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INEQUALITY IN EGYPTIAN PREDYNASTIC CEMETERIES

BY

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The concept of inequality is not easy to define except as the opposite to equality, which only transfers the difficulty to the latter term. Equality is a subjective idea that means different things to different people.

The 'democratic' concept of equality is a conventional definition, usually assumed, but that has no absolute validity. Many of the procedures deviced to measure inequality accept such an approach to the problem[1].

One of the possible interpretations is that involving the idea of an even distribution of a variable among many units. Whenever a distribution is uneven, we can speak of inequality.

In order to measure it, sociologists have developed a number of ways by means of which we can obtain quantitative estimations of inequality[2].

The way we handle this data will determine the credibility of our conclusions. Some authors warn us that 'many quantitative analyses of historical series fail to realize their potential because they are stamped by a series of interrelated pre-theoretic and meta-methodological presuppositions which are themselves 'ahistorical' ... Although distortions are inevitable, some reflections extend our understanding of (the) historical process itself. But distortions induced by conventional quantitative (and qualitative) approaches to historical data can be so gross as to make history virtually unrecognizable and the resulting theoretical interpretations of it seriously misleading. That surely is both 'failed history' and failed sociology'[3].

Nevertheless, these authors admit that 'structural transformation may also be seen through gradual changes in parameter estimates' although 'time is internal to the historical making and development of social structure and may have different tempos at different levels of social organization'[4].

Others think that 'an argument can reasonably be made that a concern with *amounts* or *numbers* is a necessary first step in the process of understanding social change'[5] or that

[1] F. Cortés and R. Rubalcava, *Técnicas estadísticas para el estudio de la desigualdad social*, México, 1984, p. 11-25.
[2] P. Allison, *American Sociological Review* 43 (1978), p. 865-880.
[3] L. Isaac and L. Griffin, *American Sociological Review* 54 (1989), p. 873-874.
[4] L. Isaac and L. Griffin, *op. cit.*, p. 883.
[5] B. Laslett, *American Sociological Review* 45 (1980), p. 217.

'both the mathematical modeling tools and the necessary statistical knowledge are available to make possible development and more effective use of quantitative approaches that have the potential of improving both the quality of our research and also our theoretical thinking'[6].

Although referring to modern societies, some authors warn us about the dangers of misconceptions and oversimplifying our understanding of social structure: 'we argue that the structure of society does not include social categories, however defined, as units. Instead, social structure consists of functioning groups and organizations such as families, work groups, business enterprises ... and so forth, which are intertwined through relationship networks to form even more complex structures'[7].

While some scholars have ventured to analyze in depth certain Egyptian Predynastic cemeteries in which they felt there was adequate information available in order to try to detect and evaluate social inequality by means of its many manifestations in the archaeological record[8], and although we think this was a necessary approach that was long overdue, we decided to continue with our study of global characteristics of all published Predynastic cemeteries in Egypt before attempting any such project[9].

This paper contains the results obtained after measuring inequality in 19 sites[10] using the two variables we considered appropriate, namely, the size of the tombs and their wealth.

First of all, we will justify our choice of variables, then we will describe the procedures we used to evaluate inequality in each case and finally, we will comment on the results obtained by means of this approach.

Scholars working in this field recommend that more than just one variable be used for these evaluations[11]. The presence or absence of wooden or clay coffins, a clear status symbol, the special treatment given to the body of the deceased and other possible criteria are unfortunately not feasible due to very incomplete data in most Egyptian Predynastic ceme-

[6] H. Blalock Jr., *American Sociological Review* 54 (1989), p. 454.

[7] F. Bates and W. Peacock, *American Sociological Review* 54 (1989), p. 575.

[8] S. Seidlmayer, *GM* 104 (1988), p. 25-51; K. Bard, *JEA* 74 (1988), p. 39-55; W. Griswold, in R. Friedman and B. Adams (Eds.), *The Followers of Horus*, 1992, p. 193-198; C. Ellis, in E. van der Brink (Ed.), *The Nile Delta in transition: 4th to 3rd millennium B.C.*, 1992, p. 241-258; T. Wilkinson, *State formation in Egypt*, 1996.

[9] J. J. Castillos, *A Reappraisal of the Published Evidence on Egyptian Predynastic and Early Dynastic cemeteries*, 1982; *A study of the spatial distribution of large and richly-endowed tombs in Egyptian Predynastic and Early Dynastic cemeteries*, 1983; *Rd'E* 48 (1997) p. 251-256.

[10] The sources for most of these sites are listed in page 200 of my 1982 publication, to which we should add: E. Ayrton and W. Loat, *The Predynastic cemetery at El Mahasna*, 1911; G. Brunton, *ASAE* 39 (1939), p. 419-424; F. Debono and B. Mortensen, *The Predynastic cemetery at Heliopolis*, 1988; I. Rizkana and J. Seeher, *The Predynastic Cemeteries at Maadi and Wadi Digla*, 1990; S. Hendrickx, *Elkab V, the Naqada III Cemetery*, 1994 and my work with Petrie's original notebooks at University College, London.

[11] G. Feinman and J. Neitzel in M. Schiffer (Ed.), *Advances in archaeological method and theory*, 1984, p. 39-102; W. Griswold, *op. cit.*, p. 197.

teries because of ground conditions which did not allow sufficient evidence to survive or to the disturbances due to robbers.

Grave size however, was recorded for almost 5,000 tombs, in most cases allowing the determination of the volume of the burials which is a better estimation of the effort made to dig the graves than just the floor area or merely the length or width.

All through ancient Egyptian Pharaonic history the size of the tombs revealed the status of the deceased in his or her community, so it is permissible to assume that this practice was not a sudden innovation of the Egyptians of the Dynastic period but that it had its roots well before the First Dynasty.

The gradual but continued increase through time of the size of certain tombs in all Egyptian Predynastic cemeteries leading to the very large graves of the end of the Predynastic, cannot be explained in any other way[12].

Although most of the burials had been disturbed in ancient times, making it very difficult to rely on intact tombs only, our experience has shown that the total extant wealth of the graves as recorded by their excavators is usually a figure not very far from the one corresponding to the intact tombs[13], a situation that can be explained by selective robbing of the tombs rather than very frequent indiscriminate looting.

If we use some of the funerary objects as a variable to measure inequality, such as the so-called 'New Materials' or other items considered as status symbols[14] or for instance, pots, which according to other scholars were left in the tombs by robbers[15] or some other system involving giving points to different objects according to their probable relative importance[16], useful criteria that allow us to test assumptions based in the majority of cases on reasonable grounds, we will nevertheless be compromising our results by the subjectivity implied by most of these approaches.

We think therefore that the total extant wealth recovered from the tombs, regardless of their condition, will be a more appropriate variable because it relies on the indisputable weight of numbers rather than on a selection of objects.

Of the two chosen variables we believe the size to be the most reliable because it was usually carefully recorded by the excavators and was seldom modified by the robbers' activity. Thus, it should be considered as the main yardstick in order to evaluate inequality in our case, but because especially in the earliest period of the Egyptian Predynastic the funerary endowment of the tombs was rather sparse, the wealth as defined by us is also a secondary useful criterium.

[12] G. Reisner, *The Development of the Egyptian Tomb down to the Accession of Cheops*, 1936.
[13] J. J. Castillos, *GM* 163 (1998), p. 27-33.
[14] K. Bard, *From Farmers to Pharaohs*, 1994, p. 61.
[15] T. Wilkinson, *op. cit.*, p. 26.
[16] S. Hendrickx, *op. cit.*, p. 217-221.

It complements the physical effort used up in digging the graves with the other aspect represented by the expenditure in objects considered appropriate to the status and needs of the deceased in the otherworld and which were therefore left with him or her and that have been recovered from the tombs.

The better known measures of inequality basically evaluate the sum of deviations from the mean. In order to make the result scale invariant, so that proportional increases will not affect it, the number is usually divided by the mean.

The first of those numbers, known as the Gini Index (G), is calculated according to the following formula:

$$G = \frac{2}{\mu n^2} (1x_1+2x_2 +3x_3+.....+nx_n) - \frac{n+1}{n}$$

where μ is the mean, n is the number of items in the sample and x_n is the value of the variable in each case. Because the above is a weighted sum, the values of the variable must be arranged from lower to higher prior to the calculation. The Gini index varies between 0 and 1, corresponding the 0 to total equality and 1 to maximum inequality. In fact, the maximum value for this coefficient never reaches 1, being 1 — (1/n) the actual upper bound.

Another way of measuring inequality is by means of the Coefficient of Variation (V) which consists of dividing the standard deviation of the sample[17] by the mean:

$$V = \frac{\sigma}{\mu}$$

Theoretically V can adopt values between 0 for perfect equality to infinity, but in actual practice the upper bound is $(n - 1)^{1/2}$.

Finally, the third current method uses the number called Theil's Measure (T) which can be calculated as follows:

$$T = \frac{(1/n) (x_1 \ln x_1 + x_2 \ln x_2 + x_3 \ln x_3 +..... + x_n \ln x_n) — \mu \ln\mu}{\mu}$$

where n is the number of items in the sample, μ is the mean, the x_n are the values of the variable and ln is the natural logarithm.

When this formula is entered as part of a computer program in order to carry out these evaluations, it has to be specified that if any of the values of the variable, let us say 'i', is 0,

[17] R. Drennan, *Statistics for archaeologists*, 1996, p. 29-33.

then $x_i \ln x_i$ must be made equal to 0 as well. The T measure also fluctuates between 0 for total equality and infinity, in fact, the upper bound can be defined as ln n.

It has been found that although similar in their function, these indices differ in their characteristics. The G index is more sensitive in the middle range values, V has a rather 'flat' response to variations and T is especially sensitive to changes in the lower end of the scale.

Rather than choosing one of them, we thought it would be better to calculate all three for each area/period of Predynastic Egypt wherever it was possible to do so.

Sociologists tend to disregard measures of inequality which are not scale invariant or do not react in a detectable manner to transfers between both ends of the scale of inequality or even within one of them. This is understandable since these calculations were designed to evaluate variables such as income, population, occupational status, concentration of property and others which should be immune to changes in the units in which the variables are measured.

From an archaeological point of view, this leads to the calculation of indices that evaluate the internal inequality represented by the distribution of a given variable within a cemetery or a settlement, but when we wish to compare it to other such values in a fair and realistic manner, they are not so useful and need to be complemented by some other index that includes the absolute value of the inequality.

For this purpose we have conceived an index which we call Average Difference (AD). It consists of calculating the average (mean) for the sample, then classifying the items as being above or below the mean and then calculating the upper and lower averages. The difference between them indicates the absolute value of the average difference between the two groups of values:

$$AD = \mu_U - \mu_L$$

For perfect equality, AD would be 0 and the upper bound is infinity. In a previous paper[18] we defined the arbitrary boundary between the two groups as twice the total average for the sample, but since that would leave the poorly differentiated cemeteries with no graves representing the higher level, we modified the criterium to be as specified above.

For instance, if we had two sets of values which we will call A and B, let us assume that they are the volumes in cubic metres of two groups of graves:

[18] J. J. Castillos, *GM* 163 (1988), p. 27-33.

A						B					
2	2	2	4	4	4	16	16	16	32	32	32

G = 0.17 V = 0.37 T = 0.06 AD = 2.00 μ = 3

G = 0.17 V = 0.37 T = 0.06 AD = 16.00 μ = 24

If we compared these G values (or V or even T) as others have done, we might be led to conclude that both groups shared a similar (or identical) degree of inequality.

The inequality in these two examples, although numerically the same, is of a different nature, being of a higher level in B than in A because people had to dig graves eight times larger for their élite. The AD index detects this essential difference and measures it, allowing a fair comparison between the two examples.

Table 4 (Predynastic cemetery at Maadi) exhibits high inequality in G, V and T values for the remaining wealth in the tombs but because in most cases they reflect the difference between no objects at all and just one or two, the AD value makes it clear that it is a low level inequality.

On the other hand, in Table 2 for the Predynastic of Mostagedda, the current inequality indices indicate for the Protodynastic there a slightly higher or a moderately higher value than for the Badarian (for G, 0.46 to 0.39; for V,1.17 to 0.75; for T, 0.43 to 0.25) but the AD values show that in the Protodynastic the actual absolute difference in cubic metres is about six times that of the Badarian (5.74 to 0.96).

In the case of Armant (Table 2 — Naqada I — II — III) the figures for size indicate a stagnation or decline in internal inequality as we move forward in time, as others have already reported[19]. Our G, V and T values support such views but considering the AD values we can see that in absolute terms the internal inequality was indeed lower in the later periods but of a higher level.

Before discussing some aspects of our results, we would also like to say that because a requirement for accuracy in these evaluations is to have as large and representative a sample as possible[20], we have refrained here as well from breaking down the Predynastic periods into sub-periods, a venture that we feel should be left for the time when through the re-excavation of old sites or the discovery of new ones, the weight of numbers may give more credibility to such attempts.

[19] W. Griswold, *op. cit.*, p. 195-196.
[20] R. Drennan, *op. cit.*, p. 105.

Considering the main areas of Predynastic Upper Egypt as we know it and also those where the required information has been published and made available to all, we were impressed to notice both in size and wealth evaluations (Tables 1 and 3), that the global figures for Predynastic inequality are quite homogeneous, with higher size inequality in northern Upper Egypt, decreasing as we move south and higher wealth inequality in southern Upper Egypt, decreasing as we go north.

This apparent discrepancy is resolved by the AD figures which show that although global internal size inequality was lower in southern Upper Egypt, it was of a higher level than in the north of this region. As far as the wealth of the tombs is concerned, southern Upper Egypt appears as at a higher level on both counts.

Altogether, Naqada, for which information on a large number of tombs is now available, seems to excel in the overall picture followed closely by Mahasna in the Abydos area, although the data for the latter refers to just about one hundred graves.

With the exception of Harageh and Abusir el Meleq, both in size and wealth, the other Lower Egyptian Predynastic cemeteries exhibit lower inequality levels than most of their Upper Egyptian counterparts.

The figures for the Early Dynastic of Maadi and Sakkara seem closer to those from Upper Egypt, one of the probable consequences of the unification of the country under the kings of the Archaic Period.

Inequality data in northern Upper Egypt confirms our early suggestion based on average size and wealth[21] that the probable centre of the Badarian culture was located in Badari itself. After the Badarian, social inequality does not seem to have been very high in this region, probably due to the same reasons that have been suggested for Armant[22] and other communities located away from the centres of political power at the time.

A similar explanation could apply to the high Amratian inequality figures for the Abydos area (Mahasna and Diospolis Parva) and the reduced later values corresponding to the Gerzean and the Protodynastic there.

The incorporation into this picture of data from other sites such as Hierakonpolis, Adaima, Buto, Minshat Abu Omar and others, as the information becomes available, would no doubt give us a better picture of social conditions which should be compared with the similar evidence from the settlements associated to those cemeteries.

We feel confident that this type of approach to the archaeological evidence, as we refine and diversify the data incorporated into it, will supply in the near future a new and significantly richer picture of the structure of Egyptian Predynastic societies and their development.

[21] J. J. Castillos, *Rd'E* 48 (1997) p. 251-256.
[22] W. Griswold, *op. cit.*, p. 196-197.

Table 1

Inequality — Size of the tombs as volume (m^3)
Upper Egyptian cemeteries

Naqada I - II - III	G	V	T	AD	Tombs
Matmar	0.43	1.12	0.37	1.82	214
Mostagedda	0.44	1.20	0.39	2.12	150
Badari	0.43	0.91	0.32	1.61	176
Abydos	–	–	–	–	–
Diospolis Parva	–	–	–	–	–
Mahasna	0.43	0.99	0.34	2.77	86
Naqada	0.35	0.70	0.21	3.87	497
Ballas	0.37	0.74	0.23	2.51	524
Armant	0.36	0.67	0.22	2.22	108
					1,755

Table 2

Inequality — Size of the tombs as volume (m^3)

Predynastic / Early Dynastic	G	V	T	AD	Tombs
Heliopolis (Naq. I / II)	0.36	0.87	0.26	0.75	35
Maadi (Naq. I / II)	0.28	0.52	0.13	0.52	45
Wadi Digla (Naq. I / II)	0.26	0.49	0.12	0.31	175
Harageh (Gerzean)	0.46	1.29	0.44	3.56	30
Turah (Protodynastic)					
Based on length	0.20	0.39	0.07	0.73	413
Based on width	0.18	0.34	0.05	0.42	(407)
Tarkhan (Protodynastic)	0.39	1.17	0.33	2.25	962
Abusir el Meleq (Protodyn.)	0.45	0.94	0.35	3.09	93
Maadi (Early Dynastic)	0.32	0.63	0.17	1.01	15
Sakkara (Early Dynastic)	0.45	1.05	0.37	2.81	231
Matmar (Badarian)	0.47	1.04	0.39	1.37	55
Matmar (Amratian)	0.30	0.61	0.15	0.79	21
Matmar (Gerzean)	0.46	1.28	0.45	2.54	106

Predynastic / Early Dynastic	G	V	T	AD	Tombs
Matmar (Protodynastic)	0.39	0.85	0.28	1.49	66
Mostagedda (Tasian)	0.37	0.68	0.22	0.94	39
Mostagedda (Badarian)	0.39	0.75	0.25	0.96	199
Mostagedda (Amratian)	0.38	0.81	0.25	0.91	41
Mostagedda (Gerzean)	0.32	0.72	0.19	1.37	56
Mostagedda (Protodyn.)	0.46	1.17	0.43	5.74	30
Badari (Badarian)	0.44	0.87	0.31	1.87	223
Badari (Amratian)	0.41	1.00	0.34	0.84	22
Badari (Gerzean)	0.38	0.79	0.25	1.18	86
Badari (Protodynastic)	0.43	0.86	0.30	2.33	53
Badari (Early Dynastic)	0.41	0.87	0.28	2.73	72
Naga-ed-Dêr (Naq. II)	0.45	1.59	0.47	1.38	577
Mahasna (Amratian)	0.48	1.14	0.43	6.58	12
Mahasna (Gerzean)	0.38	0.79	0.25	2.27	42
Mahasna (Protodynastic)	0.44	0.97	0.35	2.77	28
Naqada (Amratian/Petrie)	0.30	0.78	0.19	3.97	48
Naqada (Gerzean/Petrie)	0.30	0.56	0.15	3.49	83
Naqada (Protodyn./Petrie)	0.37	0.70	0.22	6.48	32
Naqada (Naqada I / K-B)	0.31	0.84	0.21	4.50	38
Naqada (Naqada II / K-B)	0.34	0.66	0.19	4.03	93
Naqada (Naqada III / K-B)	0.42	0.86	0.30	5.65	37
Armant (Amratian / M-P)	0.29	0.66	0.16	0.75	8
Armant (Gerzean / M-P)	0.30	0.55	0.15	1.83	55
Armant (Protodyn. / M-P)	0.30	0.60	0.15	2.08	27
Armant (Naqada I / K-B)	0.41	0.83	0.28	1.02	14
Armant (Naqada II / K-B)	0.33	0.63	0.18	2.19	78
Armant (Naqada III / K-B)	0.19	0.36	0.06	1.55	10
Elkab (Protodynastic)	0.35	0.72	0.21	1.16	76
					4,326

Table 3

Inequality — The remaining wealth of the tombs
Upper Egyptian cemeteries

Naqada I – II – III	G	V	T	AD	Tombs
Matmar	0.36	0.75	0.22	6.36	260
Mostagedda	0.37	0.94	0.26	6.11	183
Badari	0.35	0.71	0.21	5.07	207
Abydos	0.46	0.85	0.34	10.20	78
Diospolis Parva	0.47	1.12	0.41	7.76	365
Mahasna	0.46	1.01	0.37	11.70	106
Naqada	0.55	1.25	0.55	10.30	1,586
Ballas	0.48	1.01	0.41	6.88	664
Armant	0.47	0.91	0.40	6.75	144
					3,593

Table 4

Inequality — The remaining wealth of the tombs

Predynastic / Early Dynastic	G	V	T	AD	Tombs
Heliopolis (Naq. I / II)	0.53	1.04	0.51	5.60	46
Maadi (Naq. I / II)	0.67	1.43	1.05	1.11	50
Wadi Digla (Naq. I / II)	0.66	2.04	0.95	3.32	471
Harageh (Gerzean)	0.34	0.62	0.18	5.62	46
Turah (Protodynastic)	0.66	1.46	0.85	5.10	548
Tarkhan (Protodynastic)	0.35	0.83	0.23	5.70	1,042
Abusir el Meleq (Protodyn.)	0.41	0.88	0.30	8.29	851
Maadi (Early Dynastic)	0.50	1.06	0.43	13.70	19
Sakkara (Early Dynastic)	0.61	1.27	0.67	9.63	231
Matmar (Badarian)	0.45	1.00	0.42	2.64	122
Matmar (Amratian)	0.44	0.85	0.33	9.98	24
Matmar (Gerzean)	0.36	0.81	0.23	6.66	134
Matmar (Protodynastic)	0.30	0.54	0.14	5.61	76
Mostagedda (Tasian)	0.38	0.80	0.26	3.00	42
Mostagedda (Badarian)	0.58	1.30	0.66	3.06	317
Mostagedda (Amratian)	0.41	0.85	0.29	4.54	49

Predynastic / Early Dynastic	G	V	T	AD	Tombs
Mostagedda (Gerzean)	0.26	0.48	0.11	4.35	71
Mostagedda (Protodyn.)	0.42	1.30	0.41	10.60	35
Badari (Badarian)	0.54	1.32	0.57	4.70	267
Badari (Amratian)	0.42	0.95	0.32	6.49	26
Badari (Gerzean)	0.32	0.62	0.17	5.20	103
Badari (Protodyn.)	0.30	0.59	0.15	3.23	63
Badari (Early Dynastic)	0.38	0.82	0.26	6.34	108
Naga-ed-Dêr (Naq. II)	0.68	1.87	0.92	8.40	574
Abydos (Early Dynastic)	0.77	2.59	1.34	9.90	54
Diospolis Parva (Amratian)	0.51	1.22	0.48	16.60	23
Diospolis Parva (Gerzean)	0.30	0.56	0.15	6.96	96
Diospolis Parva (Protodyn.)	0.40	1.29	0.38	9.20	56
Mahasna (Amratian)	0.51	1.23	0.48	17.40	15
Mahasna (Gerzean)	0.46	0.98	0.37	12.20	48
Mahasna (Protodynastic)	0.37	0.74	0.24	7.23	37
Naqada (Amratian/Petrie)	0.42	0.84	0.30	10.70	117
Naqada (Gerzean/Petrie)	0.49	1.01	0.41	14.10	256
Naqada (Protodyn./Petrie)	0.56	1.16	0.54	24.30	102
Naqada (Naqada I / K-B)	0.43	0.84	0.31	8.50	108
Naqada (Naqada II / K-B)	0.53	1.20	0.49	15.80	231
Naqada (Naqada III / K-B)	0.47	0.96	0.38	14.20	78
Armant (Amratian / M-P)	0.32	0.60	0.17	3.67	12
Armant (Gerzean / M-P)	0.35	0.71	0.22	5.32	74
Armant (Protodyn. / M-P)	0.37	0.69	0.22	7.62	33
Armant (Naqada I / K-B)	0.52	0.96	0.49	4.95	21
Armant (Naqada II / K-B)	0.44	0.86	0.36	6.20	101
Armant (Naqada III / K-B)	0.38	0.70	0.26	11.20	11
Elkab (Protodynastic)	0.53	1.29	0.53	12.90	94
					6,882

Note – M-P indicates Myers-Petrie and K-B indicates Kaiser-Bard as the sources used for the assignment of some tombs to one or other period of the Egyptian Predynastic.

Résumé/Abstract

Dans cet article l'auteur adapte quelques méthodes utilisées en sociologie pour faire le calcul de l'inégalité dans les cimetières égyptiens prédynastiques et tire des conclusions de ces études qui semblent s'accorder avec les résultats obtenus dans ses autres travaux sur le sujet.

In this article the author adapts several ways to calculate inequality current in sociology to the study of Egyptian Predynastic cemeteries and draws some conclusions in the light of this new information, which agree with the results from his previous research on the subject.