Restricted Numeral Systems and the Hunter-Gatherer Connection

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May 16, 2015
Numerals are

- spoken
- normed expressions that are used to denote the
- exact number of objects for an
- open class of objects in an
- open class of social situations with
- the whole speech community in question
Restricted Numeral Systems: Definition

A numeral system is *restricted* iff

1. Monomorphemic numerals exist only up to 2 or 3 AND
2. Higher quantities are expressed orally only
   a) inexactely or
   b) up to ca 10 with additions of 1, 2 and 3 (possibly including ad hoc use of ’hand’ for 5).

- Example: !Kũ (Juu, Botswana-Namibia) of Vedder (1910-1911):

  1   |ē
  2   dsã
  3   !gao
   viel !gao
Restricted Numeral Systems: Notes

- A numeral system with normed usage of hand + feet for 5, 10, 20 will never be called a “restricted” numeral system.

- People with restricted numeral systems may use one or more of the following strategies to cope with higher quantities:
  1. Do without exact counting above 3 and live happily anyway
  2. Use hands, fingers and feet for tallying in an ad-hoc way
  3. Use hands, fingers and feet in a normed way (but without corresponding oral expressions)
  4. Use numerals from another language
  5. Keep track of things by tallying or individuizing
History of Research

• Probably the earliest descriptions of restricted numeral system come from the Americas:

_Taino of Hispaniola (Arawakan):_ (Very unclear)
   Ramón Pané 1571 [1498] Relación acerca de las antigüedades de los indios

_Tupinambá (Tupian):_ (Rather Unclear)
   Joseph de Anchieta 1595 [1556] Arte de Grammatica da Lingoa mais usada na costa do Brasil
   Jean de Lery 1578 Histoire d’vn voyage fait en la terre du Bresil, avtremont dite Amerique

• Probably the first scholars to mention restricted numeral systems in contrast to others are

 Re Tupinamba Locke 1689 An essay concerning human understanding
 Re Thracians – probably erroneous and Leibniz 1697 Unvorgreifliche Danken

• 19th-20th century scholars frequently flash the label “primitive” but do little to understand the nature and distribution of restricted numeral systems
Worldwide Presence of Restricted Systems

• Out of 6,880 languages in the world for which there is published data on numerals
• 1,093 languages are attested with a restricted system

Note:

• There are no bona fide cases of languages with “almost restricted” numeral systems, say, numerals up to, e.g., 5, 6, 10, 13.
• Not all restricted numeral systems are necessarily alike:
  – Most end at 2, many end at 3
  – Ca 15 cases where the 2-word is claimed to mean ’a few’ (Papua, Amazon)
  – 2 cases with very good evidence that both the 1-word and 2-word are fuzzy: Pirahã and Ninam (Yanomami, Brazil)
Whence Restricted Numeral Systems?

- A limit at 2-3 coincides with the cognitively established subitizing limit =

  the number of objects one immediately sees how many they are, without grouping or counting.

Geographical Distribution
Restricted Systems and Hunter-Gatherers

A language is a Hunter-Gatherer (HG) language iff

its speakers subsist more than 50% on plants and animals whose reproduction is not controlled by humans

• Amendment 1: If a language
  – with known HG-status ethnographically
  – borrows numerals 3+ or 4+

=> then it had an original restricted numeral system

• Amendment 2: If a language family
  – with known HG-status ethnographically
  – can reconstruct numerals up to exactly 2 or exactly 3 (inclusive)

=> then it had an original restricted numeral system
• Amendment 3: If a language
  – is not directly attested with a restricted system in vocabularies
  – but there ethnographic evidence that they are “unable to count beyond 3”
=> then it has a restricted numeral system

• Maes, Josef. (1947) Belgisch-Kongo, p 722
  Der Ituri-urwäld Pygmäe kann kaum bis drei zählen.

• Hose, Charles & William McDougall. (1912) The pagan tribes of Borneo, V2 p 193:
  The most striking evidence of the low cultural standing of the Punan is the fact that he cannot count beyond three (the words are ’ja’, ’dua’, ’telo’); all larger numbers are for him merely many ’pina’.

• Shortt, John. (1865) An Account of Some Rude Tribes, the Supposed Aborigines of Southern India, p 380:
  [Re Yenadies of Strihurreecottah] One or two of the boys, with the exception of a few errors, could count up to a hundred. Most of them, even with the assistance of their fingers, could not add numbers together; some could not tell how much three and two were, and the brightest among them could not add two figures to make twelve.
Worldwide HG Survey: Numbers

To count independent cases of restricted systems:

- If the phylogenetic history of the numeral system of a family is known, this gives which occurrences are independent.
- Otherwise, look at every restricted system with independent forms.

<table>
<thead>
<tr>
<th></th>
<th>Restricted</th>
<th>Restricted-Amendment</th>
<th>Non-Restricted</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG</td>
<td>85</td>
<td>35</td>
<td>76</td>
</tr>
<tr>
<td>NON-HG</td>
<td>7</td>
<td>1</td>
<td>124</td>
</tr>
</tbody>
</table>

- The poorly populated cell is non-HG & Restricted system.
  If a language has a restricted system, then the speakers are likely HG.
Several language families have some AGR and some HG member languages where the HG languages have restricted systems and the AGR members have non-restricted systems: Austroasiatic (Minor Mlabri, Hill Korwa), Cushitic, Morehead and Upper Maro, Pygmies (Ubangi, Bantu, Central Sudanic), Austronesian (Negritos, Tasaday, To Ala, Punan, Sera-Sissano, Waropen, Kuni), Chibchan, Khoe-Kwadi

Shrinking must be inferred in the cases such as:

– Kuni (Austronesian/Oceanic, Papua New Guinea):

![Sound Changes Diagram]

– Minor Mlabri (Austroasiatic/Khmuic, Thailand): Old Khmuic numeral morphemes are preserved in ritual formulae
Why Restricted Systems?

Why all AGR languages, as well as some HG languages, invent non-restricted systems is not well-understood:

• HG societies typically have many uses for exact counting, e.g.:
    She ... wait for the moment of birth ... calculate the nine month period ... counting the moons
  – Number of days to a festivity
  – Lots of evidence for non-verbal counting

• There is no simple explanation involving trade
  – Trade is omnipresent in HG societies around the world
    * Thurnwald, Richard. 1932 Economics in primitive communities. OUP.
  – Expressions for exact numbers are not a pre-requisite for trade, e.g., a Spanish-Panare trade pidgin has a restricted system where ’vente’ means ’many’
Restricted Systems in Khoisan

Sandawe (AGR) : Not restricted (5-10-100)

Hadza (HG) : Restricted plus Datooga + Swahili loans

Kx’a :

Ju (HG) : Restricted

Amkhoe (HG) : Restricted

Tuu :

!Ui (HG) : Attested languages restricted (possible exception //Xegwi?)

Lower Nosop (HG) : Restricted

Taa (HG) : Restricted

Khoe-Kwadi : See next slide
Khoe-Kwadi

Khoe-Kwadi

Kwadi (PAS) : Not restricted

Khoe :

Khoekhoe :

North :

Hai//om (HG) : Not restricted / Borrowings from Nama?
Nama (AGR) : Not restricted
Bergdama (HG) : Restricted
South (AGR) : Not restricted

Non-Khoekhoe :

Ts’ixa (HG) : Restricted

Ost-Kxoe :

Shua (HG) : Some lects restricted, some not
Tshwa (HG) : Restricted

West-Kxoe :

Khwe-//Ani :

Khwe (HG) : Restricted
//Ani (HG) : probably not restricted

Naro-Ana :

Naro (HG) : Originally restricted
//Gana (HG) : Restricted
/Gwi (HG) : Restricted
## Khoe-Kwadi 1-4

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<tbody>
<tr>
<td>Kwadi</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
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<td>/uí/</td>
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<td>/ám/</td>
<td>/ám/</td>
<td>/gám/</td>
</tr>
<tr>
<td>3</td>
<td>dátùa &lt; Bantu</td>
<td>istgwunny</td>
<td>!nona</td>
<td>n!óànà</td>
<td>//óbé</td>
<td>ngónà</td>
<td>//óbé</td>
</tr>
<tr>
<td>4</td>
<td>né &lt; Bantu</td>
<td>hackey</td>
<td>haka</td>
<td>fiatsa</td>
<td>hàtsa</td>
<td>//óbé</td>
<td>-</td>
</tr>
</tbody>
</table>

- 1-4 reconstructs to proto-Khoe:
  
  => no inference from numerals that proto-Khoe was HG

- 1-2 only shared between proto-Khoe and Kwadi:
  
  ? => proto-Khoe-Kwadi was HG, or
  
  ? => Kwadi went through a HG stage between the split from proto-Khoe-Kwadi and the present
The End

Thank You for Listening!


