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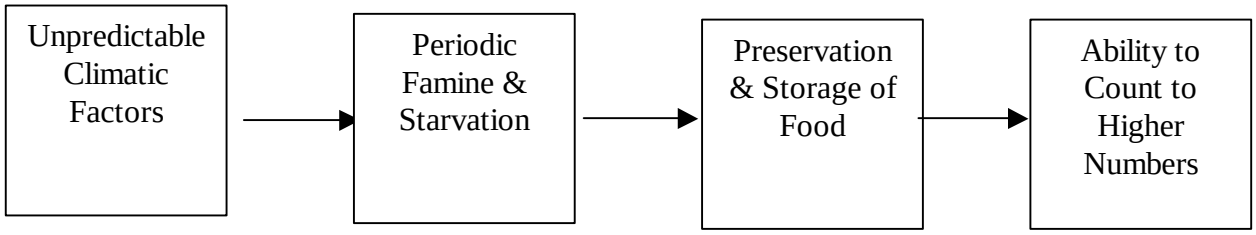
Codes on Highest Number Counted for the Standard Sample[1]

William Divale
Department of Social Sciences, York College of the City University of New York, Jamaica, NY 11451; DivaleBill@aol.com

1. INTRODUCTION

This paper presents codes on the highest number a society can count to. In the original study (Divale 1999) these codes were used to test a model that explains the variability in counting systems found in traditional societies. Societies that live in areas of climatic instability in terms of temperature and precipitation extremes tend to have period starvation and famine, which in turn stimulates societies to store and preserve food. The need to store and preserve food during one season for use in another stimulates societies to develop abilities to count to higher numbers in order to accurately estimate food storage requirements. This model was successfully tested cross-culturally on two separate worldwide samples (N = 69 and N = 136 respectively).

Figure 1. Model for the Development of Higher Counting Systems



The data and codebook are presented on the accompanying CD in both MAPTAB format (ST87.dat and STSD87.COD) and SPSS for Windows format (ST87.SAV).

2. SAMPLE

The sample is composed of the 136 societies that overlap two larger samples: the 350 societies in the Human Relations Area Files [HRAF} (Ember and Ember 1988) and the 186 societies in the Standard Cross-Cultural Sample [SCCS] (Murdock and White 1969). Societies were chosen if they were in both of the above populations. The overlap procedure was used because the SCCS has been used extensively in cross-cultural research during the past two decades. Murdock and White divided the societies of the world into 200 cultural groups based on language, geographical distribution, and adequacy of ethnographic

description. Societies were then selected from 186 of those 200 units. Part of the sampling

procedure was designed to control for the effects of diffusion, e.g., Galton's Problem (Naroll and D'Andrade 1963). The SCCS now has the added benefit of having over eighteen hundred variables measured for it. HRAF is also ideal for cross-cultural research in that ethnographic observations and reports are easily retrievable, foreign sources are translated into English, multiple authors cover each society, and historical depth is available to observe culture change. There are 136 societies found in both samples and these form the sample used here (Ember and Ember 1988). Using only sources in HRAF that were used for coding other variables in the Standard Sample controlled for time and place focus.

3 MEASURING COUNTING

The author used HRAF categories 802—numeration, 801—numerology, and 803—mathematics, to measure ***counting*** (Murdock et al. 1987). Ethnographic sources were examined for descriptions of the counting systems and how high a particular system could go. The variable was measured as an interval scale where each score was the highest number to which members of a society could count.

Galton's Problem, e.g., the problem of diffusion from cultural borrowing or the double counting caused by including near neighbors, poses a special problem in this study, especially as concerns the counting variables. The Aleut, for example, count on one counting system, but also have the European decimal system. In this case it is fairly clear that the decimal system was introduced by Europeans and is not indigenous to the Aleut. Generally the ethnographers report when a foreign counting system has been introduced. However, when there was a conflict in reports, the earlier field date report was used with the assumption that the earlier described counting system would be less likely to be influenced by contact. Sometimes the sources report that the society could count to a certain number and implied they could count higher but did not give these higher numbers or any limit. In these cases, ten multiplied the highest number reported and that figure was set as the highest number counted. If the source described a decimal type system, whether it was based on 6, 10, or 20, it was assumed that the society had the ability to count infinitely. In order to conduct analyses using an interval scale, infinite number systems were arbitrarily assigned the number of 10,000, which was far and above any figure reported in the sample.

To give a sense of the ethnographic data, the quotations collected for the Nama (SCCS society number 1, HRAF name "Hottentot", FX13) are as follows:

Hahn lived among the Nama from 1870 to 1880. Hahn (1881:10) writes:

> As regards the numerals, it seems that the Bushmen languages have not developed them beyond two; some travelers speak of three, but this is evidently derived from the Khoikhoi word *!nora* or *!nona* for "those".

> The Ai-bushmen, however, who inhabit the North Western Kalihari. . . count up to twenty, and for the sake of completeness I give these numerals here, as I have written them down from the mouth of three individuals of the !Ai tribe.

Hahn (1881:11) goes on to write:

> I was so struck with the novelty of this discovery, in finding a Bushmen tribe which could count beyond three, that I repeatedly cross-examined those individuals separately. I however still maintain the suspicion that this system of numerals is not genuine Bushmen counting, but that we have to ascribe it to the influence of the neighboring Bakoba tribes….
>
> A remarkable feature of the Khoikhoi language is the decimal system of counting; a system not adopted from the Europeans….

An interesting note that relates to the theory tested in the original paper (Divale 1999) comes also from Hahn (1881:13):

> We also know that the Khoi-Khoi could not have invented the numerals before their domestic and social condition made counting and taxing necessary. As long as they were hunters, there was nothing worth counting, but when they had taken to breeding cattle and sheep, they had to count (*!g"a*) their flocks.

Based on the above, I rated the Nama as being able to count to three before the influence of outside contact from the Bakoba or the Europeans. I also rated the code as confident. The counting codes for each of these societies are listed on the CD as data files ST87.dat, with the codebook STDS87.COD, and in SPSS for Windows format as ST87.sav. The ST87.DAT file recodes the count data to remain compatible with MAPTAB. The SPSS file retains the original number codes.

4 RELIABILITY OF THE COUNTING MEASUREMENTS

Thirteen student raters in a cross-cultural research methods class each collected quotes on counting for ten to eleven societies. The author then read the collected quotations and made the final ratings. Five additional student raters collected data on twenty of the same societies. The correlations between the two sets of codes on these twenty societies were almost identical, indicating high rater reliability.

The author also made ratings as to the confidence he had in making the ratings. The confidence codes would suggest if there was possible systematic error in the ethnographic accounts. If the ethnographic reports were clear and did not contain conflicting reports, they were rated as "confident". If the reports were not clear, or inferences had to be made, then these ratings were coded "not confident". A t-test between the average highest number

counted among each of the confidence rating groups did not show any significant statistical differences. However, the large standard deviations within each group mean that the differences between the two means would have to be very great to achieve statistical significance.

Figure 2. T-test of the Highest Number Counted by Confidence of Ratings

Rating	N	Mean	S.D.	T	Probability
Confident	57	1837.02	3641.75	-0.234	0.815
Not Confident	34	1659.26	3245.77		

5 DISTRIBUTION OF COUNTING

The following tables display the frequency distribution of the counting codes and the rater's codes on his confidence in making the counting rating. In the original paper (Divale 1999) the confidence ratings were not reported.

1862. Highest Number Counted

N	CODE	DESCRIPTION
93	.	Missing data (including 50 societies not rated)
1	1	1
9	2	3
3	3	4
2	4	5
1	5	6
1	6	7
1	7	8
15	8	10
1	9	12
1	10	16
8	11	20
2	12	30
1	13	36
1	14	40
1	15	90
14	16	100
1	17	200
1	18	400
10	19	1,000
3	20	2,000

1	21	3,600
1	22	4,000
1	23	5,000
13	24	10,000

1863. Confidence in Making Counting Rating

N	CODE	DESCRIPTION
95	.	Missing data (including 50 societies not rated)
34	1	Not Confident in making counting rating
57	2	Confident in making counting rating

6 COUNTING MEASUREMENT VALIDITY

Validity refers to the accuracy of a variable in terms of actually measuring the concept it is suppose to represent. In the case of direct measurements as we have here, validity does not present much of a problem (Ember et al. 1991). However, this does not mean that some measurement error is not present. A cross-tab analysis of the counting codes by rater confidence showed that for the eighteen societies that had counted only as high as "8", seventeen were rated as confident (94%). For the seventy-three societies that counted to 10 or higher, 55% were rated as confident. The difference is almost statistically significant (Gamma = -0.243, p = 0.056). Thus there is some tendency for the raters to be more confident in the ratings they made when the society counted no higher than "8".

7 NOTES

1. This research was supported in part by NIH MARC Training Grant T34 GM08498-01 (William Divale), the 1993 NSF Summer Institute in Comparative Anthropology SBR-8911173 (C. Ember, M. Burton, and R. Munroe), and the 1995 NSF Summer Institute in Quantitative Methods in Anthropology (R. Bernard, P. Pelto, and S. Borgatti).

7 REFERENCES CITED

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World Cultures CD Data Disk

The CD with this issue of ***World Cultures*** contains the following files in the home directory:

ST85.DAT	STDS85.COD	ST85.SAV:	Secondary disposal codes
ST86.DAT	STDS86.COD	ST86.SAV:	Language and region codes
ST87.DAT	STDS87.COD	ST87.SAV:	Highest number counted codes
STDS01.COD			Corrected code file
STDS03.COD			Corrected code file
FILECDBK			Updated MAPTAB codebook
STAMPL			Updated MAPTAB codebook
WC12#1.DOC			Issue in Word 2000 format

There are two subdirectories with files for 12(1):

\inuit
This subdirectory contains the Inuit mortuary practice files
\culture
This subdirectory contains the data files for Khaltourina and Korotayev's article.

There are five other subdirectories with files containing:

\Ethnographic Atlas Revised by World Cultures
This includes the codebook and SPSS data file for 105 variables and 1267 societies.

\Std Cross-Cultural Sample Manuals
This includes codebooks and bibliography for the Standard Sample

\Western North American Indians Data Set
This contains codebook and SPSS data files for the 441 variables and 172 N. A. Indian societies.

\World Cultures Volumes 1 to 11
This contains subdirectories of all files of the first eleven volumes of World Cultures.

William Divale