DZONGKHA NUMBER SYSTEMS

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INTRODUCTION

Central and Written Tibetan are known to have a purely decimal number system, without any of the traces of a quinary or vigesimal system which can be found scattered in other Tibeto-Burman languages. Their close relative, Dzongkha, the national language of Bhutan, has preserved, alongside a decimal system copied from Tibetan, a complete vigesimal system with lexical names for the bases up to 160 000 (20^4). Another Bodish language, Tamang, spoken in Central Nepal, has a less extensive vigesimal system, which is the only number system of that language. I suspect that further research would reveal similar systems in other languages of that group, including some dialects of Tibetan.

From the typological point of view, three number systems co-exist in Dzongkha: 1) a decimal-vigesimal system whose main features are a) the use of addition, multiplication and division (fractions) in the building of numbers, b) the use of 'over-counting' (expressing the number in relation to the higher limit of the interval which contains it, but reckoning it from the lower limit), c) the expression 'on the surface' of the base of rank zero (the

unit); 2) a decimal system used in formal speech, and probably borrowed; and 3) a system of grouping by pairs.

I. NUMBER NAMES FROM 1 TO 19

Up to 20, Dzongkha has a single set of number words.[1]

Table 1 : Number names from 1 to 19

Form[2]	Structure	Meaning
ci:		1
'ɲi:		2
sum		3
ʐi/ʐe̩		4
'ŋa		5
ɖhu:		6
ɖyn		7
ge:		8
gu:		9
cuthãm/cu	10 (full)	10
cuci	10.1	11
cuɲi	10.2	12
cusu/cusum	10.3	13
cyʐi	10.4	14
ceŋa	10.5	15
cuɖu/curu	10.6	16
cupdỹ	10.7	17
copge/couge	10.8	18
cygu	10.9	19

As can be seen from Table 1, the organizing principle
is purely decimal : Numbers from 1 to 10 have unanalysable names,
and numbers from 11 to 19 are formed by adding to the root 10
the names of the units from 1 to 9. We find no trace here of
the PTB root *s-nis '7', whose etymological connection with PTB
*(g-)nis '2' betrays an old quinary system in PTB.This is somewhat
surprising since other Bodish languages, such as Tamang with *hnis,
or Dungkarpa (Eastern Bhutan) with nis ⏋, have kept this root,
pointing to the familiar quinary-vigesimal system as a possible
ancestor to their present day decimal-vigesimal systems. But a
survey of vigesimal systems such as those in Dixon and Kroeber
or in Menninger reveals that the decimal-vigesimal pattern is at
least as frequent as the quinary-vigesimal.

Under 20, Dzongkha is in no way vigesimal either, since
all number names from 11 on are clearly compounds, at least
etymologically. In this respect Dzongkha is not exceptional,
since no purely vigesimal system (that is using a number sequence
of the 1 2 3 4 5 6 7 8 9 A B C D E F G H I J 10 type) has yet
been reported. It seems that the 20 gradation is always interrupted
by a smaller gradation by 5s or by 10s (Menninger, 56sqq.).

II. TWENTY

With "twenty", Dzongkha starts to differentiate between a
decimal and a vigesimal method of reckoning. In the decimal system,
"twenty" is /ɲiɕu/, etymologically $|2.10|$, but strongly amalgamated.
The root '2' has lost its high tone,[3] and the root 10 is weakened
to /ɕu/ , whereas in the names of the other tens the multiplier
retains its "strong" form (corresponding to an old prefixed form
as we will see below), and '10' is either /cu/ or /pcu/. The form
for '20' and all the other forms of the decimal system are very
similar to the Central and Written Tibetan forms, and are in my
opinion either straight borrowings or calques from the more prestigious
Tibetan norm.

In the vigesimal system, "twenty" is /khe/, an unanalysable
morpheme, always accompanied by a multiplicator, including 'one', so
that '20' is actually /khe ci:/, $|20.1|$. The internal syntax of '20'
and of all the multiples of a base in the vigesimal system is multi-
plicand + multiplier, which is in agreement with the general word
order of Dzongkha: Noun + Quantifier. The forms are not amalgamated,
and their internal syntax is transparent.

Conversely, number names in the decimal system follow
the order multiplier + multiplicand, as in /ɲiɕu/, and are more or less
amalgamated. So much so that Dzongkha has employed the word /ɲiɕu/
twice, once in the decimal system to mean '20', and once in the