New Guinea systems is worth exploring.

Commencing in the Border Mountains to the north of the upper Sepik River, we find that the Trans New Guinea Phylum speakers there share the body-part tally system. **Amanab** speakers have a 25-cycle system that commences and terminates the tally on the small fingers but the data does not specify on which side the tally commences. The major difference with the central New Guinea systems is that the tally does not include points on the head but, after the shoulder (10), the tally goes to armpit, breast, *heart* (midpoint of 13), other breast, other armpit, etc.

Anggor speakers, to the south of Amanab, have an abbreviated 18-point tally and a 23-point tally. For the full 23-cycle system, the tally commences and terminates on the small fingers and again the data does not specify on which side the tally commences. The tally proceeds from the shoulder (10) to the breast, *sternum* (midpoint of 12), other breast, shoulder, etc.

Yuri speakers, to the south-west of Amanab, have a 23-cycle system identical to that of the Anggor. The data specifies that the tally commences on the left small finger and proceeds to the right.

For these three tally systems, then, the relationship with the tally systems of the TNG languages of central New Guinea is close, with the main differences being the shorter count and the substitution of points on the torso for points on the head. The fact that the Yuri have the same system as the neighbouring Anggor but speak a totally unrelated language, should be noted.

In the upper Sepik lowland basin to the east of Amanab, the information for the **Baibai**, **Kwomtari** and **Biaka** speakers is equivocal but the possibility is that the incomplete data for each of these three related groups represent the first five words for body-part tally systems. Further east, the **Namie** of Yellow River have a decimal system (1 to 10, 10+1=11, 10+2=12, 10x2=20, 10x2+1=21, etc. – Craig 1969: 24-25).

Along the upper Sepik River mainstream, the **Abau** speakers are reported to have a complex body-part tally system, commencing at the small finger of the left hand, proceeding to the navel (6), the breast, then the right hand, back to the navel and breast, the eye, then the toes of one foot, to a total of twenty. Lean (1992, Ch.2.5) describes the system as 'essentially a digit-tally augmented by the navel, the breast and the eye'.

Nagatman speakers, along the mid-Horden River to the north of the Abau, commence their tally 'on the left side of the body, proceeding up the left arm and then down the left side. The toes are tallied and upon reaching the big toe the tally stands at 36. The side of the left foot is then tallied and then the symmetrical points on the right side of the body. The complete cycle . . . is not given although it would have to be at least 74' (ibid.). There seems to be some relationship between this complex system and that of the Abau, in that the feet are included in the tally, but more detail would be necessary for a more rigorous comparison. The data for the **Busa**, located between the Abau and the Nagatman speakers, is insufficient to determine whether or not the counting is a body-part tally system and whether it has any similarities to the Nagatman or Abau systems.

The Abau claim they migrated westwards (upstream) along the Sepik from the May River, presently occupied by **Iwam** speakers (Craig 1968: USEE: 7-8). Yoshida (1998: 115) reports a 35-cycle body-part tally system for the Iwam that seems to be a digit tally based on the fingers and toes, with head and torso parts added. The count commences with the small finger of the left hand, proceeding to the thumb of the right hand (10), then the small toe of the left foot (11) to the big toe of the right foot (20). Thus the basis is a 5-cycle digit-tally. The tally then goes to the left eye (21), right eye, nose, left ear, right ear, upper lip, lower lip, upper teeth, lower teeth, left breast (30), right breast, navel, left testicle, right testicle, penis (35). It is obvious that it would have been used only by males. Yoshida states (ibid.: 116) that according to oral history, the Iwam moved northwards down the May River from the foothills in the south and implies that their neighbours to the south (the Mianmin) may have been the source of a body-part tally system that the Iwam modified for their own use. But it should also be observed that the inclusion of the feet, and the head and torso points, suggest a relationship with the Nagatman and Abau counting systems. Yoshida comments, 'it is said that at one time the system was adopted for counting bride wealth. It is not used for any other purpose and most people do not know it' (ibid: 114).

In the West Range, south of the Abau and west of the Iwam, Lean's data for the **Amto-Musian** are insufficient to determine whether they are 5-cycle digit tallies or body-part tally systems, although my Amto field notes for 21 March 1973 indicate that they count on their fingers to ten and continue with numbers up to twenty; this seems consistent with the Namie system. The data for the **Ama** (Sawiyano) of the Left May, however, are sufficient to identify a truncated body-part tally system commencing with the fingers of one hand and proceeding to the navel (6), each breast, each shoulder, one eye and then the other eye (12), at which point the tally ends (Lean 1992, Ch.2.5). There are consistencies with the Abau and Iwam tally systems in the use of navel, breasts and eyes as tally points.

Thus the data for the tally systems of the upper Sepik basin and the West Range suggest a diversity to match the language diversity, with possible borrowing of aspects of the tally systems of neighbours.

To the north-east and east of central New Guinea, are the Tuwari speakers at the headwaters of the Leonhard Schultze River, the Sanio of the Wogamush River and the Hewa speakers on the middle and lower Lagaiap River. The information for the **Tuwari** is incomplete; the tally commences with the small finger of one hand, proceeds to the thumb (5) and the shoulder (10), but further data is lacking. It is likely that it is a 27-cycle body-part tally system similar to that for the related Duranmin (Asabano) who, however, commence counting with the thumb of the right hand. Further to the north, on the Wogamush River, the **Sanio** also have a 27-cycle body-part tally with the nose as the centre point.

The **Hewa** have a 27-cycle body-part tally commencing with the small finger of one hand and ending with the small finger of the other, via the nose as centre point. This system reflects the optional left or right hand start of the neighbouring Oksapmin but otherwise the system is the same as for most of the central New Guinea systems.

The **Duna** (speaking a TNG Phylum language), south of the Hewa and east of the Oksapmin and the Strickland Gorge, appear to have a truncated 29-cycle system where the tally commences with the small finger of one hand and proceeds to the ear (14) or nose (15), then stops.

The Sepik Hill groups therefore appear to have adopted the body tally system of central New Guinea, and the TNG speakers immediate east of the Oksapmin share the widespread distribution of body-part tally systems through the Southern Highlands (see Lean 1992, Map 7).

The **Awin** (Aekyom) south of the Faiwol speakers have a 23-cycle body-part tally commencing with the small finger of the left hand and terminating with the small finger of the right hand, proceeding via the shoulder (10), breast, *sternum* (12), other breast, and so on. Remarkably, this appears to be identical with the 23-cycle tallies of the Anggor and Yuri of the Border Mountains. Healey reports (1964: 111) that ‘a further 10 is added by the use of all the toes’, bringing the total to 33. This could indicate a hybrid of a quinary system (fingers and toes to a total of 20) such as that used by the Marind away to the south, with the round-the-body tally of central New Guinea.

The data for the Lowland-Ok groups west of the Ok Tedi (Alice) River, and along the Muyu River in West Papua, are incomplete. The **Ninggirum** speakers have a 30-cycle tally that commences with the small finger (which hand is not recorded), goes to the wrist (6), proceeds through two points on the forearm, the elbow, and two points on the upper arm to the collar bone (12), then through the neck, ear and eye (15), to continue symmetrically down the other side.

The **Yonggom** speakers (and probably also the North and South Kati of the Muyu River in West Papua) commence with the small finger (which hand is not recorded), proceed to the shoulder (10), with the probability of a total of 27, 28 or 29.

The Dumut languages, around the upper Digul further to the west in West Papua, also use the body-part tally. Healey (1964: 111) reports that **Kaeti** speakers count to 23 and the top of the head is the middle point (as for the Mek speakers away to the north). **Wambon** speakers, immediately north of the Kaeti, use a 27-cycle system with the nose as the middle point, consistent with the Ngalum some distance north of them. Healey does not report which side of the body, or on which digit of the hand, the counting starts and ends.

Thus the lowland groups immediately south of central New Guinea use tally systems closely related to those in the mountains north of them but because of the linguistic affinities, there is no basis for considering these systems as borrowed.

3. Conclusions

Laycock (1975) provided an early survey of counting systems in New Guinea. He notes the body-part tallies of the Huli and Duna with a base of 14; the Pole with 15; the Awyi, Baibai and Nambu with 18; the Bine and Gidra with 19; the Anggor, Kalam, Maramuni Enga, Namau and Yuri with 23; the Hewa, Orokolo, Sibil, and Telefol with 27; the Gende with 31; the Foe of Lake Kutubu with 37; and the Kewa with 47. He concludes (1975: 221) that ‘in spite of . . . 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’.

Most of the body-part tally systems are a feature of languages belonging to the Trans New Guinea Phylum (eg. Awyi, Anggor, Duna, Maramuni Enga, Foe, Gende, Huli, Kalam, Namau, Nambu, the Ok Family, Oksapmin, Orokolo), plus some other languages adjacent to these (eg. Yuri, Baibai, Dulanmin/Asabano, Sanio, Hewa). Of those languages featuring a numerical base of 27, all are adjacent and located in central New Guinea, except for Orokolo in the Papuan Gulf area.

It is evident that the region of greatest homogeneity with regard to the body-part tally systems is central New Guinea, specifically the speakers of Mountain-Ok languages, and their linguistically unrelated near neighbours to the north-east and east (Dulanmin/Asabano, Sanio, Oksapmin and Hewa). Closely related systems are found among the Mek to the west, in the Border Mountains to the north, and around the upper reaches of the Fly and Digul rivers to the south.

The existence of 29-cycle and 31-cycle body-part tallies in south-east Australia (Lean 1992 Ch.2.4), with the top of the head as the mid-point, is a fact for which there is no satisfactory explanation at present.[4]

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[1] 'Mek' means 'water', 'river', as does 'ok' among the people further east and has been adopted, as a convenience by many scholars, as the name of the people and their language.

[2] I accessed Lean's PhD thesis on-line (www.uop.ac.pg/glec/thesis/thesis.htm). Unfortunately there is no pagination. I have, therefore, referred to the section of the chapter in which the quote or information occurs.

[3] The data has been gleaned from a number of sources, in particular Lean (1992) and a database of counting systems he created. That part of his database providing information on the languages of Sandaun, Western and Southern Highlands Provinces was kindly made available to me by Kay Owens of Charles Sturt University (New South Wales, Australia). I also accessed Healey 1964 for general information on tally systems in central New Guinea and adjacent regions, Healey & Healey's 1977 *Telefol Dictionary* for Telefolmin, my 1965 field notes for west Wopkeimin and 1967 fieldnotes for Fegolmin, Brongersma & Venema 1962: 85-86 and Plate 21and Galis 1960: 136 for the Sibil valley Ngalum, Barth 1975: 21 for the Baktaman Faiwol, Poole 1976: 301-303 for the Bimin, Perey 1973: 295-296, Saxe 1981: 83 and Saxe & Edmond 2005: 181-182 for the Oksapmin, Smith & Weston 1974: 50-52 (via Lean's database for Sandaun Province) for the Mianmin, Briley 1977: 31-32 for the Bime Mek, Heeschen & Schiefenhövel 1983: 18 and Koch 1984: 123-125 for the Eipo Mek, and Godschalk 1993: 52-53 for the Sela Mek. For the Tifalmin, Kwermin and Dulanmin (Asabano) I received personal communications in March 2009 from Wilson Wheatcroft, Sveinn Eggertsson and Roger Lohmann respectively, and also from Arnold Perey to clarify aspects of the Oksapmin tally system. Perey made the suggestion that the commencement of the tally (on the right or left hand) may be related to whether the informant is left- or right-handed and that the predominance of a left hand start is because most people are right-handed and use the right index finger to point to the fingers of the left hand to start the count. It seems doubtful that any of the researchers cited above tested this possibility in the field.

[4] I thank Professor Andrew Pawley (Linguistics, ANU) for rescuing me from unfounded speculations concerning the prehistory of the languages and counting systems of New Guinea.