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Part One

## **Change in Traditional Numerals Systems in Mian and other Trans New Guinea Languages<sup>1</sup>**

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### **ABSTRACT**

This paper examines the numeral systems and the change in these systems in the Papuan language Mian (Trans New Guinea, Ok family) due to the influence of Tok Pisin. Mian has a binary numeral system consisting of a word for ‘one’ and a word for ‘two’. As in other Trans New Guinea languages, there is also a body-part tally system in which certain points on the arms, the upper body, and the head and face are associated with numbers. The highest number in the Mian body-part system is 27. With the advent of western cash economy and currency Tok Pisin numerals and the decimal system have taken hold in the community and spread quickly. While the old binary system is still in use for both counting and modification of a noun in a noun phrase, the body-part tally system is defunct. This is in contrast to some other Trans New Guinea languages, for example Kalam and Oksapmin, in which the body-part system is still employed by older speakers. There is no evidence that the terms of the Mian body-part system have ever been used as numerals in the noun phrase. I suggest that the Mian system had a particularly hard time in surviving because it was restricted to the counting of temporal units even at the time when the linguistic work on Mian began.

### **KEYWORDS**

Body-part tally systems, language change, Mian, numeral systems, Tok Pisin, Trans New Guinea.

### **1. INTRODUCTION**

This paper examines the impact of Tok Pisin, the Neo-Melanesian Pidgin spoken in Papua New Guinea, on the native numeral systems of the Papuan language Mian (Fedden 2007, 2011). Tok Pisin numerals, which derive ultimately from English, nowadays play an

important role in the Mian speech community, both as number words used in counting and as modifiers in noun phrases.<sup>2</sup> As in many Papuan languages, this is to the detriment of the native Mian numeral systems, namely a binary system with an expression for ‘one’ and an expression for ‘two’ and a body-part tally system. Body-part tally systems (Lancy 1983; Lean 1992; Wassmann and Dasen 1994; van Enk and de Vries 1997) are typical for many subgroups of the Trans New Guinea (TNG) family. In a body-part-tally system one hand is used to indicate points on the opposite side of the body. These points on the body are associated with numbers. Unlike other TNG languages, such as Oksapmin (R. Loughnane, p.c.) or Kalam (A. Pawley, p.c.), where older speakers still use the body-part tally system, even though its range of usage has been curtailed, the Mian body-part tally system is defunct and apparently has been so for at least a few decades. The reason for this might be that the Mian body-part system was restricted to specific cultural practices of counting units of time which made it especially difficult for this system to survive as a counting method. Before looking at the developments in Mian numeral systems in more detail, I will give a brief introduction to the linguistic environment in which Mian speakers live today.

## 2. THE LANGUAGE AND ITS SPEAKERS

Mian (also known as ‘Mianmin’ or ‘Miyamin’ in the literature, ISO 639-3 *mpt*) belongs to the Ok language family. Mian has 1,750 speakers (Lewis 2009) and is spoken in the Telefomin District of Sandaun Province in Papua New Guinea (see Map 1 below).

The Ok family of languages belongs to the larger TNG family (Healey 1964, Wurm 1982, Pawley 2005). The Ok languages are named after the widespread cognate *ok* ‘river, water’ in these languages. The basic division is between the Mountain Ok, Lowland Ok and Ngalum branches. Figure 1 below summarizes the Ok family. Also see Map 1 below. There are, in addition, about five more Ok languages often labeled ‘Western Ok’ but nothing beyond the lexicostatistical figures in Wilbrink (2004) and Hughes (2009) is known about their internal and external relationships, and they will not be further discussed here.

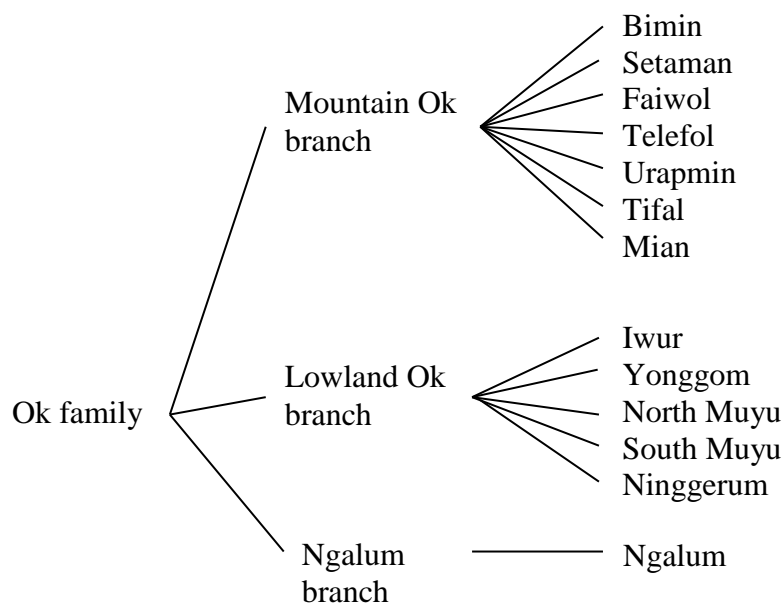
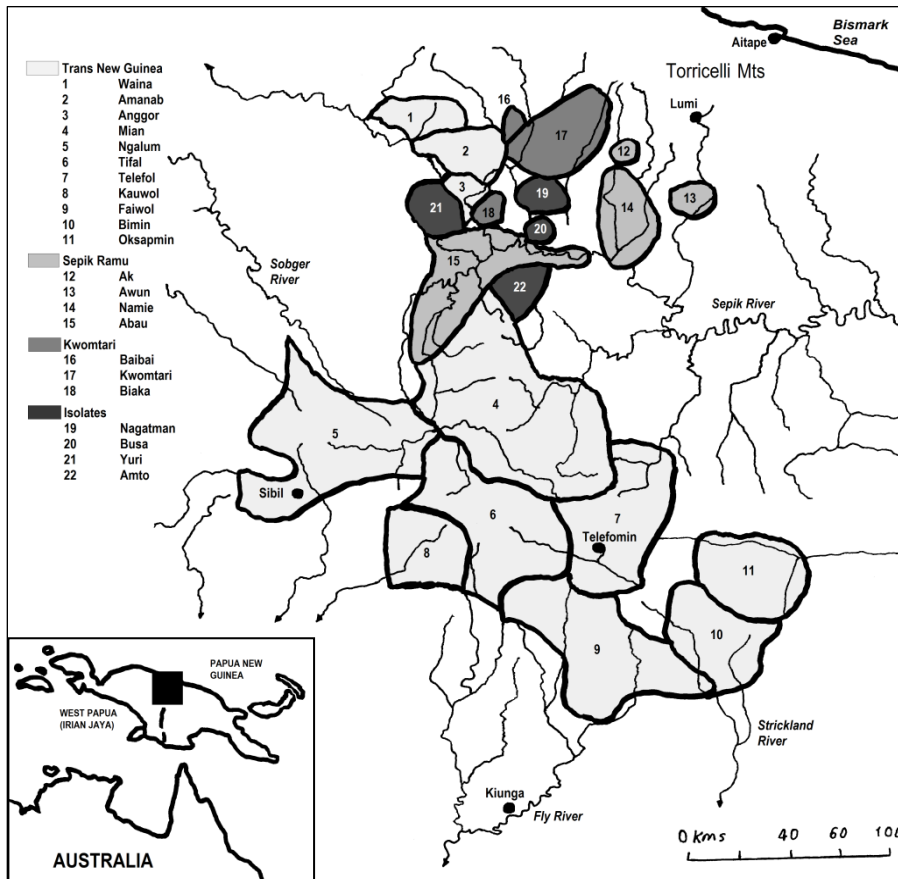


Figure 1. The Ok family (based on Healey 1964 and Voorhoeve 2005)

The Ethnologue (Lewis 2009) classifies Ngalum as forming a subgroup with Tsaukambo-Komyandaret, possibly following Voorhoeve's (2005: 151) suggestion that Ngalum formed a subgroup together with Tsaukambo.<sup>3</sup> There is good evidence for a Korowai-Tsaukambo-Komyandaret subgroup (Hughes 2009: 4), which de Vries (this volume) calls the Becking-Dawi group. However, Ngalum is clearly an Ok language, albeit one associated with its own branch, whereas Tsaukambo and Komyandaret are not Ok but rather Awyu-Dumut languages. Oksapmin (Loughnane 2009), previously treated as an isolate within TNG, has been shown to be distantly related to the Ok languages (Loughnane and Fedden 2011).



Map 1. The Ok languages of Papua New Guinea

Geographically, the Mianmin area is delimited by the August and May Rivers in the west and east, respectively, and the Hindenburg Range in the south. This area is roughly located between the 141<sup>st</sup> and 142<sup>nd</sup> degrees of longitude and between the 4<sup>th</sup> and 5<sup>th</sup> parallels.

Two dialect varieties can be distinguished. West Mian (also known as Wagarabai, Skonga or Suganga)<sup>4</sup> in and around Yapsiei, a government and Catholic mission station about 15 km east of the border to Papua (formerly Irian Jaya) with approximately 350 speakers, and East Mian in the villages around Mianmin airstrip (Timeilmin, Temsakmin, and Sokamin), in Gubil, Fiak, and Hotmin with approximately 1,400 speakers. The two Mian dialects are mutually intelligible<sup>5</sup>, although some speakers of the eastern dialect confess to some difficulty understanding the western dialect. While the western dialect is contiguous to several other Ok languages to the west and to the non-related Sepik language Abau (Bailey 1975; Lock 2011) upstream from Yapsiei, the eastern dialect is in contact with the closely related Ok languages Telefol to the east and south and Tifal to the southwest. Some men above 50 years of age speak or at least understand Telefol.

Contact with Ok speakers was established relatively late. The first expedition into the Upper Sepik area was led by the Austrian ethnologist Richard Thurnwald from 1912 to 1914, who followed the Sepik River to its source near Telefomin (Thurnwald 1914, 1916). A further expedition was made between the Fly and Sepik headwaters in the mid-1920s (Champion 1966) and then mining investigations were carried out in the mid-1930s (Kienzle and Campbell 1938), during which first contact with the Mianmin was established (Campbell 1938: 245). Tok Pisin only gained wider currency in the Mian speech community in the early 1960s. It gained ground quickly so that nowadays all speakers except very old ones (in their late seventies and older) are bilingual in Mian and Tok Pisin. Younger speakers have quite good English but in general knowledge of English is not widespread. Older male speakers above 50 years of age also speak or at least understand the closely related neighbouring language Telefol.

Both Mian dialects are under strong influence from English and Tok Pisin. Tok Pisin firmly took root in the Mian speech community in the 1960s. Although English is the more prestigious of the two and school education and official business are conducted in English, Tok Pisin is the lingua franca throughout the area. It is also Tok Pisin (rather than English) that Mian speakers consider important as the main linguistic means of forging a Papua New Guinean national identity. Mian speakers are aware of the influence of the non-indigenous languages English and Tok Pisin and some regularly identify words and grammatical constructions which are inspired by or calqued from either Tok Pisin or English. They describe these words and constructions as *wan wéng funin* [bird talk thinking]<sup>6</sup> or *tablasébwali wéng funin* [white\_man talk thinking], respectively. I now turn to the indigenous numeral systems.

### 3. THE BINARY SYSTEM

As is typical for many Papuan languages, Mian essentially has a binary system with terms for ‘one’ and ‘two’.<sup>7</sup> These are given in (1) below. The forms for the numeral ‘one’ are the same as the singular forms of the ‘alone’-pronoun series. Mian has several distinct pronoun series (Fedden 2011: 124–139), all of which make a gender distinction in the third person singular between masculine (M) and feminine (F). There is an added wrinkle involving the expression for ‘three’, which will be discussed in more detail below.

## (1) Mian

*elekiêm* ~ *eleyêm* 'one (M)'*olokiêm* ~ *oloyêm* 'one (F)'*asú/asusûna* 'two'

Like the pronouns from the 'alone'-series, the numeral 'one' obligatorily agrees in gender with the noun referring to the entity being counted. This is illustrated for a masculine noun in (2) and a feminine noun in (3):

## (2) Mian

*naka=e* *elekiêm*

man=SG.M one(M)

'one man' OR 'only the man alone'

## (3) Mian

*unáng=o* *olokiêm*

woman=SG.F one(F)

'one woman' OR 'only the woman alone'

The numerals *asú* 'two' and *asumâtna* 'three' can occur with an article reflecting the number and the gender of the counted noun but are often bare. *Asú* 'two' has a variant *asusûna*, which looks like a partial reduplication of the simple numeral *asú*, plus some additional element *na*. Nonetheless, *asusûna* means 'two' rather than 'four'. An example of *asumâtna* 'three' is given in (5). (The article on the numeral is optional and appears in brackets. The allomorphy between *i* and *ei* is phonologically conditioned. The allomorph =*ei* is used after the high vowels /u/ and /i/.)

## (4) Mian

*unáng=i* *asú(=ei)/asusûna(=i)*

woman=PL.AN two(=PL.AN)/two(=PL.AN)

'two women'



## (5) Mian

*unáng=i*                *asumâtna(=i)*  
 woman=PL.AN    three(=PL.AN)  
 ‘three women’

The numeral *asumâtna* ‘three’ is historically segmentable into *asú* ‘two’, *mak* ‘a(n), some, (an)other’ and an unidentified additional element *na*,<sup>8</sup> where /k/ > /t/ before /n/. The tone change is regular. The numeral *asumâtna* developed from a structure with the meaning ‘two and another’.

The numerals for numbers larger than three are phrasal. These forms are used in natural speech. The rationale for forming such phrasal numerals is stringing together instances of *asú=ke* ‘two and’ (i.e. the numeral *asú* ‘two’ plus the light verb *ke* ‘do’ serving as a coordinator in phrasal numerals) as many times as needed to count to an even number and rounding this off by *make* ‘(one) other’ for odd numbers, which is *mak* plus the clitic article =*e*, frozen in the masculine singular form:

## (6) Mian

*asúke asúke*                ‘four’ [two and two]  
*asúke asúke make*        ‘five’ [two and two and another]  
*asúke asúke asúke*        ‘six’ [two and two and two]  
*asúke asúke asúke make* ‘seven’ [two and two and two and another]

Although this can be done ad infinitum typically the upper limit of counting in the binary system is ‘six’ or ‘seven’. Phrasal numerals serve as modifiers in the noun phrase and occupy the same position as basic numerals, namely after the noun. Some examples of phrasal numerals functioning as modifiers in the noun phrase are:

## (7) Mian

*memé=i*                *asú=ke*    *asú=ke*    *make*  
 children=PL.AN    two=and    two=and    another  
 ‘five children’ (lit. ‘two and two children and another’)

## (8) Mian

*naka=i*      *asú=ke*      *asú=ke*  
 man=PL.AN    two=and    two=and  
 ‘four men’ (lit. ‘two and two men’)

The Mian numeral system is slightly more complex than a typical binary system like Kalam (Pawley and Bulmer 2011: 424, 453), where the numerals ‘three’ to ‘six’ are built strictly by concatenating the basic numerals *nokom* ‘one’ and *omŋal* ‘two’ in the following way.

## (9) Kalam

*omŋal nokom*                      ‘three’  
*omŋal omŋal nokom*              ‘four’  
*omŋal omŋal nokom*              ‘five’  
*omŋal omŋal omŋal*                ‘six’

For a very similar system in the non-TNG language Haruai, see Comrie (1999: 81–2).

The Mian system is more complex in that it uses a pronominal form for ‘one’. The word *mak*, on the other hand, ‘a(n), some, an(other)’ can be used to express indefiniteness but it is not a numeral and it is never used in counting. Furthermore, the numeral *asumâtna* ‘three’ shows some fusion of its constituent parts and may be better analyzed synchronically as a basic numeral itself. An indication that its internal structure is not transparent anymore is that younger speakers frequently use *asúke make* for ‘three’, which extends the regular formation of odd numbers with the binary system to include ‘three’ (see (6) above).

As a counting method this is very clunky. It is not difficult to see how this would get quite cumbersome very quickly for the speakers, who nowadays operate with large exact numbers on a regular basis, namely tens or hundreds of kina plus tens of toea<sup>9</sup>. Wages and school fees can even go up to low four-digit figures. Tok Pisin numerals, which ultimately come from English, have replaced the native ones roughly from six upwards. An example is given in (10):

## (10) Mian

*memé=i*                      *fifin*                      *yē*                      *tl-∅-io=be*  
 children(PL)=PL.AN      fifteen(TP)      there      come.PFV-REAL-2/3PL.AN.SBJ=DECL  
 ‘There came fifteen children.’

Roberts (1987: 321) notes for the TNG language Amele that the indigenous base five (quinary) counting system based on the five fingers of the hand has been superseded by Tok Pisin numerals beyond 10 because of its increasing clunkiness in expressing numbers greater than 10.

While the traditional numbers from the binary system are still widely used for the numbers one to six these can also be expressed with Tok Pisin numerals. An example is given in (11):

## (11) Mian

*nakai*                      *tupela*                      *yē*                      *tl-∅-io=be*  
 man=PL.AN      two(TP)      there      come.PFV-REAL-2/3PL.AN.SBJ=DECL  
 ‘There came two men.’

Younger Mian speakers sometimes use a place-value system (Menninger 1969: 120), in which numbers with more than one digit are broken down and each digit is rendered in the traditional counting system with a short pause between the digits. This way of numeral expression is understood by older speakers. Examples are *elekiêm blim* [one not\_exist] ‘ten’, *elekiêm asúke asúke make* [one five] ‘fifteen’, and *asúke blim* [two not\_exist] ‘twenty’. These numerals can be used for the expression of numbers and as numeral modifiers in the noun phrase. An example is (12):

## (12) Mian

*naka=i*                      *asumâtna*      *blim*                      *yē*                      *tl-∅-io=be*  
 man=PL.AN      three                      not\_exist      there      come.PFV-REAL-2/3PL.AN.SBJ=DECL  
 ‘There came thirty men.’

This is cross-linguistically rare and in fact appears to violate the Greenberg’s (1978: 254) observation that “no natural language has a place system with the zero principle, such as

found in the written system of Arabic numerals”. A similar situation can be found in colloquial Tongan, which also uses a place-value system in the range 11-99 (Shumway 1971: 122, Harrison 2007: ch. 6, fn. 47). The obvious difference between Mian and Tongan is that Mian relies on its binary system to express numbers within the place-value system, whereas Tongan has numeral words for all single-digit numbers.

The body-part tally system is the topic of the next section.

#### 4. THE BODY-PART TALLY SYSTEM

Body-part tally systems are found in Australia and New Guinea (Lean 1992). In such a system one hand is used to indicate points on the other side of the body. These points are associated with numbers. These systems almost exclusively have an odd number base and there is one ‘highest’ or turning point in the counting process, which is the nose in Mian and the other Mountain Ok languages or the base of the neck in Kalam (Pawley and Bulmer 2011: 443–4). Counting proceeds from the highest point with the other hand on the other side of the body. Whether a speaker starts with the left or the right half of the body typically depends on handedness (de Vries 1998: 409).

Counting in the Mian body-part tally system involves pointing or touching the body-part. A right-handed speaker commences with the left thumb, followed by the fingers of the left hand. The numbers one to five are typically expressed with the numerals assembled following the binary system, e.g. *asumâtna* for ‘three’ and *asúke asúke make* for ‘five’. Then counting proceeds up the left side of the body (wrist, forearm, elbow, upper arm, shoulder, cheek, ear, eye, nose) each time adding one, so that one reaches 14 when touching the nose. From there, counting proceeds down the right side of the body (on the way down the right side of the body the pointing is done with the left hand) till the whole procedure ends with the little finger of the right hand and the number 27, which is the highest number. There is no evidence that counting ever went higher than 27 or that other numerals were added to 27 or that 27 was multiplied. This is in contrast to the body-part tally system of Kalam, for example, where such arithmetic operations on the base 23 are possible (Pawley and Bulmer 2011, and A. Pawley, p.c.). A very similar base 27 body-part system can be found in the closely related Ok language Telefol and in the other Mountain Ok languages (Healey 1964: 65) and in more distantly related Oksapmin (Loughnane 2009: 15–17). There are body-tally systems in the Lowland Ok

languages as well but the bases are more divergent, ranging from 25 in Yonggom to 31 in Ninggerum (Healey 1964: 65; also see Chan 2012).

Smith and Weston (1974: 50–2) report that Mian speakers become increasingly vague while counting down the other side of the body and 30 years later my own experience confirms that speakers have trouble with the higher numbers, i.e. when counting ‘down’ the other side of the body. The points of the Mian body-part tally system and the associated numbers are shown in Figure 2. The forms are given in Table 1 (adapted from Fedden 2011: 148). The body-part terms are formed regularly using the clitic postposition *dim* ‘on’ on the way up to the nose and *milim* ‘(other) side, half’ on the way down. The first five points, i.e. the fingers of the hand, are assigned numbers from the binary system. Although speakers know that 27 is the highest number within the Mian body-part tally system, the forms from 15 to 22 were difficult to elicit and the forms from 23 to 27 were impossible to get.

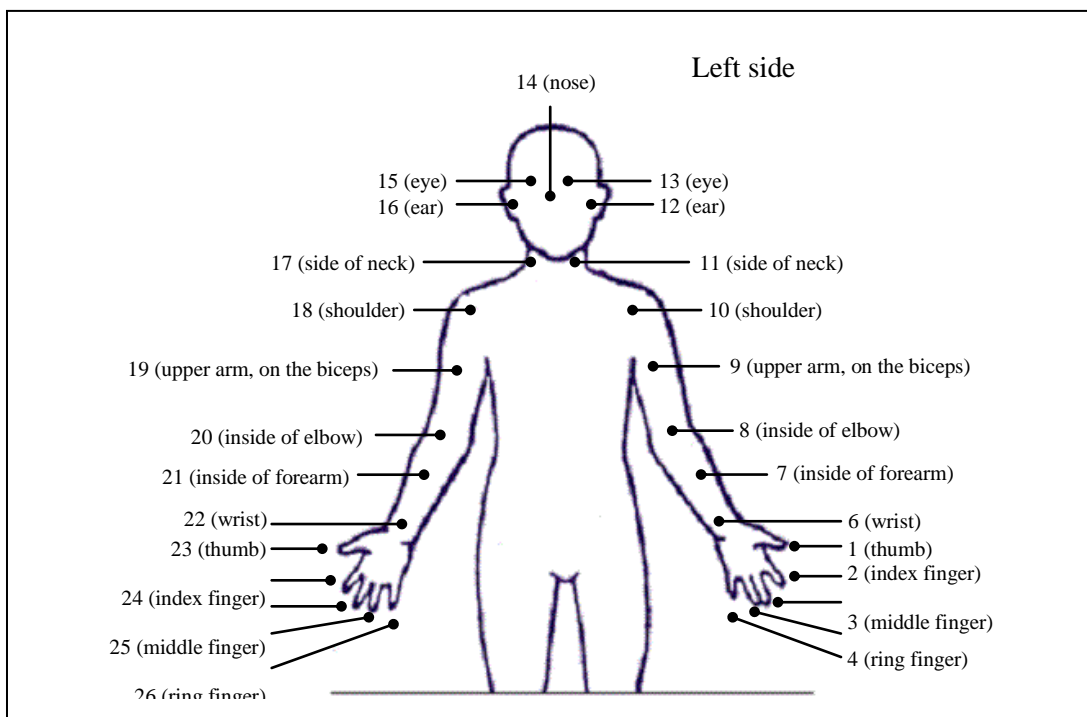


Figure 2. Points of the Mian body tally system showing body parts and associated numbers

The diagram in Figure 2 also applies to the other Mountain Ok languages and to Oksapmin with the qualification that the Telefol, Tifal and Faiwol systems start with the little finger rather than the thumb (Craig 2010: 5).

Table 1. Mian body-part tally system

Expression	Literal meaning	Meaning as numeral
<i>elekîem/olokîem</i>	‘only this one (M/F)’	‘1’
<i>asú/asusûna</i>	‘two’	‘2’
<i>asumâtna</i>	‘three’	‘3’
<i>asúke asúke</i>	‘two and two’	‘4’
<i>asúke asúke make</i>	‘two and two and another’	‘5’
<i>góng=dim</i> [joint=on]	‘on the joint’	‘6’
<i>bān=dim</i> [forearm=on]	‘on the forearm’	‘7’
<i>hetón=dim</i> [elbow=on]	‘on the elbow’	‘8’
<i>bānon=dim</i> [upper arm=on]	‘on the upper arm’	‘9’
<i>kwīng=dim</i> [shoulder=on]	‘on the shoulder’	‘10’
<i>mukón=dim</i> [neck_vertebrae=on]	‘on the neck vertebrae’	‘11’
<i>klón=dim</i> [ear=on]	‘on the ear’	‘12’
<i>kin=dim</i> [eye=on]	‘on the eye’	‘13’
<i>mukùng=dim</i> [nose=on]	‘on the nose’	‘14’
<i>kin milím</i> [eye other_side]	‘eye other side’	‘15’
<i>klón milím</i> [ear other_side]	‘ear other side’	‘16’
<i>mukón milím</i> [neck_vertebrae other_side]	‘neck vertebrae other side’	‘17’
<i>kwīng milím</i> [shoulder other_side]	‘shoulder other side’	‘18’
<i>bānon milím</i> [upper_arm other_side]	‘upper arm other side’	‘19’
<i>hetón milím</i> [elbow other_side]	‘elbow other side’	‘20’
<i>bān milím</i> [forearm other_side]	‘forearm other side’	‘21’
<i>góng milím</i> [wrist other_side]	‘wrist other side’	‘22’

For the sake of completeness, in Table 2 I list those body-part terms found in Smith and Weston (1974: 50–2), which deviate from the ones I recorded. Tone is not indicated in the source.

Table 2. Deviant and additional body-part terms found in Smith and Weston (1974: 50–2)

Expression	Meaning	Meaning as numeral
<i>het dafab</i> [elbow summit]	‘elbow’	‘8’
<i>tumin</i> [upper_arm]	‘upper arm’	‘9’
<i>tam=dim</i> [side=on]	‘side of face’	‘11’
<i>munung=dim</i> [nose=on]	‘on the nose’	‘14’
<i>tam milim</i> [side other_side]	‘side of face other side’	‘17’
<i>tum milim</i> [upper_arm other_side]	‘upper arm other side’	‘19’
<i>het dafab milim</i> [elbow summit other_side]	‘elbow other side’	‘20’
<i>kweil awok milim</i> [hand mother other_side]	‘thumb other side’	‘23’

While digit-tally systems with bases of 5, 10, or 20 (based on hands and feet) are very common in Papuan languages, body-part tally systems of the type described for Mian are less common. What’s more, Chan’s (2012) sample suggests that these are essentially confined to subgroups of TNG.<sup>10</sup> Even within TNG, these systems are relatively rare as only 15% of the TNG languages in the sample have them. The TNG subgroups with body-part tally systems are shown in Table 3 from east to west. It is important to bear in mind that Table 3 is based on the languages for which Chan’s sample has data points. It is very likely that there are more languages with body-part tally systems. Whether the proportion of languages with such systems actually changes with more data points is less likely.

Table 3. Subgroups of TNG with body-part tally systems

Subgroup	Languages
Madang	Kalam, Kobon
Engan	East Kewa, West Kewa, Ipili
Bosavi	Edolo, Kaluli, Onobasulu
East Strickland	Kubo, Odoodee, Samo
Ok-Oksapmin	Mian, Telefol, Tifal, Faiwol, Bimin (all Mountain Ok); Iwur, Ninggerum, Yonggom (all Lowland Ok); Oksapmin
Mek	Eipo Mek, Una, Kosarek Yale, Korupun-Sela, Nalca, Ketengban
Awyu-Dumut	Kombai, Korowai

Outside the TNG family body-part tally systems are rarely found. They seem to be completely absent from West Papuan, Torricelli, and the Ramu-Lower Sepik languages, and from most Sepik languages. Some non-TNG languages which are in contact with or close to TNG languages do have them. The following list contains all examples from Chan's (2012) sample, but there are probably more. Haruai (Comrie 1999) is a non-TNG language but a neighbour of Kobon. The Haruai system is very similar to the Kobon system and possibly a relatively recent loan (p. 81). A rudimentary system can be found in the Upper Sepik language Abau<sup>11</sup>, which is in contact with the western Mian dialect (see Map 1 above). The genealogical affiliation of the Senagi languages Menggwa Dla and Anggor (see Map 1 above), for which links to the TNG family have been suggested (Voorhoeve 1971; Wurm 1982), remains unclear (de Sousa 2006). The Senagi languages, while not in direct contact with TNG, are spoken close to TNG languages. The same holds for the Kwomtari language Biaka (also known as Nai) and the Left May language Nakwi.

So far there don't seem to be clear counterexamples to the claim that body-part tally systems in New Guinea are an areal feature associated with TNG languages and some non-TNG languages in contact with TNG languages.

Body-part tally systems across New Guinea serve similar functions, mainly of keeping track of bride and compensation payments and of counting pigs and various object of cultural significance. While they are remarkably similar at their core, there is also some variation. While the Mountain Ok languages have a base 27 system, the base in the Madang languages Kalam and Kobon is 23 (Pawley and Bulmer 2011: 443). Counting typically starts with the little finger, as in Kalam and Telefol, but can start with the thumb as well, as in Mian and Oksapmin. The Yupno (Madang; Wassmann and Dasen 1994) augment a base 20 system, which uses both hands and feet, by 13 further numbers associated with various body parts, to give a total of 33.<sup>12</sup> The range of bases in New Guinea runs from 18 to 74 (Lean 1992). For an overview of the variation between tally systems in the Upper Sepik and Central New Guinea, see Craig (2010).

Languages also differ in whether they allow body-part expressions to figure as modifiers in noun phrases. The Mian body-part expressions cannot be used as numeral modifiers in noun phrases. Mian has to rely on the binary system or Tok Pisin numerals. See above for examples. This is however possible in Telefol. An example is (13):



## (13) Telefol

<i>tanúm</i>	<i>[[mít diim ka foko]</i>	<i>[tuluún milií foko]]</i>	<i>kalíb</i>	<i>ítá</i>
man	[[above on at done]	[ear other_side done]]	these	3PL
man	[up to above(=nose)——]	[down to the other ear=16]		
man	[sixteen—————]		these	3PL

‘these sixteen men’ (Healey 1965: 28; glosses for the complex number idiom are mine, based on Healey’s description)

In noun phrases, the body part numeral in this Telefol example is *tuluún milií foko* [ear other\_side done] meaning ‘sixteen’. The preceding phrase *mít diim ka foko* [above on at done], which I gloss as ‘up to above, i.e. the nose’, does not add an additional numerical meaning but rather recapitulates the course the counting process takes across the body. In order to reach the right ear (‘sixteen’), one first has to reach the nose (‘fourteen’).

Body-part expressions are used as modifiers in noun phrases in some other TNG languages as well. An Oksapmin example is given in (14) and a Kalam example in (15). Note that in Oksapmin the body-part expression as a modifier precedes the head noun and occurs with the possessive clitic =*xe*.

## (14) Oksapmin

<i>jəxə</i>	<i>amun=xe</i>	<i>dik</i>	<i>jox</i>	<i>na=pi-n-gop=li=o</i>
then	elbow=POSS	time	DEF	NEG=come-PFV-VIS.FP.SG=REP=EMPH

‘Then, he didn’t come for eight nights (lit. elbow’s time).’ (Loughnane 2009: 16)

## (15) Kalam

<i>takn</i>	<i>ji</i>
month	elbow

‘eighth month (=August)’ (A. Pawley, p.c.)

When the linguistic work on Mian started with Smith and Weston in the late sixties (see Smith and Weston 1974), the body-part tally system was not used as a general counting device, as it was for example in Telefol (Healey 1964; Healey 1965).<sup>13</sup> Of course, we cannot say much about earlier stages of the language, but by that time the Mian system was highly restricted to the counting of temporal units, e.g. for keeping track of the months that had to

pass until a new taro garden would have to be cleared and planted or the nights that had to pass before one was scheduled to meet someone. Nowadays, the body-part counting system is basically defunct. It is remembered (at least in parts) but it is not used anymore.

Body-part tally systems in other TNG languages are still in use. For example, in Kalam and Oksapmin older speakers still use the system (A. Pawley and R. Loughnane, p.c.). Yet, even in these languages the traditional methods of counting have lost a lot of ground to Tok Pisin numerals.

## **5. CHANGE THROUGH CONTACT WITH TOK PISIN**

The obvious factors which contributed to the changes in the counting practices of many indigenous societies in New Guinea are education and the exposure to a cash economy with its concomitant daily use of currency. Saxe and Esmonde (2004) report in a 2001 study for Oksapmin that the prolonged contact of the speech community with the decimal system in the economic context puts pressure on the traditional systems and promotes the use of Tok Pisin numerals. They also report that there is a strong link between the degree of education and the use of the Tok Pisin numeral system. It is easy to see how schools, where children were exposed to Tok Pisin, entrench the use of Tok Pisin numerals. While body-part and Tok Pisin numerals still exist side by side in Oksapmin, use of body-part expressions is mainly found among older speakers and use of Tok Pisin numerals in younger, more educated speakers. This is in accord with Loughnane's observations about the use of the body-part system in Oksapmin, whose range of functions has become smaller due to the changes in society: While body-part numerals are still employed and even younger speakers know them, Tok Pisin is taking over in the economic context (R. Loughnane, p.c.).

Another factor facilitating the widespread use of Tok Pisin numerals is that many men from the Ok area and in general from rural areas in New Guinea were commonly hired for cash to work on plantations or for various companies throughout the region. In these contexts social and economic transactions would be (almost) exclusively in Tok Pisin. For these speakers Tok Pisin numerals become the norm and they take this attitude with them when they return home.

While a binary system is obviously impractical for human beings for trade store mathematics, let alone for more complex arithmetic operations, the body-part tally system is

less clearly so. There is evidence that Oksapmin speakers truncated the body-part tally system to base 20 to cope better with the counting of shillings, after missionaries and patrol officers had introduced Australian pounds and shillings around 1961 (1 pound = 20 shillings) in this area (Saxe 1982: 585). Constant translation of numbers to and from the decimal system can also be obviated by two other methods (Saxe and Esmode 2005: 192–194).

First, one can treat a counting step on the body as a multiple of 10 in toea so that numbers up to K2.70 can easily be expressed with the body-part tally system. For example, the elbow ('eight') would mean 80 toea, and the nose ('fourteen') K1.40. The little finger on the opposite side of the body ('twenty-seven') would mean K2.70.

Second, one can indicate the numbers for kina and toea separately, which would allow one to cover numbers up to K27.90 without going into additional counting cycles. K27.90 even nowadays should be enough to handle a typical trade store purchase. For example, the nose ('fourteen') and the elbow ('eight') together mean K14.80. On the use of the base 20 (hands and feet) part of the Yupno system in the trade store environment, see Wassmann and Dasen (1994: 85).

Nevertheless, the Tok Pisin decimal system is better suited for counting and arithmetic operations in the context of a western cash economy.<sup>14</sup> But apart from practicality I believe there are other factors which favour the Tok Pisin decimal system over the traditional body-part tally system. Tok Pisin numerals were introduced together with western currency and were propagated through the education system. So if a new system of goods exchange comes with its own highly suitable system of counting and reckoning it makes sense to avail oneself of this system. Anthropological reasons may also have played a role. The set of things which were traditionally counted in exact terms was quite limited and not necessarily co-extensive with the set of objects which suddenly had to be counted in a cash economy. To use the new numbers for the new objects was the obvious thing to do. The fact that the body-part tally system in Mian had been restricted to counting temporal units gave it an especially hard time when it came to surviving as a counting system in the modern world.

## 6. CONCLUSION

The Ok language Mian has a binary numeral system and—like many other TNG languages—a body-part tally system, in which certain points on the arms, the upper body, and the head

and face are associated with numbers. Across TNG there is some formal variation between the body-part tally systems found in various languages but their function of keeping track of bride and compensation payments and of counting pigs and various object of cultural significance is essentially the same.

The introduction of a western cash economy, currency, and the decimal system of Tok Pisin, together with the education system, which propagates and entrenches these, led universally to a decline of traditional body-part tally systems. While the system is defunct in Mian, it is still used by older speakers in some other TNG languages. I suggest that the Mian system had a particularly hard time in surviving because it was restricted to the counting of temporal units even at the time when the linguistic work on Mian began.

## **ABBREVIATIONS**

1 - first person, 2 - second person, 3 - third person, AN - animate, AUX - auxiliary, DECL - declarative, DEF - definite, F - feminine, FP - far past, HAB - habitual, HPST - hesternal past, IPFV - imperfective, M - masculine, N1 - neuter 1, NEG - negation, PFV - perfective, PL - plural, POSS - possessive, REAL - realis, REP - reported evidential, SEQ - sequential, SG - singular, SBJ - subject, TP - Tok Pisin, VIS - visual-sensory evidential.

**REFERENCES**

- Bailey, David A. 1975. *Abau language: Phonology and grammar*. Workpapers in Papua New Guinea languages 9. Ukarumpa: Summer Institute of Linguistics.
- Campbell, Stuart. 1938. The country between the headwaters of the Fly and Sepik Rivers. *Geographical Journal* 92.232–58.
- Champion, Ivan F. 1966. *Across New Guinea from the Fly to the Sepik*. London: Constable.
- Chan, Eugene. 2012. Numeral systems of the world's languages. Online: <http://lingweb.eva.mpg.de/numeral>.
- Comrie, Bernard. 1999. Haruai numerals. *Numeral types and changes worldwide*, ed. by Jadranka Gvozdanović, 81–94. (Trends in Linguistics, Studies and Monographs 118.) Berlin: Mouton de Gruyter.
- Craig, Barry. 2010. Tally systems of the Upper Sepik and Central New Guinea. Online: <http://www.scribd.com/doc/33157049/Tally-Systems>.
- de Sousa, Hilário. 2006. The Menggwa Dla language of New Guinea. University of Sydney dissertation.
- de Vries, Lourens. 1998. Body part tally counting and Bible translation in Papua New Guinea and Irian Jaya. *The Bible translator* (practical papers) 49.409–15.
- Fedden, Sebastian. 2007. A grammar of Mian, a Papuan language of New Guinea. University of Melbourne doctoral dissertation.
- Fedden, Sebastian. 2011. *A grammar of Mian*. Berlin: De Gruyter Mouton.
- Greenberg, Joseph H. 1978. Generalizations about numeral systems. *Universals of human language*, ed. by Joseph H. Greenberg, Charles A. Ferguson, and Edith A. Moravcsik, 249–95. Vol. 3 (Word structure). Stanford, CA: Stanford University Press.
- Harrison, David K. 2007. *When languages die: The extinction of the world's languages and the erosion of human knowledge*. Oxford: Oxford University Press.
- Healey, Phyllis. 1965. Telefol noun phrases. (B-4.) Canberra: Pacific Linguistics.
- Healey, Alan. 1964. A survey of the Ok family of languages, reconstructing Proto-Ok. Australian National University doctoral dissertation.
- Hughes, Jock. 2009. Upper Digul survey. SIL International. SIL Electronic Survey Reports 2009-003:1–43. Online: Accessed at <http://www.sil.org/silesr/2009/silesr2009-003.pdf>.
- Kienzle, Wallace; Stuart Campbell. 1938. Notes on the natives of the Fly and Sepik River headwaters. *Oceania* 8.463–81.

- Lancy, David F. 1983. *Cross-cultural studies in cognition and mathematics*. New York: Academic Press.
- Lean, Glendon A. 1992. Counting systems of Papua New Guinea and Oceania. PNG University of Technology (Lae) dissertation.
- Lewis, M. Paul. 2009. *Ethnologue: Languages of the world*. 16<sup>th</sup> edition. Dallas: SIL International.
- Lock, Arnold (Arjen) H. 2011. Abau grammar. Data papers on Papua New Guinea languages 57. Ukarumpa: SIL-PNG Academic Publications.
- Loughnane, Robyn. 2009. A grammar of Oksapmin. University of Melbourne dissertation.
- Loughnane, Robyn & Sebastian Fedden. 2011. Is Oksapmin Ok? A study of the genetic relatedness of Oksapmin and the Ok languages. *Australian Journal of Linguistics* 31.1–40.
- Menninger, Karl. 1969. *Number words and number symbols: A cultural history of numbers*. Trans. Paul Broneer. Cambridge, MA: The MIT Press.
- Pawley, Andrew. 2005. The chequered career of the Trans New Guinea hypothesis: Recent research and its implications. *Papuan pasts: Cultural, linguistic and biological histories of Papuan-speaking peoples*, ed. by Andrew Pawley, Robert Attenborough, Jack Golson, and Robin Hide, 67–108. Canberra: Pacific Linguistics.
- Pawley, Andrew & Ralph N. H. Bulmer. 2011. *A dictionary of Kalam with ethnographic notes*. Canberra: Pacific Linguistics.
- Roberts, John R. 1987. *Amele*. (Croom Helm descriptive grammar series.) London: Croom Helm.
- Saxe, Geoffrey B. 1982. Developing forms of arithmetical thought among the Oksapmin of Papua New Guinea. *Developmental Psychology* 18.583-594.
- Saxe, Geoffrey B. & Indigo Esmonde. 2004. Making change in Oksapmin tradestores: A study of shifting practices of quantification under conditions of rapid shifts towards a cash economy. *South Pacific Journal of Psychology* 15.2–19.
- Saxe, Geoffrey B. & Indigo Esmonde. 2005. Studying cognition in flux: A historical treatment of *fu* in the shifting structure of Oksapmin mathematics. *Mind, Culture, and Activity* 12.171–225.
- Shumway, Eric B. 1971. *Intensive course in Tongan*. Honolulu: University of Hawaii.

- Smith, Jean & Pamela Weston. 1974. Notes on Mianmin grammar. *Workpapers in Papua New Guinea languages: Studies in languages of the Ok family*, ed. by Richard Loving, 35–142. Vol. 7. Ukarumpa, PNG: Summer Institute of Linguistics.
- Thurnwald, Richard. 1914. Entdeckungen im Becken des oberen Sepik. *Mitteilungen aus den deutschen Schutzgebieten* 27.338–48.
- Thurnwald, Richard. 1916. Vorstöße nach dem Quellgebiet des Kaiserin-Augusta-Flusses, dem Sand-Fluß und dem Nord-Fluß bis an das Küstengebirge. *Mitteilungen aus den deutschen Schutzgebieten* 29.82–93.
- van Enk, Gerrit J. & Lourens de Vries. 1997. *The Korowai of Irian Jaya*. Oxford: Oxford University Press.
- Voorhoeve, Bert. 1971. Miscellaneous notes on languages in West Irian, New Guinea. *Pacific Linguistics A-28*, 47–114. Canberra: Pacific Linguistics.
- Voorhoeve, Bert. 2005. Asmat-Kamoro, Awyu-Dumut and Ok: an enquiry into their linguistic relationships. *Papuan pasts: Cultural, linguistic and biological histories of Papuan-speaking peoples*, ed. by Andrew Pawley, Robert Attenborough, Jack Golson, and Robin Hide, 145–66. Canberra: Pacific Linguistics.
- Wassmann, Jürg & Pierre R. Dasen. 1994. Yupno number system and counting. *Journal of Cross-Cultural Psychology* 25.78–94.
- Wilbrink, Ans. 2004. The Kopkaka of Papua. Provisional notes on their language, its language affiliation and on the Kopkaka culture. Vrije Universiteit Amsterdam MA thesis.
- Wurm, Stephen. 1982. *Papuan languages of Oceania*. Tübingen: Narr.

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<sup>2</sup> An anonymous reviewer points out that there are (at least) two Tok Pisin numeral systems, the older transparently decimal one, where e.g. 21 is *tupela ten wan* [two ten one], and the one identical to English except for details of pronunciation, as well as possibly intermediate varieties. The system relevant for the purposes of this paper is the latter. It is used in the Mian speech community today. I have no evidence of the former system ever having been used in the speech community.

<sup>3</sup> Voorhoeve does not give evidence for this subgrouping. He gives the language name as Tsakwambo.

<sup>4</sup> 'Wagarabai' is an Abau (Bailey 1975; Lock 2011) name for a large river (which the Mianmin call 'Kweima') flowing into the August river. The lowland groups (quite a few of whom were in the Kweima valley at that time)

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were contacted from Green River, so the patrols would have had Abau-speaking interpreters, hence the use of Abau names. ‘Skonga’ (or sometimes ‘Suganga’), by contrast, is the Mian name for a smaller river upstream from Yapsiei (D. Gardner, p.c.).

<sup>5</sup> The author witnessed conversations between speakers of the two dialects in the field.

<sup>6</sup> In Tok Pisin, *pisin* means both ‘bird’ and ‘pidgin’.

<sup>7</sup> The word *blim* ‘not exist’ is used as an expression for ‘nothing’. It is morphological complex, consisting of the existential verb root *bl* and a negative suffix *-im*.

<sup>8</sup> It is possible that the origin of this element is the verb *na* ‘do’.

<sup>9</sup> Since independence in 1975 Papua New Guinea uses kina (K) and toea. One kina is divided into 100 toea.

<sup>10</sup> Based on the Ethnologue classification (Lewis 2009).

<sup>11</sup> According to Lean (1992), Abau uses a digit-tally system augmented by the terms for navel, breast, and eye.

<sup>12</sup> The numbers from 21 to 33 are: 21 - left ear, 22 - right ear, 23 - left eye, 24 - right eye, 25 - nose, 26 - left nostril, 27 - right nostril, 28 - left breast, 29 - right breast, 30 - navel, 31 left testicle, 32 - right testicle, 33 - penis. The shape of the Yupno system is therefore quite different from the “around-the-body” counting systems found in the Ok languages or Kalam.

<sup>13</sup> A sign that the Mian body-part tally system had eroded much already in the sixties is that Healey (1964: 65–6) explicitly and incorrectly notes that Mian did not have such a system. If the system had already declined back then it is understandable that it was overlooked by Healey. Smith and Weston (1974: 50–2) very briefly describe the Mian body-part tally system. They do not give the terms from 24 to 27.

<sup>14</sup> An anonymous reviewer correctly points out that there is nothing inherently problematic about arithmetic to base 27. The problem arises when the language signs use that system but the notation uses a different system, so that one has to shift continuously between base 27 and base 10.