The Ritual Origin of Counting

A. SEIDENBERG

Communicated by B. L. VAN DER WAERDEN

1. Introduction

The following study is intended as a contribution to Lord RAGLAN'S general theory that civilization had a ritual origin and is written in accordance with his suggestion that the various components of civilization be studied with that theory in mind, in order to build it up inductively[1]. The theory is associated with another, namely, the theory of the Diffusion of Culture, according to which various widespread practices and beliefs are not the spontaneous reactions of the human mind to environing conditions but are the product of certain special circumstances. One problem is to establish the diffused character of a phenomenon in question and to trace its spread; another is to throw light on the special circumstances of its origin.

Anthropologists have long been familiar with the idea that the use of a thing by no means necessarily indicates its origin. Yet there exists a strong tendency,

[1] Lord RAGLAN, *How Came Civilization?*, p. vi.

generally and also amongst anthropologists, to argue from use to origin. No one asserts that KEPLER invented the ellipse in order to describe the motion of the planets, mainly because there is a well-attested history of the ellipse covering two thousand years. Yet when it comes to what appear to be the simplest mathematical devices, for example, counting, these are dismissed as so obvious that they no doubt were spontaneously discovered again and again, being directly suggested by the uses to which they are put.

Thus the shepherd is pictured as asking how many sheep are in his flock and inventing counting in order to answer. But how can one ask "How many?" until one knows how to count? It is true that FREGE, towards the end of the last century, and RUSSELL, at the beginning of this, so analyzed the concept of number that they could ask and answer the question "How many?" without the device of counting, but their ideas are not generally familiar to shepherds[2].

The commonly held view is that the origin of mathematics is to be seen in its practical applications. But an application of a device (or idea) is an effect of the device, not a cause. As effects are multiple, one can get at the cause through the effects only if one considers all the effects, practical and otherwise. For example, the Pythagoreans held that odd numbers are male, even numbers female. A theory that does not take into account such ideas — and the utilitarian theories never do — cannot be considered adequate.

Since according to our theory counting was invented under special circumstances, in fact in relation to the creation ritual, it may be thought that it would be sufficient to present that theory, which is a theory of origins, directly, without special emphasis on the theory of diffusion, and to let the fate of the theory rest on whatever plausibility we can manage to impart to it. Unfortunately, that is not so. A widely held view is that the various peoples of the earth made their way to their present locations completely without culture and there, quite without communication even with their neighbors, proceeded to build up the cultures that they now possess. The inference would be that all these peoples independently built up the creation ritual, which is a complex containing many apparently arbitrary elements, and then, reacting similarly to it, developed counting. Such a theory could hardly be recommended for its plausibility.

Conversely, if we could show that counting had a single origin, we would be prepared to see its origin under special, even weird, circumstances. For this reason we have taken up first, in a previous paper, the problem of the diffusion of counting practices[3]. That paper need not be, for present purposes, familiar to the reader; or, if familiar, its arguments need not be accepted. All that is required is an understanding that the present paper ought to be seen in relation to the theory of a single origin.

Even so, it will be well to give briefly some of the points of that paper. A leading idea is to examine counting for its conventional elements. Counting itself may be logical, but the particular ways of counting are not: they are con-

[2] G. FREGE, *The Foundation of Arithmetic.* B. RUSSELL, *The Principles of Mathematics.*

[3] "The Diffusion of Counting Practices", *Univ. of Calif. Publ. in Math.*, vol. **3**, no. 4 (1960).

ventions. The paper starts by looking at the counting methods of three far apart peoples:

Gumulgal (Australia)	Bakairi (South America)	Bushmen (South Africa)
1. urapon	tokale	xa
2. ukasar	ahage	t'oa
3. ukasar-urapon	ahage tokale (*or* ahawao)	'quo
4. ukasar-ukasar	ahage ahage	t'oa-t'oa
5. ukasar-ukasar-urapon	ahage ahage tokale	t'oa-t'oa-t'a
6. ukasar-ukasar-ukasar	ahage ahage ahage	t'oa-t'oa-t'oa

The most striking feature here is that the counting proceeds by two's. Somewhat less striking, but still noteworthy, is that the larger number (two) precedes the smaller (one) in the words for three and five; and that no copula is used. These are purely conventional features of the counting and indicate that the counting of all three peoples goes back to a common source.

A great deal of effort has been spent, as we have reported, on deriving the 2 of pure 2-counting (as we call the above method) from some universal character of the human mind (though no one seems to have concerned himself with the other points mentioned). Our explanation of the uniformity is, as stated, that "the 2-system had a single origin. From this point of origin it spread out over the whole earth; later, other methods of counting arose and spread out over almost all, but not quite all, of the world", and we "note that the 2-system appears now only at the edges, and seems ready to be wiped off the face of the globe (see maps 1 and 2)[4]."

We placed 2-counting first. The main reason for doing so is its geographical distribution, its peripheral character, though its seemingly primitive structure and its possession by peoples otherwise the most culturally impoverished also entered into our judgment. A consequence is that counting did not start with finger-counting, as finger-counting would produce $6=5+1$ and not $6=2+2+2$.

There is epigraphical evidence from Sumeria showing that the 2-system was known there in 3000 B.C.[5]. Between Sumeria and the locale of the modern representatives of 2-counting one finds, more or less as expected, traces of 2-counting, for example, one finds $3=2+1$ in the Tukudh language, spoken in the interior of Alaska[6]. Somewhat more surprising, one finds a system, not the pure 2-system, but one clearly allied to 2-counting: in this system, which we have called neo-2-counting, one finds the forms $6=2\times3$ (or $6=3+3$), $7=4+3$, $8=2\times4$ (or $4+4$), $9=5+4$, and slight variants of these.

The neo-2-counting has a widespread existence. In the Americas it occurs (if we subtract the Eskimo) at the extremes and along the west coast of North America; it also occurs with the Eskimo of Labrador and of Melville Bay, Greenland, but it is not typical of the Eskimo, who for the most part have what is called a 5–20 system. In northeasternmost Asia it is found with the Yukaghir. It has a widespread if sporadic occurrence in southeast Asia and the Pacific, and in

[4] *Ibid.*, p. 218.
[5] *Ibid.*, p. 237 and Plate 1 (p. 299).
[6] *Ibid.*, p. 226.

particular occurs in Australia. In Africa it occurs on the periphery of the Sudan; it scarcely occurs in Bantu, but there is a system of neo-2-gestures widespread in the Congo forests. From epigraphical evidence, it is clear that the Ancient Egyptians knew the neo-2-system[7].

It may be suggested that although the 2-system really was first, it was eventually forgotten, and that man got a new start with the 10- or 20-system. It seems to us that the widespread occurrence of the pure 2- and the neo-2-counting excludes this possibility, and that 10- or 20-counting must have been an amplification of 2-counting.

In examining number vocabularies one notes that they can for the most part be separated according to structure into a small number of categories. Thus there are the pure 2- and the neo-2-counting mentioned; in 10-counting the count proceeds, as in English, by tens; in 5—20-counting, the count is by twenties and there is further structure in the lower number words — thus there are the forms $6=5+1$, $7=5+2$, $8=5+3$, $9=5+4$; and one can speak of neo-2-10-systems, of 5-10-systems, of 4-systems, *et alia*. In analyzing individual number vocabularies one observes, with some surprise at first, that they are frequently crosses; for example, in a given vocabulary one may find the forms $6=2\times 3$, $7=5+2$, $8=2\times 4$ — this is a cross between neo-2 and quinary counting; or one may find $40=20\times 2$, $30=3\times 10$, which are typical forms in 20- and 10-counting, respectively[8]. It is, of course, impossible to understand this phenomenon apart from diffusion.

In our *Diffusion* paper, we consider the relation of 10-counting to 20-counting and the relation of both to gesture counting. In doing so, we encounter difficulties and we do not regard our conclusions (or surmises) on these matters with the same confidence as the points mentioned above. Thus we have come to the view that 10-counting preceded 5—20 counting, that 5—20 counting communicated its quinary character to 10-counting, and even that the 10-counters got their gestures from 5—20-counters. These views may be wrong, but, although we felt obliged to consider these questions, one ought to realize that they do not bear directly on the unique origin of counting, which we consider to be sufficiently well-founded on the points already made above[9].

The theory of diffusion as a whole is an inductive theory depending on the accumulation of evidence. In our *Diffusion* paper we consider not only counting systems but also other counting practices that may be regarded as evidence of diffusion; and all the various phenomena that we consider below are likewise evidence for diffusion. For example, we find a widespread belief that odd numbers are lucky, even numbers unlucky. If odd numbers really are lucky, we may

[7] *Ibid.*, pp. 225—233.

[8] An example of the first is Tukudh (*loc. cit.*, p. 226); of the second, Sumerian (see A. POEBEL, *Grundzüge der Sumerische Grammatik*, p. 104).

[9] We take this opportunity to correct misprints in footnotes 64—79 of *Diffusion*. S = W. SCHMIDT, *Sprachfamilien und Sprachenkreis der Erde*, K = T. KLUGE, *Zahlenbegriffe der Völker Americas, Nordeurasiens, der Munda, und der Palaioafricaner*, M = F. MÜLLER, *Grundriß der Sprachwissenschaft*, vol. 2:1. The footnotes should read: 64: S 375; 65: S 374; 66: S 378; 67: K 231, 20, 164, 146ff.; 68: K 208; 69: K 199; 70: K 203; 71: K 245, 151; 72: K 140, 141, 107ff.; 73: M 359, 379; 74: M 379, 438, K 6, 50; 75: K 191, 229, M 363, K 163, 54, 39, 8; 76: K 501; 77: M 439, K 141, 229, 105: 78: K 346; 79: K 607, 608, 449, 456, 442, 636, 400, 439.

regard this belief as a consequence of observation, but if not, we ought to look to a common source for the belief. Similarly, one finds a widespread belief that counting people can kill them; if counting people really does endanger them, then that would be an end of the matter, otherwise here too we should look for a common source.

From the point of view of method, the question of diffusion ought to be taken up before that of origin. There is something fortunate in this order, for in studying diffusion one has to take into account only the structure of the phenomenon in question and its distribution over the earth. Psychology — and it is all false psychology, since these are not psychological questions[10] — is automatically excluded; the human being scarcely enters, at most his fingers and toes do. Nor does one have to consider the relations between the facts; and no theory is needed. Indeed, one can only know the facts — one might say, even know what a fact is — after a preliminary survey of the phenomena in question. For example, almost everyone who mentions the 10-system feels obliged to say that we probably count by tens because we have ten fingers, and some even produce evidence to show that there are 5—10-systems. But what if the quinary character of 5—10-systems was received, as we have suggested, from 5—20-systems? We can at the beginning of the investigation set up the category of 5—10-counting; but the tendency is to read facts into the category, that is, to regard 5—10-counting as an atom rather than a molecule. It is not possible to decide on this by an off-hand judgment, but only by a survey of the evidence.

On the other hand, origin and diffusion are objectively related. The theory of ritual origins, although not especially well-known, is not absolutely brand new: we were familiar with it from Lord RAGLAN'S and A.M.HOCART'S books when we first began to suspect a unique and in fact ritual origin of counting — it would be correct to say that this suspicion formed itself because of that theory[11]. At the beginning, we knew some of the facts about 2-counting and were familiar with Pythagorean number mysticism. Confident that the uniformity in the pure 2-counting indicated a unique origin for counting, we were encouraged to seek a ritual origin for it. There was no difficulty finding evidence: it was forthcoming from all parts of the earth and in all historical periods. This, in turn, strengthened the case for the theory of a single origin.

Unlike the *Diffusion* paper, which required no special knowledge for its reading, the present one really presupposes some familiarity with archaic thought; however, in the course of the exposition we will summarize whatever is needed.

2. Number-mysticism and ritual

Our starting point is the Pythagorean (and, more generally, Greek) number mysticism. Here are a few sayings of the Pythagoreans:

1. Odd numbers are male, even numbers female[12].
2. Ten is a perfect number[13].

[10] This point has been well made by E. DURKHEIM, *The Rules of Sociological Method*; see also L. WHITE, *The Science of Culture*.

[11] Of RAGLAN'S works see especially *Origins of Religion*, *The Hero*, *Jocasta's Crime*; of HOCART'S, see especially *Kingship*.

[12] ARISTOTLE, *Metaphysica*, A 5, 986a 24—25.

[13] *Ibid.*, A 5, 986a.

3. Five is the marriage number[14].

4. One is God[15].

5. One is both even and odd[16].

6. Everything is number[17].

Our main idea in unraveling the meaning of such sayings is to regard them as myths (or, possibly, as derivatives of myths) and to use the basic, key idea that myth and ritual are associated phenomena: as Lord RAGLAN says, a myth "is nothing but the form of words associated with a rite." "Myth and ritual are complementary; ritual is a magic drama to which myth is the book of words, which often survives after the drama has ceased to be performed[18]." With each myth, then, there is, or was, a rite which stands in intelligible relation to it. The intention of the myth is to tell the meaning of the rite: but conversely, if we know, or can guess, the rite, this will throw light on the myth.

The role of number-mysticism in crystallizing the notion of *form* is well known (for example, 220 and 284 are friends, because each is the sum of the proper divisors of the other — one has but to take the last phrase as a definition to come to a valid and interesting mathematical theorem), but the nature of the mysticism itself is little understood. The "Central Fire" of PYTHAGORAS (or of PHILOLAUS), around which move the heavenly bodies, is familiar and has played a part in the history of astronomy[19]. Being a part of mysticism, it has remained a mystery: one supposes that speaking of it is an obscure way of communicating an astronomical theory. As soon, however, as one regards the Pythagorean doctrines not merely as a body of beliefs, but as a part or outgrowth of ritual, the idea suggests itself that the "Central Fire" was the actual central fire around which ten participants in a ritual arranged themselves. Circumambulations, especially around a fire, are well known, and "the Cambodians tell us plainly that when they pass seven candles from hand to hand round the king they are imitating the movements of the seven planets round the world[20]."

Why PYTHAGORAS should consider that "odd numbers are male; even numbers, female" it would seem (as E.T. BELL remarks[21]) impossible to say; but perhaps

---

[14] PLUTARCH associates the marriage number with the Pythagorean 3, 4, 5 right triangle, which he calls the Nuptial Figure. In our paper "The Ritual Origin of Geometry", we connect the Theorem of PYTHAGORAS with Creation, in particular with generation. PLUTARCH realizes that he must get the five from the three and the four, but instead of being content with the observation that $5 = \sqrt{3^2 + 4^2}$, which is here the underlying reason, he argues that $5 = 3 + \sqrt{4} = 3 + 2 =$ male + female. The first reason appears to us to be the original reason because we can trace it historically back to ritual, whereas the second looks like an *ad hoc* verification of a known doctrine.

[15] See IAMBLICHOS, *Theologoumena Arithmeticae*, p. 3.21 (de Falco), or P. FESTUGIÈRE, *La Révélation d'Hermès Trismégiste*, vol. 4, p. 43. According to ARISTOTLE'S report (*Metaphysica* A 5), the Pythagoreans held that number proceeds from the One (986^a 20) and that number is the substance of all things (987^a 18). XENOPHANES, too, said that One is God (986^b 25).

[16] *Metaphysica*, A 5, 986^a 19.

[17] *Ibid.*, A 5, 985^bf.

[18] *The Hero*, p. 130; *Jocasta's Crime*, p. 106.

[19] J.L.E. DREYER, *A History of Astronomy*, pp. 40—52.

[20] HOCART, *Progress of Man*, p. 156.

[21] *The Magic of Numbers*, p. 155.

the problem is not altogether hopeless if taken in conjunction with the phenomenon of gender in language and with the sexual division of labor. As is obvious for numbers, "the attribution of sex to inanimate objects — stars, rivers, boats, and so on — cannot be the result of observation, even faulty observation, and can never have served any useful purpose[22]." RAGLAN goes on to suggest that it does result from the creation ritual: the world is created anew by the divine king and queen, that is, by a man and woman in ritual union, the things created by the king being male, those by the queen female. One might then suggest that this division of the world is elaborated until it includes numbers also, *one* going to the men, *two* to the women, *three* to the men, and so forth.

The above connects the phenomenon of sex in number with a broader class of similar phenomena and this with ritual, but it makes of statement (1) nothing but a latter-day development of the view that everything must have sex. We need not doubt that such developments take place; in fact, we can more or less see them taking place. Why is ten perfect? From SPEUSIPPUS, the successor of PLATO in the Academy, we get the answer, among others, that ten is perfect because it is the smallest number n such that there are as many composite numbers as primes between 1 and n (see I. THOMAS, *Greek Mathematics*, vol. 1, p. 79). This seems to us nothing more than a form of apologetics, a development of the doctrine that ten is perfect: that is, ten was perfect long before it was considered perfect on the basis of valid mathematical observations. While we consider this line of thought to be correct, the real problem as we see it is: Why was ten perfect in the first place? Similarly, we are not content with the suggestion that sex in number is a dogmatic development, but want, if we can, to connect the phenomenon directly with ritual.

We try to imagine a rite corresponding to the myth that odd numbers are male, even numbers female, and the image that forms itself is that of men and women being numbered in a rite, in fact, being counted, first a man, then a woman, and so on, so that the odd numbers fall to men, the even to women. This is a guess, and if no evidence is forthcoming, we can abandon it.

The question then is (or was): Is there any evidence that participants in ritual were numbered? Do there exist counting rites, or, at the very least, other counting beliefs bearing on the above guess? Looking to the likely sources, we found that in Babylonia, the numbers from 60 down to 1 came to be reserved each for a special deity — there was a god Eight, a god Three, *et alia*[23]; the *Satapatha Brahmana* presented the numbers from 1 to 101 as deities to whom offerings are made at the horse sacrifice[24]; with the Maya the numbers 1 to 13 were (and still are) regarded as sacred beings and invoked as such[25]. These still are myths,

[22] RAGLAN, *Origins of Religion*, p. 111.

[23] *Encyclopaedia of Religion and Ethics*, article "Number", vol. 9, p. 416.

[24] *Sacred Books of the East (S.B.E.)*, v. 44, p. 297 and p. 297 n. In the *Taittiriya Samhita* vii, 2, 11 (KEITH, vol. 19, p. 582), at the horse sacrifice, there occurs an invocation to the numbers: "To one hail! To two hail! ... To nineteen hail! To twenty-nine hail! ... To ninety-nine hail! To a hundred hail! To two hundred hail!" Then in vii, 2, 12, there is a similar invocation to the odd numbers; then to the evens, then to multiples of four, of five, of ten, of twenty, of fifty, of hundred; then to a sequence in which occurs ten hundred thousand million.

[25] J. S. LINCOLN, "The Maya Calendar of the Ixil of Guatemala", *Carnegie Contr. to Amer. Anth. and Hist.*, No. 38 (1942), pp. 107, 112.

not rites, but it seems to take less of an effort to imagine the corresponding rites: participants in ritual are called onto the ritual scene by numbers. As to rites, from FRAZER'S books we learned about tabus on counting[26], but found (or thought we found) only one clear rite (the refraining from counting can hardly count as a rite): according to FRAZER, "the Walachians look on ST. GEORGE'S Day as very holy; for they are mainly a pastoral folk and ST. GEORGE is the patron of herds and herdsmen. On that day also, as well as on the day before and the day after, the Walachian numbers his herd, beginning at one and counting up to the total[27]." In *Numbers* IV:49, it is required that those who enter into the service of the tabernacle be numbered, each according to his service. From still another source, we recall that in the Orthodox Synagogue, at present, there are $7+1$ people "called up" to the reading of the Torah on the Sabbath[28]. These are called forward by name (and by the father's name) and a word indicating the order of being called: the first, the priest, by the title "Cohen"; the second, the Levite, by the title "Levi"; the next five, ordinary Israelites, by number, Shelishi, "third"; Rebii, "fourth"; Hamishi, "fifth"; and so on; the last position, the Maftir, is somewhat special and the eighth man is not assigned a number as such.

3. Toward a hypothesis of ritual origin

If we agree that counting is not a simple process invented in one stroke, we may examine it for elements it contains that could have had an independent existence and out of which it might have grown. There is no particular call to count the fingers, and we may safely suppose that they have no bearing on the invention. The basic things needed for counting are a definite sequence of words and a familiar activity in which they are employed. The creation ritual offers us precisely such sequence and activity. Processions of couples in ritual are well known. "Male and female he created them." "There went in two and two unto Noah into the ark, the male and the female, as God had commanded Noah." Presumably, a couple is announced (in ritual the Word always accompanies the Deed) and then they make their appearance on the ritual scene. The sequence of words so used might have come to be used as the initial number-words.

The above is in accordance with, and explains, the phenomena: first, the association of numbers with deities, in fact, according to the above, numbers did not exist prior to their ritual application, *viz*, for the purpose of invoking "deities", that is, participants in ritual; second, "the marked preference not infrequently observed among savages for counting by pairs"[29] — this is *our*

[26] *Folklore in the Old Testament*, chapter on "The Sin of a Census", p. 307.

[27] *The Magic Art and the Evolution of Kings*, vol. 2, p. 338.

[28] *The Universal Jewish Encyclopedia*, article "Torah", vol. 10, p. 275.

[29] L.L. CONANT, *The Number Concept*, p. 104. The pure 2-counters count by pairs, but the evidence is much broader. For example, the Bavili, in Luango (northern portion of the Congo coast), use beads in counting and count these in pairs. (R.E. DENNETT, *At the Back of the Black Man's Mind*, p. 62.) The Oedd-Ostiacks, a Siberian people, have specific terms, not formed by composition, for all the even numbers from 20 to 100 inclusive; similarly with the Manchus (20—90) and the Mongols (J. CRAWFURD, "Numerals as Evidence of Civilization", *Tr. Ethn. Soc. of London*, n.s., vol. 2, p. 84). Pair-counting is widespread in the Pacific (CONANT, *op. cit.*, p. 115). See also E. FETTWEIS, *Das Rechnen der Naturvölker*, p. 11.

explanation of the 2 of the 2-system[30]; third, the ritual division of numbers into even and odd, known also to the Egyptians, Babylonians, Indians, Chinese, and Incas, as well as to savages in Africa, Sumatra, the Philippines, Polynesia, and North America[31].

[30] *Cf. Diffusion*, p. 260, n. 97.

[31] According to the *Satapatha Brahmana* (XIII, 8, 1, 3): "... the uneven [numbers] belong to the Fathers..." In the five-layer Vedic altar, layers three and five pleased the gods, but layers two and four were to their mind "unfirm and unsettled" (*Satapatha Brahmana*, VIII, 3, 1, 2; 5, 1, 2; 2, 1, 2; 4, 1, 2). See also footnote 24 above. The numbers 1, 3, 5, 7, 9 (aika, teras, panka, satta, nav) occur in an ancient Aryan document on horse-breeding and are (along with certain personal names) the oldest actual specimens of any Aryan speech that we possess (V. GORDON CHILDE, *The Aryans*, p. 19). A. DARMESTETER (*The Life of Words*, p. 90) says: "It would seem characteristic of the Indo-European mind, or at least of the Aryan family in Europe, to start from the idea of *two*, and, by a natural and unconscious process to arrive at the idea of badness." He gives many examples. It should be clear, however, that the idea of *two* in no way of itself contains the idea of progress or destruction or any moral idea.

According to *The Great Appendix to the Yi-King* (Sacred Books of the East, vol. 16, p. 365): "To heaven belongs (the number) 1; to earth 2; to heaven 3; ...; to earth 10."

The Incas divined by odds and evens (C. R. MARKHAM, *Incas of Peru*, p. 107, *Rites and Laws of the Yncas*, p. 14; E. NORDENSKIOLD, *Comparative Ethnological Studies*, vol. 6:1, p. 9). It is not said which, the odd or the even, were favorable; however, according to the Incas "a double will is sinful, a single heart will be shown favour" (*Rites and Laws*, p. 27), and this may indicate that the odd were favorable.

The Maya and Aztecs used beans and maize in divination by numbers (J. E. S. THOMPSON, "Maya Arithmetic", *Contr. to Am. Anthr, and Hist.*, 36, *Carnegie Inst. of Wash.*, Publ. 528 (1941), vol. **403**, p. 42), but we are not told that this was by evens and odds.

European literature frequently refers to the division, as when DANTE (*De Vulgari Eloquentia*, Bk. I, Chap. XVI) says that "Just as the simplest of substances, which is God, is more perceptible in man than in a brute... [so] the simplest quantity, which is unity, is more perceptible in an odd than in an even number." SHAKESPEARE refers to the belief that "Good luck lies in odd numbers... they say there is divinity in odd numbers, either in nativity, chance, or death" (*Merry Wives of Windsor*, V, i, 2).

The Muhammadans say: "God is odd, He loves the odd" (J. ABBOTT, *The Keys of Power*, p. 309).

Passing now to peoples of lower culture, we first consider Africa. Speaking of the Bushmen, G. W. STOW says: "It is certain... that the constant repetition of the numbers 3, 5, and 7, their 'quo, t'oa-t'oa-t'a and t'oa-t'oa-t'oa-ta in their symbolic representations in the valleys of the Gumaap and the Vaal, evidently indicated that they had a sacred meaning, now lost, but known and understood at the time by the initiated" (*Native Races of S. Africa*, p. 19). The Ganda of Uganda count spots on entrails in divination: an odd number is good, an even number is bad (G. P. MURDOCK, *Our Primitive Contemporaries*, p. 541.) (The Nandi medicine men divine by counting pebbles, but not by evens and odds: the lucky numbers are 2, 3, 5, 8, 10; the unlucky, 1, 4, 6, 7, 9 (A. C. HOLLIS, *The Nandi*, p. 89).) With the Gold Coast Akan the numbers 3, 5, 7, 9 are favorable in divination (E. L. R. MEYEROWITZ, *The Sacred State of the Akan*, p. 151).

With the natives of Central Sumatra, strangely enough, the even are good and the odd bad (A. MAAS, *Durch Zentral-Sumatra*, vol. 1, p. 524).

With the Bagobo of the Philippines, too, the even are lucky, the odd unlucky (except 9) (L. W. BENEDICT, "A Study of Bagobo Ceremonial, Magic, and Myth", *Annals N.Y. Acad. Science*, vol. **28**, pp. 206f.).

The Pukapukans have a version of our game of jackstones that is played with a stone and shells. After throwing up the stone, one gathers as many shells as possible

Our conjecture is, then, first, that the names of participants in ritual, or the words announcing them, were the initial number words. This ritual suffuses itself into all sorts of activities — according to RAGLAN "all rites were originally creation rites, and in essence are so still[32]." A collection of objects, say a catch of fish, must undergo a rite. The "serializing" is the rite, and the "counting" is the myth. The original intention is to mimic a portion of the Creation ritual. It is in this way that we envisage "counting" to have become detached from the ritual and to have acquired its abstract or general character.

Second, we think that the higher counting may have started as a method of taking care of longer and longer processions (not with the idea of counting them, however). The base (which is not logically inherent in counting) corresponds to the number of persons in the basic ritual, and the higher counting derives from the continued repetition, with slight modifications, of this basic ritual.

As we have seen in the Introduction, counting started without the employment of fingers. We have seen reason (in our *Diffusion* paper) for supposing that the higher 10-counting preceded finger counting, but, of course, the conclusion is not certain. Moreover, most higher counting has 10 or a multiple thereof as base. Nonetheless, there does exist some higher counting with a base less than 10:

---

before catching the stone. If the number of shells is odd, one continues; that is, odd = favorable, even = unfavorable (E. & P. BEAGLEHOLE, "Ethnology of Pukapuka", *B. P. Bishop Museum*, Bull. 150, p. 361f.).

The Fox Indians, formerly of Wisconsin, had a game played with two bundles of sticks, one of 51, one of 102. One dropped a bundle in a pile and then tried to separate off $10n+1$, $10n+3$, $10n+5$, $10n+7$ or $10n+9$. They had a name for each of these residue classes and the name had to be called out before making the division (W. JONES, "Ethnology of the Fox Indians", *Smith. Inst. Bur. of Am. Ethn.* Bull. **125** (1939), p. 111). The Pomo, of California, in effect make the distinction, but first take the remainder after separating off groups of fours (E. M. LOEB, "Pomo Folkways", *Univ. of Calif. Publ. in Amer. Arch. and Ethn.*, vol. **19** (1926), p. 215).

Clearly related to the above phenomenon (and in our view derivative of it) is the custom of assigning a pair of adjacent numbers to the two sexes. Thus in the Egyptian pyramid texts there is a reference to 5 mealtimes, 3 for Heaven, 2 for Earth (L. FROBENIUS, *Vom Kulturreich des Festlandes*, p. 108). The Old Babylonians assigned 60 to Heaven, 40 to Earth, that is, Heaven: Earth = 3:2 (*Ibid.*, p. 108). (However, both in Egypt and in Babylonia, Heaven was female, Earth male, the reverse of the more usual attribution.) The Altar of Heaven in Peking is a magnificent structure of white marble 27 feet high, composed of three circular terraces, the lowest of which is 210 feet in diameter; the middle, 150; the upper, 90. Some distance north is the Altar of Earth, a yellow edifice of two square terraces each 6 feet in height; the lower, 100 feet square; the upper, 60 feet square. Here we have Heaven: Earth = 3:2 (terraces) = $3 \times 3 : 3 \times 2$ (height per terrace) (*Encyclopaedia of Religion and Ethics*, vol. **1**, p. 37).

In Africa, from Abyssinia over to the country west of Lake Chad, one finds male = 3, female = 2. For example, in north Kordofan the birth of a boy is announced three times, that of a girl, twice. (Thus sometimes, at least, a rite is performed three times in order to bring it into relation with the male sex.) Farther west, over to Senegal, one finds male = 3, female = 4 (FROBENIUS, *op. cit.*, pp. 109—111). However, with the Akan, the sacred number of the Great Mother and of her counterpart on earth, the queen mother, is 3; that for the king, 4 (MEYEROWITZ, *op. cit.*, p. 57).

The Eskimo in a resurrection myth say the Creator breathed once on the men, twice on the women, to bring them alive (D. G. BRINTON, *The Myths of the New World*, p. 303).

[32] *Origins of Religion*, p. 63.

for example, the Cumas Indians of California count to 16 by a 4-system (though from 20 they continue with a 10-system)[33]. Thus the suggestion that we count by tens because we have ten fingers does not meet the evidence. Such an explanation not only does not take into account the existence of 2-, 4-, 6-, and 8-systems (except to dismiss them as not significant), but almost *a priori* excludes their being taken into account. Thus ARISTOTLE, who considers the question of the base, writes[34]:

> Why do all men, barbarians and Greeks alike, count up to ten, and not up to any other number? ... For it is clearly not the result of chance that all men invariably count in tens: and that which is invariable and universal is not the result of chance, but is in the nature of things. Is it because ten is a perfect number? ... Or is it because the bodies which move in heaven are nine in number?[35] Or is it because all men have ten fingers? One race among the Thracians alone of all men count in fours, because their memory, like that of children, cannot extend farther and they do not use a large number of anything.

The neglect of the Thracian 4-system is quite typical of Greek rationalist ideology and spoils the argument somewhat. Perhaps the other answers suggested, but rhetorically dismissed, might point to the truth.

4. The creative word

The above hypothesis has a number of aspects and depends for its validity on evidence in myth, ritual, and custom for the existence of the following features:

(a) the ritual procession,

(b) the ritual procession in pairs,

(c) the appearance of the participants in ritual on the ritual scene upon announcement,

(d) the announcement taking the form of numbers.

Of these, (a) and (b) are ancient, widespread, and well known[36]. Item (c) serves to explain some facts otherwise quite obscure, or even incomprehensible; for example, the great interest and importance attached to names. "The name, so the Babylonians believed, was the essence of a person or thing to which it was attached; that which had no name did not exist, and its existence commenced only when it received its name[37]." As philosophy this view may be false, but as a description of ritual, it is the simple and direct truth: the person comes into ritual existence at precisely the moment he is announced. When the Egyptian

---

[33] KLUGE, *op. cit.*, p. 458; A.L. Kroeber, "Elements of Culture in Native California", *Univ. of Calif. Publ. in Amer. Arch. and Ethno.*, vol. **13**, (1922), p. 327. The Yuki have an 8-system to 64. "The latter operate by laying pairs of twigs between the fingers. Thus the anomaly is presented of an octonary system based on the hand. The Yuki operate quite skillfully by this method: when asked to count on their fingers as such, like their neighbors, they work slowly and with frequent errors" (*Ibid.*, p. 327).

[34] *Problemata*, XV, 3.

[35] ARISTOTLE is being ironical: there were five known planets; sun and moon made seven, earth eight, the sphere of the fixed stars nine. To complete the decade, the Pythagoreans invented the *counter-earth*!

[36] For an example of what we mean, see G.C. VAILLANT, *The Aztecs of Mexico*, Plate 33.

[37] A.H. SAYCE, *The Religion of Ancient Egypt and Babylonia*, p. 331.

god (RA, or NU, or whoever he is) is praised as the one "at whose utterance the gods came into being"[38], we are being told that he is the one who announced the gods' coming forth onto the ritual scene. Similarly, when the Babylonian Creation myth says: "At that time the heaven above had not yet announced, nor the earth beneath recorded, a name"[39], it is simply telling us that the play had not yet begun and that it does begin by someone, who is assimilated to heaven, announcing a name. One very puzzling feature in Creation myths is that of the Self-begotten — if anything is a self-contradiction, so it seems to us, it is a god who creates himself: yet it is managed — the Egyptian Creator of the gods, KHEPERA, gave being to himself by uttering his own name. In other words, the first person on the scene announces himself. This solution may seem ingenious to us, but it must also have seemed ingenious, or somehow special, to the early ritualists, because it is a basic rule that no one may perform the ritual for himself (with very few exceptions)[40]. Thus there would be one and only one Self-begotten, and this explains why the Egyptians could, amidst a multitude of gods, praise a god as One, as the only One. The Creator announces himself as One, and the god One is Self-begotten[41].

Similar ideas (that is, of creation by utterances) were held by the Sumerians, the Persians and the Indians, and other ancient peoples[42]. It is, of course, well known from *Genesis* that God created the world by pronouncements. Later, "when Adam named the animals the act had a creative character, conferring upon him a power over the animal creation; and Adam was by some regarded as having been the creator of animals[43]."

The Maori, the Polynesian natives of New Zealand, in their account of Creation, speak of "human beings [being] called into existence[44]."

In the Marquesas, the name of a thing is its essence (or, rather, the thing itself), and everything has a personal name. As a consequence, the account of the Creation need be nothing more than a genealogy. And so it is: the Creation myth, which is chanted on ceremonial occasions, consists simply of two lists of about 140 names each. "The chanting, whatever the occasion, was always done by women. At formal festivals two old women skilled in the art were chosen; these two stood up together and recited alternately, one the men's names, the other the women's[45]."

---

[38] *The Book of the Dead* (trans. by E.A. WALLIS BUDGE), p. 647.

[39] A.H. SAYCE, *Origin and Growth of Religion*, p. 384.

[40] HOCART, *Progress of Man*, p. 242f. There are exceptions. Thus, in many places, the King is ritually killed, and often this is by suicide (*The Golden Bough*, Chap. XXIV). HOCART *(loc. cit.)* connects the rule with the dual organization, but it appears to be of broader applicability. Perhaps it results because the ritual is derivative of a ritual of death and rebirth — the principals are assimilated to the newly born, who can do nothing for themselves.

[41] See various remarks on One in *The Book of the Dead*, for example, pp. 13—14, 65, 178, 93, 219—220, and E.A. WALLIS BUDGE, *The Gods of the Egyptians*, p. 400.

[42] R. BRIFFAULT, *The Mothers*, vol. 1, p. 4ff.

[43] *Ibid.*, p. 11.

[44] G. GREY, "The Creation According to the Maori", in A.L. KROEBER & T.T. WATERMAN, *Source Book in Anthropology*, p. 445.

[45] E.S.C. HANDY, "Native Culture in the Marquesas", *B. P. Bishop Museum Bulletin* 9 (1923), p. 85, p. 342.

According to the Maidu[46], Indians of northern California, "in the beginning there was no sun, no moon, no stars... From the sky a rope of feathers, called Po-kelma, was let down, and down it came Earth-Initiate... Then Earth-Initiate said: "Look that way to the east! I am going to tell my sister to come up." Then it began to grow light... and the sun came up... After the sun went down... Earth-Initiate said, "I'll tell my brother to come up." Then the moon rose... Then Earth-Initiate asked Turtle and Father-of-the-Secret-Society, "How do you like it?" and they both answered, "It is very good[47]." Then Turtle asked, "Is that all you are going to do for us?" and Earth-Initiate answered, "No, I am going to do more yet." Then he called the stars each by its name, and they came out...[48]".

The Athapascans of Canada and the Maya-speaking Quiches of Guatemala know Creation by words[49].

The Word has power and in particular the power to invoke. "Not only can the spirit or soul of a man, and therefore also the ghosts of the dead and all spiritual beings or gods be drawn or evoked by uttering their names, but the uttered word is regarded as having the power actually to translate a man bodily from one place to another... [The Annamites] believe that "to name a being is to evoke him, to render him present..." The Zulus believe the same thing quite as vividly, [as do] the natives of Duke of York Island... Inanimate objects are also subject to the power of the word...[50]."

5. Counting rituals

These phenomena flow from the fact that every ritual action is accompanied by words; they illustrate and establish point (c). Thus the core of the problem is (d) — the conversion of the Creative Word into the Creative Number. The clearest evidence would be actual rituals in which counting plays an essential role. We have already given some examples of such rites — the numbering of those who entered into the service of the tabernacle, the "calling up" to the reading of the Torah by number, the Walachian's counting of his sheep. These were our first examples, found, or at any rate sought, on the basis of an idea, and we were happy to have them, perhaps because we had none before. Still, the counting may not seem to be essential — the numbering of those "called up" to the reading of the Torah, it may be suggested, merely describes a fact and is scarely significant; and if the shepherd counts his sheep, it is because he wants to know how many he has. Because of this, it will be well to give here some further evidence, so as to

[46] R. B. Dixon, "The Creation According to the Maidu", in *The Source Book*, p. 458f.

[47] *Cf. Genesis* I, 18. It is because of such identities that some people have thought that the American Indians are the Ten Lost Tribes of Israel. This explanation is, of course, much more plausible than the one current in American anthropological circles, according to which such identities result from the similar working of the human mind under similar conditions.

[48] *Cf. Psalm* 147, 4: He telleth the number of the stars, he calleth them all by their names.

[49] Brinton, *op. cit.*, p. 229.

[50] Briffault, *op. cit.*, p. 11.

place beyond doubt that in counting rituals we have an extensive, ancient, and significant body of phenomena.

In Egypt years came to be named after the "fiscal" enumeration: thus, "Year of the Second Occurrence of the Numbering of all Large and Small Cattle of the North and South." This became standard by the Fifth Dynasty, and was abbreviated to "Year of the n^{th} Numbering", though the numberings already occur in the First Dynasty. There was a numbering of all the people, also. We learn these facts from the Palermo stone, a few lines from the beginning of Egyptian history. The "great achievements" of the Pharoahs recorded for the first two dynasties are for the most part celebrations of religious feasts and the like: so that it is difficult to regard these numberings as purely or even mainly secular; on the contrary, they must have been religious[51].

The Hebrews and Romans had similar religious countings, which we consider below in more detail.

With the Incas, in an annual ceremony, on each November 22 in fact, the priests of the Creator and the Sun, of Thunder and the Moon, and the shepherds of the Incas counted the flocks[52].

Savages also have counting rites. With the Kwakiutl, Indians of the northwest coast of North America, there exist two hereditary offices called *The Counter* and *The Tallyer*. When a man gives a feast, the Counter counts groups of dishes by tens, guests by sixes, and so forth. The Tallyer assists him, keeping account of the number of groups thus counted[53]. The Pomo, Indians of California, were great counters — *actual* counters. Sticks of various sizes were used to keep track of the counting of large quantities of beads; the equipment was sufficient for a count to 40000. One of LOEB'S informants actually witnessed a count to more than 20000. "Large counts were commonly performed by the Pomo at the time of deaths and peace treaties[54]."

There is no lack of evidence. The problem is to connect the evidence with Creation.

6. Tabus on counting

The tabu against counting is just about world-wide, and the most usual result of the breach of the tabu is death. FRAZER gives examples from many parts of Africa of tabus against counting men and beasts[55]; typically, it is very bad form to ask a mother how many children she has. "For example, among the Bakongo, of the Lower Congo, 'it is considered extremely unlucky for a woman to count her children one, two, three, and so on, for the evil spirits will hear and take some of them away by death. The people themselves do not like to be counted; for they fear that counting will draw to them the attention of the evil spirits, and as a result of the counting some of them will soon die. In 1908 the Congo State officials, desiring to number the people for the purpose of a tax, sent an officer

[51] J. H. BREASTED, *Ancient Records of Egypt*, vol. 1, pp. 54, 59.

[52] MARKHAM, *Rites and Laws of the Yncas*, p. 46.

[53] F. BOAS, "Contr. to the Ethn. of the Kwakuitl", *Columbia Univ. Contr. to Anth.*, vol. 3, p. 57.

[54] LOEB, *op. cit.*, p. 229f.

[55] *Folklore in the Old Testament*, pp. 308—309. The facts of this and the next seven paragraphs are taken from the same source.

with soldiers to count them. The natives would have resisted the officer, but he had too many soldiers with him; and it is not improbable that fights have taken place between whites and blacks in other parts of Africa, not that they resisted the taxation, but because they objected to being counted for fear the spirits would hear and kill them'." Similar beliefs hold among the Boloki or Bangala of the Upper Congo, the Wa-Sania and the Akikuyu of British East Africa, and the Hottentot of the Southwest.

"The Masai of East Africa count neither men nor beasts, believing that if they did so the men or beasts would die... To the Akamba, another tribe [of British East Africa], the welfare of the cattle is a matter of great concern; hence the people observe certain superstitious rules, the breach of which is believed to entail misfortune on the herds. One of these rules is that the cattle may never be counted; so when the herd returns to the village the owner will merely cast his eye over it to discover if a beast is missing." The Gallas of East Africa think that to count cattle impedes the increase of the herd.

"The superstitious objection to numbering people seems to be general in North Africa... Nor is this repugnance limited to the counting of persons; it is exhibited also in the counting of measures of grain, an operation which has a sacred character. For example, at Oran the person who counts the measures of grain should be in a state of ceremonial purity, and instead of counting one, two, three, and so on, he says, 'In the name of God for 'one'; 'two blessings' for 'two'; 'hospitality of the Prophet' for 'three'; 'we shall gain, please God' for 'four'; 'in the eye of the Devil' for 'five'; 'in the eye of his son' for 'six'; 'it is God who gives us our fill' for 'seven'; and so on up to 'twelve', for which the expression is 'the perfection of God'." Similarly, with the Palestinian Mohammedans, certain odd numbers are considered unlucky and passed over in silence.

In the Shortland group of islands in the western Pacific, when leaves are collected for the building of a chief's house, "the builders are not allowed to count the number, as that would be deemed unlucky"; if an insufficient number has been collected, the house, though nearing completion, will be abandoned, at considerable expense it may be.

Counting melons and squashes, at least while they are still growing on the vine, is tabu with the Cherokee Indians of North America. In British Columbia a plague of measles, which resulted in many deaths, was attributed by the Indians to a census of them that had been taken[56].

Similar superstitions are found in Europe. In Denmark one should not count blossoms or fruit, else the blossoms will wither and the fruit will fall untimely from the bough, nor should one count eggs under a brooding hen (we say: Don't count your chickens before the eggs are hatched; the French say: Brebis comptées, le loup les mange). In England one should not count sheep. The Lapps used to be, and perhaps still are, unwilling to count themselves. The Highland Scots consider it unlucky to number people or cattle, especially on Friday; "the cowherd knows every creature committed to his charge by the color, size, and

[56] According to H. S. SCHOOLCRAFT, "The whole aboriginal population of the United States has, at all periods of their history, felt a strong repugnance to be numbered" (*Archives of Aboriginal Knowledge*, vol. 3, p. 249).

other particular marks, but is perhaps all along ignorant of the sum total of his flocks." A good way to tease fisherwomen of the northeast coast of Scotland is "to point at them with a finger and begin to number them aloud:

Ane, twa, three!
Faht a fishers I see
Gyain our the brigg o'Dee
Deel pick their muckle greethy ee."

In Bavaria, in the Upper Palatinate, one should not count loaves in the oven, while in Upper Franconia, one should not count dumplings in the pan.

It is a popular German belief that if you count your money often it will steadily decrease. On the other hand, in Denmark, if you count the mice caught by the cat, the mice will increase in number. Likewise in Greece and Armenia, if you count your warts they will increase in number.

There are many traces current of an association of death and counting. Thus of someone who has narrowly escaped death, we say: "His number just wasn't up." We have also encountered the tabu on counting, as, for example, one should not count the guests at a party.

The reluctance to use number-words frequently observed amongst savages, preference being given to pantomime, may be evidence of a tabu. This reluctance among the Comanches, Indians of the Southwest, gave "rise to the impression which at one time became current that they had no numerals at all for ordinary counting[57]." "The Watchandies of Australia have but two simple numerals, and their entire number system is *cooteon*, 1; *utarra*, 2; *utarra cooteoo*, 3; *atarra utarra*, 4. Beyond this they can only say *booltha*, many, and *booltha bat*, very many. Although they have the expressions here given for 3 and 4, they are reluctant to use them, and only do so when absolutely required." The Mairassis of the interior of New Guinea appear to use nothing but finger pantomime, the single word *awari* being uttered with display of fingers: no disinclination to use number-words has been reported. The reluctance to count by words has, according to L. L. CONANT, led to limits being "assigned for spoken numerals, which subsequent investigation proved to fall far short of the real extent of the number systems to which they belonged."

The use of finger gestures is certainly sometimes related to the fear of uttering number words: thus, with the African neo-2-gesture people, when the speaker comes to a number, he utters the initial syllable of the word, at the same time making the appropriate gesture; then the interlocutor pronounces the word, and only then does the speaker continue[58]. In this way (so we suggest), the danger attendant upon the utterance of numbers is shared with the interlocutor. In our *Diffusion* paper, we have ventured the hypothesis that finger-toe counting arose as an attempt to circumvent a tabu of silence. However, this point is not at issue for the moment.

The tabu on counting points to the existence of counting rites. But what are the rites? And how does the tabu fit into Creation?

---

[57] CONANT, *op. cit.*, p. 83; for the next facts, pp. 29, 10, 83.

[58] Lt. ENGELS, "Les Wangata", *Rev. Congolaise*, vol. **2** (1911), p. 210. P. REICHARD, "Gebärden und Mienenspiel der Neger", *Ausland*, vol. **63** (1890), p. 408.

7. The census

The story from the Bible that initiates FRAZER's discussion of "The Sin of a Census" is another example of the tabu of counting, in fact, its prototype. "From two well-known narratives in the *Books of Samuel* and the *Chronicles* we learn that at one period of his career Jehovah cherished a singular antipathy to the taking of a census, which he appears to have regarded as a crime of even deeper dye than boiling milk or jumping on a threshold. We read that Jehovah, or Satan, inspired King David with the unhappy idea of counting his people. Whatever the precise source of the inspiration may have been — for on that point the sacred writers differ — the result, or at least the sequel, was disastrous. The numbering of the people was immediately followed by a great pestilence, and public opinion viewed the calamity as a righteous retribution for the sin of a census." In short, the Bible story is another example of the kind mentioned above. Yet there are numerous censuses, undertaken upon God's express command, related in the Bible: the *Book of Numbers* contains several. Even in II *Samuel* 18, David himself numbers his men, without doing wrong. Obviously, it was not to find out how many were there, but somehow to confer a blessing on them: after being numbered, the troops pass in review; that is, David "succours (them) out of the city." (It may be objected that it was the passing-in-review, not the numbering, as required by hypothesis, that conferred the blessing, but duplication, detachment, and displacement of parts of the ritual are a common phenomenon. What we find noteworthy is the juxtaposition of the numbering and the passing-in-review[59].) A similar rite, the lustrum, which was a kind of "wholesale initiation", and which directly followed the census, obtained amongst the Romans[60]. We recall, too, the censuses of the Egyptians and the annual ceremonies of the Incas previously mentioned.

From the examples of the census as sin, it should be clear that the censuses mentioned in *Numbers* are not bona fide, that is, secular, censuses, but are rituals involving the numbering of the participants. Of course we cannot expect the Bible to tell us this explicitly, but the countings are usually undertaken at God's command and sometimes have a purely ritual purpose[61].

Corresponding to the tabu on counting, we have the rite of a census; and the census appears to be related to the passing-in-review. We have the rite, then. The question remains: What is the meaning of the tabu within the rite?

8. Stones

Rites or ceremonies in which each participant deposits a stone are widespread. Speaking of the New World in general, D. G. BRINTON says that "at a victory, a treaty, or the founding of a village, sometimes a pillar or heap of stones was erected equalling in number the persons present at the occasion, or the number fallen[62]." When the Inca Sinchi Rusas sent his captains and men to

[59] It occurs to us that the counting is a "coming in" ceremony, the passing-in-review, a "going out" ceremony. According to HOCART (*Progress of Man*, p. 156), processions "usually mark the end, but sometimes open the proceedings."

[60] DIONYSIUS of HALICARNASSUS, *Roman Antiquities*, Book IV, Sections 15 and 22; HOCART, *Caste*, p. 127.

[61] For example, *Numbers* IV.

[62] BRINTON, *op. cit.*, p. 28. See also J. R. SWANTON, "Indians of the Southeastern United States", *Smithsonian Inst., Bur. Amer. Ethn.*, Bull. 137 (1946), p. 610.

make conquests, these made stone heaps in each ravine. "They say that an Indian wizard appeared to one of the officers of war, and told him that the heaps must be called *apachitas*. A rite was established, which was that each passerby should bring a great stone..." The practice is continued to this day[63]. An elaborate census is said to have been taken of the Chichimecs who emigrated under Xolotl to Anahuac. The count, to over 3000000 some say, was repeated several times along the route at *nepohualcos*, "counting places." The counting was effected by each plebian casting a small stone into a heap set apart for his class, and each lord or officer a larger stone into another heap[64]."

A similar ceremonial counting of troops has been observed in Madagascar, where there was "a curious but simple mode of ascertaining the number of soldiers in an army. Each soldier was made to go through a passage in the presence of the principal chiefs; and as he went through, a pebble was dropped on the ground. This continued until a heap of ten was obtained and a new heap begun. Upon completion of ten heaps, a pebble was set aside to indicate 100; and so on until the entire army had been numbered[65]."

"In Palestine and Arabia the fellahin accumulate heaps of stones at the point in the road where one first catches sight of a holy place or important town. Each traveler casts his stone on one of the heaps, and the action is considered meritorious." In India, like practices dispel fatigue[66].

In *Genesis* XXXI:44ff., Jacob and his father-in-law, Laban, make a covenant by piling up a heap of stones (just as in America). A like custom still obtains in Syria[67]. The word *cairn*, from the Gaelic word for heap, means "a heap of stones raised for a memorial..."

All these rites, we suggest, derive from the creation ritual: and occasionally creation itself is effected by the casting of stones. In the Greek story of the Deluge, after the waters subsided, the Greek Noah, Deucalion, threw stones over his head, which thereupon became men: the stones thrown by his wife, Pyrrha, became women. The mythographer APOLLODORUS adds: "That is why in Greek, people are called *laoi*, from *laas*, 'a stone'[68]." Similar stories are recounted by the Macusi, of British Guinea, and the Tamanaques, also of South America[69]; with the Quiches, a Maya-speaking people, "a stone, in the beginning of things, fell from heaven to earth, and broke into 1600 pieces, each of which sprang up a god"; and the Mexicans used to say that all men have, at one time, been stones[70].

Why each participant, as he came forward, was required to bring a stone or other object is a question we hope to answer below.

[63] MARKHAM, *Rites and Laws of the Yncas*, p. 78f.

[64] H.H. BANCROFT, *Native Races*, vol. 5, p. 292.

[65] CONANT, *op. cit.*, p. 8, after DE FLACOURT, *Histoire de la Grande Isle de Madagascar*. There still exists, incidentally, a ceremonial counting in today's armies, namely, the operation "Count off!"

[66] *Encyclopaedia of Religion and Ethics*, Art. "Stones", vol. 11, p. 877. J. ABBOTT, *op. cit.*, Chap. X, especially pp. 243, 250.

[67] *Folklore in the Old Testament*, p. 250.

[68] *Ibid.*, p. 67.

[69] *Ibid.*, p. 103f.

[70] BRINTON, *op. cit.*, pp. 189, 294.

9. Taxation

It has been suggested that censuses were invented as a means of imposing a tax, and hence that counting arose out of the necessity for taxation. But there is nothing obvious about taxes. A Kuanyama Ambo chieftain, if he feels the need of a little extra something, goes out and steals it[71]. The Romans could not get the idea of taxation either: "the residents of a *civitas* were practically exempt from the payment of municipal taxes. Local taxation could not be introduced, because the tax was a sign of servitude. Rome could exact tribute, because she was mistress of the world, but for citizens of a municipality to pay taxes to a government which they themselves had established was out of harmony with their way of thinking[72]."

HOCART has a theory of the origin of taxation which, however wrong it may turn out to be, does not ask us to assert what was or was not obvious to the ancients, but instead tries to find the answer in terms of the known activities and ideas of archaic society. According to this theory, taxation is a result of the ancient belief that the good of the community was bound up with that of a single man, the king. The life of the community was made to pass through the king, and was, according to those ideas, derived from the king. Taxation was, in origin, a way of participating in the ritual[73].

We would like to add to this theory, and suggest that the tax is associated with the census and with the tabu on counting: *the tax is that which is counted instead of the person himself.* Speaking of the innovation of the census amongst the Romans, DIONYSIUS of Hallicarnassus says[74]:

> And in order that the number of these husbandmen might... be known at once, [Tullius] ordered them to erect altars to the gods who presided over and were guardians of the district, and directed them to assemble every year and honour these gods with public sacrifices. This occasion also he made one of the most solemn festivals, calling it the Paganalia; and he drew up laws concerning these sacrifices which the Romans still observe. Towards the expense of this sacrifice and of this assemblage he ordered all of those of the same district to contribute each of them a certain piece of money, the men paying one, and the women another and the children a third. When these pieces of money were counted by those who presided over the sacrifices, the number of people, distinguished by their sex and age, became known...

The people, then, were not counted, but pieces of money were. One may ask, What difference does it make? There is a difference: we see it, but are prone to dismiss it as insignificant; the Romans were not — it appears to have been a way of finding how many people there were, at the same time taking into account a tabu against numbering them. The same can be said for the Hebrews, with whom the idea appears with greater explicitness (*Exodus* XXX: 11—16):

> 11. And the Lord spake unto Moses, saying,
>
> 12. When thou takest the sum of the children of Israel after their number, then shall they give every man a ransom for his soul unto the Lord, when thou numberest them.

---

[71] Mr. LOEB told us this.

[72] F.F. ABBOTT & A.C. JOHNSON, *Municipal Administration in the Roman Empire*, p. 138, cited in HOCART, *Kings and Councillors*, p. 203.

[73] HOCART, *Kings and Councillors*, Chapters XV, XVI.

[74] *Roman Antiquities*, Book IV, 15.

13. This they shall give, every one that passeth among them that are numbered, half a shekel after a shekel of the sanctuary: (a shekel is twenty gerahs:) an half shekel shall be the offering of the Lord.

14. Every one that passeth among them that are numbered, from twenty years old and above, shall give an offering unto the Lord.

15. The rich shall not give more, and the poor shall not give less than half a shekel, when they give an offering unto the Lord, to make an atonement for your souls.

16. And thou shalt take the atonement money of the children of Israel, and shall appoint it for the service of the tabernacle of the congregation; that it may be a memorial unto the children of Israel before the Lord, to make an atonement for your souls.

In short, being counted is necessary, but it is also dangerous: once you are counted, your soul becomes the Lord's but can be redeemed upon payment of half a shekel. (See also *Numbers* III: 39—51.)

The ritual requirement to count and the tabu against counting continue to interpenetrate to the present day. In the Synagogue, a minimum of ten men is required for the conduct of services. But one is not permitted to count; instead one uses a sentence of Scripture, *Psalm* 28:9, which in Hebrew contains ten words, to establish a one-to-one correspondence with the integers from 1 to 10[75]. Incidentally, the Hebrew word for the required quorum, *Minyan*, means "count".

Peoples of lower culture have the same device. "A dodge sometimes adopted, especially by the Kenyah [of Borneo], for counting the persons present, is to take a fern leaf with many fronds, tear off a half of each frond, handing each piece to one of the men, until every man present affirms that he has a piece, and then to count the number of torn fronds remaining on the stalk[76]."

In Florida Island at a feast, "a man will go around with a basket, and everyone present will put some small thing into it, that so the number entertained may be known[77]." Here again appears the idea that people are to be counted only indirectly. It takes a form we would call a tax.

10. Money

The Rossel Islanders, a peculiarly isolated people occupying the easternmost island of the Louisiade group, Papua, have a most complicated monetary system, which enters most vitally into their rituals. The money is of 22 denominations (there are two kinds, the *ndap*, male, and the *nkö*, female, money; we will speak only of the *ndap* money). The different denominations have names, not numbers; but for convenience may be referred to by number, from the lowest, 1, to the highest, 22. The "coins" (that is, stones) of types 12 to 22, of which there are about 150, even have individual names (there are only 7 coins of type 22). The coins of types 18 to 22 are sacred: those from 19 to 22 never see the light of day, and when type 18 changes hands, it is handled with great reverence and a crouching attitude is maintained.

A feast consists of one group of persons buying a pig (or a man, or possibly some object, such as a canoe) from another group. One group supplies the pig, the

---

[75] S. GANZFRIED, *Code of Jewish Law*, vol. I, p. 48. I *Samuel* XV, 4 is cited as the reason. The passage, incidentally, has been mistranslated and should read: "And Saul gathered the people together and numbered them with lambs..."

[76] C. HOSE & W. MCDOUGALL, *The Pagan Tribes of Borneo*, vol. 2, p. 210.

[77] R. H. CODRINGTON, *Melanesians*, p. 353.

other group the money. The body is cut up into precisely ten (standard) parts (the middle of the back, the head, *et cetera*); and these various parts are paid for by a sequence of ten stones of successive value. For a pig, these are types 9 to 18; for a man, types 11 to 20. The parties are correspondingly divided into ten parts. (Also in the buying of a canoe, the transaction parallels that of the feast, though the canoe is not actually dismembered.)

Of these facts W.E. ARMSTRONG says[78]:

> The above might be regarded as nothing more than a method by which a number of persons collectively buys a pig for purposes of consumption from a collective owner of that pig. It is, however, rather difficult to suppose that numbers of valuable *ndap* and fathoms of closely strung *nkö* are, in any real sense, the price of a pig, especially when we remember that some of the *ndap* and *nkö* that enter into the price imply loans for long periods, and payments of interest on these loans... It is, I think, clear that the pig should be regarded as a pivot for the ceremonial ... which is unintelligible if we imagine it to be primarily an economic activity.

Similar ideas have been expressed regarding trade in Indonesia[79] and interchanges in Fiji, Samoa, and Tonga, where, however, there is "no trade, not even barter[80]."

The Kwakiutl, of the American North Pacific coast, also have a complicated monetary system, and many of their customs remind one of the Rossel Islanders. The Kwakiutl have a unit of exchange, the blanket; but they also have certain curiously shaped copper plates that are analogous to the *ndap* stones of higher denomination, for example, the coppers have individual names (as did the mats of the Samoans and Togans, who used them as gifts on great occasions[81]). The value of a copper is not fixed, but depends on its career. Maxtsolem, "all other coppers are ashamed to look at it', was worth 7500 blankets in 1893[82].

BOAS writes[83]: "Marriage among the Kwakiutl must be considered a purchase, which is conducted on the same principles as the purchase of a copper." The word "purchase" has a distinctly secular connotation. It would be at least as correct to say that the exchange of a copper is as much of a rite as a marriage is.

We say "at least as correct": but actually, the two ways of describing the facts correspond to two opposed ways of looking at the facts. One considers such categories as "buying, selling, trade" as obvious, secular concepts that insert themselves into ritual. The other regards these concepts as obvious only because we are familiar with them; and explains them as arising by *secularization* from ritual[84].

---

[78] W.E. ARMSTRONG, *Rossel Island*, p. 81f.

[79] J.M. VAN DER KROEF, "Origin of Trade in Indonesia", *The Scientific Monthly*, vol. **76** (1953), pp. 284–289.

[80] HOCART, *The Life-Giving Myth*, p. 101.

[81] *Ibid.*, p. 99.

[82] F. BOAS, "The Potlatch of the Kwakiutl Indians", in the *Source Book*, p. 335.

[83] *Ibid.*, p. 337.

[84] "Secularization is merely a form of specialization; it involves a narrowing down of attention and interest..." (*Caste*, p. 153). HOCART gives several examples. We may add one from the history of counting: once the same man took care of our morals and counted us; now he has specialized into two — the censor, who takes care of our morals, and the census taker, who counts us.

The explanation of modern money takes the following form: money arises by a secularization of the ritual interchange of objects such as stones (or whales' teeth [Fiji], mats [Tonga], cowrie shells [Africa], cacao beans [Central America]) for objects of use-value, such as pigs, canoes, *et alia*. In this sense we can say that money had a ritual origin. But the next question is: Why were objects of use-value exchanged for stones within the ritual? What was the ritual origin of money?

Trade might conceivably be considered as obvious, but money certainly is not: why should anyone give away a pig for a stone? Granted he realizes that next week or next month he can give the stone back for a canoe: still, how did the whole thing start? Once stones are used in ritual they acquire a use within the ritual: then there is no more a puzzle. The crux of the problem is to understand why, or how, stones and other objects clearly devoid of use-value made their way into ritual.

11. Sacrifice

According to RAGLAN, it is possible, from existing myths and rites, to reconstruct, at least in outline, an ancient and very influential ritual, a prominent feature of which was sacrifice, originally, human sacrifice: it was believed that the community would benefit from the periodic killing of a human victim. It is clear from the evidence that the victim was not necessarily unwilling, and it is perhaps not too difficult to understand this in a general way (as effect, if not as cause), as people will do anything once in the grip of an idea. What is difficult to understand is the special form the idea took, namely, that the world must be periodically destroyed and created again from the body of the victim; or victims, rather, for there is reason to suppose that a man and a woman, "the divine King and Queen", were both sacrificed. These were actually killed, and the rest of the community feigned death. The new King and Queen thereupon appeared on the scene and became the ancestors of the resurrected race[85].

To play the central role in this ritual meant, then, to end up shortly as a corpse. There is evidence to show, however, that theories were devised to avoid this drastic conclusion, at least in general, while retaining the benefits. For example, "the fundamental principle of the Indian as of the Semitic sacrifice [was that through ritual action] the sacrificer becomes the sacrifice[86]", thus getting the benefit of being the sacrifice — but, of course, *he* remained alive, an animal replacing him as the actual victim. The same idea was held by the Incas: at the summer festival each participating youth presented a llama for sacrifice. "The sacrificial llamas bore the names of the youths who presented them. Hence the Spanish writers, with little or no knowledge of the language, assumed that the youths themselves were the victims[87]." But these were clearly feigned to be the victims. "The candidates in the New Guinea initiation ceremonies are often said to be restored by the monster which has swallowed them, on considera-

[85] For the ideas underlying these statements, see RAGLAN, *The Origins of Religion*, Chap. IX, and *Jocasta's Crime*, Chap. XXIII.

[86] HOCART, *Kingship*, p. 199.

[87] MARKHAM, *The Inca Civilization in Peru*, Chap IV. Vol. I in J. WINSOR (ed.), *Narrative and Critical History of America*, p. 239n.

tion of some pigs being supplied by the parents as ransom... In some tribes, in which the ceremonies become reduced to a simplified form, the final investiture of the candidate with the emblems of initiation takes place while he stands on the carcass of the dead pig which he has provided as his "entrance fee", and before being decorated he is steamed as if he and not the pig were about to be eaten." Similar ideas obtained amongst the Celts and Germans[88].

The central feature of ritual was sacrifice. Sacrifice itself remains somewhat of a puzzle, but a large part of archaic thought can be understood in relation to it. Thus many rituals, for example, the puberty rituals just mentioned, are death and rebirth ceremonies. Why this is so becomes intelligible if the rites are viewed as derivative of a rite in which the principal is actually killed.

To be called forth onto the ritual scene was to be placed in jeopardy: one way out was to associate some object with each participant, and call this object onto the ritual scene. The object might be an animal, or a stone, or a piece of money. Keeping these points in mind, we see that there is a relation between counting or census-taking and taxation, but it would appear that the taxation arose out of the counting and not vice versa.

Now we have all the pieces in hand for the explanation of the tabu on counting: Counting is a way of calling participants in ritual onto the ritual scene. The ritual is a creation ritual, which involves the death of the principals ("the divine King and Queen"). The other participants are replicas of the principals, and they would die, too, unless there was some device for getting them onto the scene without calling them on. The device consists in associating with each participant some object, and then calling this object onto the scene, the participant carrying it there. This counting of objects in one-to-one correspondence with the participants, with the associated avoidance of counting the participants themselves, is the tabu on counting.

12. Counting at Creation and elsewhere

With the examples above of ritual censuses, we can be fairly sure that wherever a population figure is given in sacred writings or in myth we have evidence of a ritual counting. The Todas of southern India, a pastoral people, have very elaborate rituals involving their herds, including ritual processions. "Every adult female buffalo has an individual name, which is usually given when her first calf is born. The number of buffalo names is limited, so that many buffaloes bear the same name." We are not informed of a ritual counting of the herds, but in their account of the Creation we are told[89]:

One day Ön went with his wife Pinarkurs to Medrpem (the top of the Kundahs). There he put up an iron bar which stretched from one end of the *pem* to the other. Ön stood at one end of the bar and brought forth buffaloes from the earth 1600 in number. Then Pinarkurs tried to produce buffaloes and she stood at the other end of the bar and produced 1800 buffaloes.

---

[88] BRIFFAULT, *The Mothers*, vol. 2, p. 690f. Initiate-swallowing monsters are also found on the northwest coast of America and in Africa. (Ad. E. JENSEN, *Beschneidung und Reifezeremonien bei Naturvölkern*, Map VII; see also Map VI). See also RAGLAN, *Death and Rebirth*, pp. 53–55.

[89] W. H. R. RIVERS, *The Todas*, p. 184.

Behind Ön's buffaloes there came out of the earth a man, holding the tail of the last buffalo, and this was the first Toda. Ön took one of the man's ribs from the right side of his body and made a woman, who was the first Toda woman. The Todas then increased in number very rapidly so that at the end of the first week there were about a hundred.

Most of this sounds like a direct account of a ritual[90]. The 1600 and 1800 buffaloes might be 16 and 18 participants dressed up to represent buffaloes.

In one version of the Babylonian account of the Creation, written for "Thou, king, priest-ruler, Shepherd, or whoever thou art", we are told: "Seven kings, brethren, appeared and begat children. Six thousand in number were their people[91]."

Such explicit numbers may have something to do with the widespread belief in the existence of a fixed number of members to a community — deaths and births taking place simultaneously. Such belief in itself does not depend on the counting process, but when some specific number is given, as for example do the Moslem peasants of Transjordan, who say that the number of Samaritans at Nablus had always been the same, namely, sixty-six, then we may have the residue of a counting ritual[92].

Usually we cannot expect a precise number, but a population will be described as a "multitude" — that is, where once there was given a precise number, later this would be given only vaguely. A similar phenomenon with respect to names has been remarked on by A. H. SAYCE, who says[93]: "In ancient hymns, the phrase, 'mankind, whatsoever be their name', is of frequent occurrence, and seems to signify that as the special favor of the gods could be showered only on those whose names were recited, a vague and general expression of the kind would avoid the difficulty of enumerating by its own name each division of the human race." Halfway between "multitude" and an explicit number would be the phrase "whatever be their number" as showing some concern for what the number might be. This phrase we also find in a hymn to the Babylonian god Merodach (=Marduk)[94]:

> The living creatures as many as pronounce a name and exist in the earth,
> The four zones, all that there are,
> The angels of the hosts of heaven and earth, *whatever be their number*,
> All worship thee and lend to thee their ears.

Thus SAYCE's remark would also apply to census specifications.

In the short version of Chapter LXIV of *The Book of the Dead*, a chapter which is believed to date from the First Dynasty, and which was considered to have a value equal to all other chapters combined, we read, NU speaking: "(I) work for (you), O ye Spirits, who are in number (four) millions, (six) hundred and one thousand, and two hundred, and they are (in height) twelve cubits. (Ye) travel on joining the hands, each to each, but the sixth (hour), which belongeth at the head of the Tuat (underworld), is the hour of the overthrow of the

[90] But not necessarily a ritual of the Todas.

[91] SAYCE, *Origin*, p. 373.

[92] *Jocasta's Crime*, p. 139f. In the ancient Licchavi state of Northern India there were always 7,707 reigning kings (*Caste*, p. 123).

[93] *Origin*, p. 304.

[94] *Ibid.*, p. 502.

fiend." Presumably Nu, or some other god, counted the Spirits, called Khus: he certainly had the opportunity, as everyone had to go up for judgment upon reaching the underworld.

13. The ordinal name

Not only at ritual birth, but also at actual birth, the participants are numbered as they make their way onto the scene. In Australia, amongst people who on their own initiative never count beyond seven, one nonetheless finds a fixed sequence of nine names that are assigned to their children in order of age, one set for boys, and the same set modified in terminations for girls. A similar phenomenon has been observed in Malaya, in Madagascar, in North America, and in Africa; it also occurred in ancient Rome (and the names Primo, Secondo, Quinto, Sisto, Settimio, Ottavio are still current)[95].

14. Gematria

In gematria, a numerical value is assigned each letter of the alphabet, and the value of a word is the sum of the values of its letters. Two words are then counted as equivalent if they have the same value[96] (and there are many elaborations of this basic idea). The Cabalists of the Middle Ages assigned to each planet a spirit, demon, magic square, *et cetera*, and to each name (of spirit or demon) a number in accord with the rules of gematria[97]. The antiquity of gematria is not known; the word occurs in the literature of the second century A.D. A most difficult passage in SUETONIUS (*Nero*, 39) has been explained by the discovery that "Nero" is there resolved into "matricide." Examples of gematria have been found in the graffiti of Pompeii: "I love her whose number is 545." "Amerimnus thought upon his lady for good. The number of her honorable name is 45[98]." SARGON II (eighth century B. C.) says he made the wall of Sargonsburg 16280 ells long because the number 16280 corresponds to his own name[99]. What appear to be traces of gematria occur in the Bible. The number 318 in *Genesis* XIV:14 is the number of persons born in the childless Abram's house, and it is also the value of "the steward of my house, this Eliezer" of whom Abram complains in the next chapter[100]. And there exist other examples of like nature.

(In the *Book of Numbers*, the phrase "number of the names" occurs, but does not appear to refer to gematria. On the other hand, in *Revelation* XIII: 17—18, the phrase "number of his name" occurs and definitely refers to gematria, giving the number of the Beast as 666. It is there given, incidentally, as a part of a parable, or riddle, with this number as clue. "The Catholics' interpretation of the Beast was the Antichrist. One of their theologians, Peter Bungus, who

[95] The examples, except for Rome, are given by E.B.TYLOR, *Primitive Culture*, vol. 1, p. 254. The one from Australia is from the Eyre district: CONANT, *op. cit.*, p. 108, reports a count to *six* from this district. For Rome, see PAULY-WISSOWA, *Real-Encyclopädie der Classischen Altertumswissenschaft*, article "Namenwesen", vol. 16, col. 1669.

[96] Gematria, in a way, has come into its own in modern logic. GÖDEL assigns to each logical statement an integer, much in the way that gematria would do; but different logical statements have different GÖDEL numbers.

[97] E.A.WALLIS BUDGE, *Amulets and Superstitions*, p. 393.

[98] M.H.FARBRIDGE, *Studies in Biblical and Semitic Symbolism*, p. 95.

[99] B.MEISNER, *Babylonien und Assyrien*, vol. 2, p. 278.

[100] C.LEVIAS, "Gematria", in *The Jewish Encyclopedia*, vol. 5, p. 589.

lived in the days of Luther, wrote a book on numerology consisting of nearly 700 pages. A great part of this work was devoted to the mystical 666, which he had found equivalent to the name of Luther; this he took as conclusive proof that Luther was the Antichrist. In reply, Luther interpreted 666 as the forecast of the duration of the Papal regime and rejoiced in the fact that it was nearing its end[101].")

A participant in ritual could easily be assigned a number, and was (according to our hypothesis) assigned one indicating the order of his appearance upon the ritual scene: it would therefore be important for everyone, and everything, to have a name and a number. Gematria may have been introduced as a device for giving every object one of its necessary characteristics, namely, its number.

Ancient ritual, through ritual action, established and was obliged to establish various equivalences. Gematria is a sophisticated way of doing this, by assigning to each object a number: but it could scarcely have developed except from a situation in which objects were ritually assigned numbers in more naive fashion.

Identification in ritual through number is not a conjecture (though it was once), but can be found explicitly in the sacred works of the Hindus. Thus in the Upanishads we read[102]: "These verses, by repeating the first three times, become 25. The trunk is the twenty-fifth and Prajapati is the twenty-fifth. There are ten fingers on his hands, ten toes on his feet, two legs, two arms, the trunk is the twenty-fifth. He adorns that trunk as the twenty-fifth. Now this day consists of 25, and the Stoma hymn of that day consists of 25; it becomes the same through the same, therefore the two, the day and the hymn are 25." In the *Satapatha Brahmana*, equivalence (and in particular, equivalence through number) is of frequent occurrence: for example, various parts of the altar are brought into association with parts of the body, with deities, with metres having a definite number of syllables. The following passage, beginning with X, 3, 1, 9 is typical[103]:

> 9. Now these seven metres which increase by four (syllables) successively, and are firmly established in one another, are those seven vital airs in man, firmly established in one another: ... X, 3, 2, 1. As to this they say, "What metre and what deity are the head of the fire altar?" The metre Gayatri and the deity Agni are its head. 2. "What metre and what deity are its neck?" The metre Ushnih and the deity Savitri are its neck. 3. *Et cetera.*

The above passage is definite enough, but perhaps HOCART had something even more explicit in mind when he remarked that "each god [had] a number which determined the number of syllables of which the verses to him must be composed[104]." Note how number enters into verse and rules it.

Although unaccompanied by ritual, these same ideas appear clearly with the Greeks. For the Pythagoreans, things were numbers and everything had a number. EURYTUS had a method for deciding "what was the number of what (for example, one of man and another of horse), *viz*, by imitating the figures of living things with pebbles, as some people bring numbers into the form of triangle

---

[101] T. DANTZIG, *Number, the Language of Science*, p. 39f.

[102] *Sacred Books of the East*, vol. 1, p. 182.

[103] *Sacred Books of the East*, vol. 43, p. 329.

[104] *Kingship*, p. 240. In our paper "*Ritual Origin of Geometry*", this *Archive*, vol. 1 (1962), pp. 488–527, we show that the Indian altar ritual involved a kind of geometrical gematria.

and square[105]." ARISTOTLE thought that such views must lead to a contradiction: "If all things must share in number, it must follow that many things are the same, and the same number must belong to one thing and to another... Therefore if the same number had belonged to certain things, these would have been the same as one another, since they would have had the same form of number; for example, sun and moon would have been the same[106]." ARISTOTLE gets his contradiction by confounding equivalence with equality, something his opponents did not do[107].

According to the Pythagoreans things really were numbers, whereas for PLATO they merely "participated" in number[108].

The reason ARISTOTLE discusses the Pythagorean number mysticism is that he is concerned with the nature of existence and wishes to consider the views of others. From this we ought to realize (in view of what has been said) that the Pythagorean number mysticism is a derivative of earlier creation myths. ARISTOTLE himself recognizes that mythology was a precursor of theories of existence, but appears to consider it as a kind of malfunctioning of the philosophic spirit[109]. He cannot really understand the myths because he thinks they refer to actual creation, whereas, if we are right, they refer to ritual creation.

Nowadays it is also realized, perhaps more clearly, that mythology was a starting point of Greek philosophy, but generally this mythology is considered to be philosophy formed by a mythopoeic mentality. No one, so far as we know, has discussed Greek philosophy in the light of the relation between myth and ritual[110].

We spoke before of the Egyptian spirits (khus). The Egyptians, by the way, had not only body and soul, as we do, but body (khat), double (ka), soul (ba), heart (or conscience) (ab), shadow (khaibit), spirit (khu), power (sekhem), and name (ren)[111]. We are suggesting that once every man, or at least every participant in ritual, also had a number. And, indeed, with some Greeks the soul was a number: according to XENOCRATES, the soul is a number that moves itself[112].

[105] *Metaphysica*, N 5, 1092^b 10.

[106] *Ibid.*, 1093^a 1.

[107] At least if we can judge by the Vedic ritualists. They make distinct things equivalent through ritual action. See HOCART, *Kingship*, p. 198f.

[108] ARISTOTLE, *Metaphysica*, 987^b. Actually, ARISTOTLE says two things that seem to contradict each other: *cf.* 987^b 12 and 987^b 28.

[109] See, for example, *Metaphysica*, 982^b 17, 1000^a 17, 1071^b 28.

[110] F.M. CORNFORD (*From Religion to Philosophy*), following lines laid down by DURKHEIM, has considered Greek philosophy, or rather the preceding mythology, in relation to social organization. This is a good idea, and there is a relation, but it is never made clear how the relationship establishes itself. Compare, for example, what he says about the separation of sky and earth on pp. 66—69 with what we say in our paper "Separation of Sky and Earth at Creation", *Folklore*, vol. **70**, pp. 477—482. (CORNFORD cannot make the relation clear because he supposes the myths to be a consequence of social organization, which in turn is a natural phenomenon, of the same order as "diamonds are hard" or "grass is green". He is led to this view because he supposes that widely separated areas showing minute identities in mythology are nonetheless independent. But these areas also show minute identities in their technology, which CORNFORD can scarcely suppose to result from a type of social organization. These remarks hold, of course, for other, and in particular more recent, writers.)

[111] *Book of the Dead*, p. lix, f.

[112] ARISTOTLE, *De Anima*, p. 408^b 34.

We do not have many communities in which each member is assigned a number, but we do have one. With the Palau Islanders, in the Carolines, "every 'Pelu' [village] includes a number of 'Rupaks', the rulers, and a number of 'Kaldebekels', the folk, both parts ordered in a descending numerical order 1, 2, 3, *et cetera*, and the natural consequence was that in two separate communities the Rupaks of equal number, as also the corresponding Kaldebekels, considered themselves equal, therefore in principle as friends or as standing near to each other, and this considerably facilitated the intercourse between the communities[113]."

It is nice to have such examples. From the point of view of the general thesis that myth, ritual, and social organization are to be seen in relation to each other, it is even necessary. But once that thesis is established, it tells us on the basis of part of the evidence what other evidence to expect. If we did not have communities in which each member is assigned a number, we would posit them anyway; and this, in fact, is what we originally did.

15. The Heavenly Shepherd

Previously we mentioned the Wallachians, who on St. George's Day, as well as the day before and the day after, count their sheep. Our explanation for this is as follows. We start from the homology:

(1) The Lord: His people = the shepherd: his sheep.

According to our hypothesis, the Lord counts His people, and hence the shepherd counts his sheep.

It is interesting to trace the above homology back to its origins. It was certainly familiar to the Egyptians, who used the (shepherd's) crook as symbol of authority: one can see the crook in the hands of the gods in many vignettes in *The Book of the Dead*. In his discussion of the god Tammuz, showing that Tammuz was a moon god, or derived from a moon god, BRIFFAULT remarks that the two most common appellatives of Tammuz are "The Shepherd" and "The Wanderer", the latter definitely giving Tammuz a moony character. He associates this latter character also with the former, saying: "The flocks which the Heavenly Shepherd originally tended were not earthly sheep, but the flocks of the stars." As for the antiquity of Tammuz, he says: "The dying and resurrecting god Tammuz, the Divine Son, is one of the oldest elements in Babylonian religion, and figures in it as far back as our records reach; his cult was established from time immemorial in the cities of Sumer before the Babylonian empire existed, as early as 3000, or according to other authorities, 4000 B. C. As Professor LANGDON observes, we do not know among historical peoples possessing written records of a more ancient god[114]." In short, our homology (1) is as old as we can ever hope to establish it to be. And at the same time, we have obtained another homology:

(2) The shepherd: his sheep = the moon: the stars.

It so frequently turns out when we have two homologies A = B and B = C, such as (1) and (2), that we can also produce evidence for the homology A = C,

[113] J. KUBARY, *Ethnographische Beiträge zur Kenntnis der Karolinischen Inselgruppe und Nachbarschaft*, Heft 1, p. 113. VAN DER KROEF, *op. cit.*, p. 286, tells how two groups, when they agree to meet for trade, also agree on an equal number of participants for each side.

[114] BRIFFAULT, *op. cit.*, vol. 3, pp. 95, 93, 92.

that in any case we would tentatively make this conclusion (it is for this reason that we write the suggestive equality sign[115]). In the present case we would write:

(3) The Lord: His people = the moon: the stars.

Actually it would be quite easy to bring forward direct evidence for this homology. Assuming it for the moment, if our argument above as to why shepherds count sheep is correct, then we ought to conclude that *the moon counts the stars.* And now the question is: Do we have any direct evidence for such conclusion? Yes! The god Thoth, whose headdress carries a crescent, counts the stars[116]. The Babylonian god Ea, of antiquity equal to that of Tammuz, was, like Thoth, the god of wisdom, the instructor of his worshippers in arts and science, in particular, in geometry and numbers. He taught his son Merodach, or Marduk (=Tammuz), everything he knew:

> Oh my son, what dost thou not know?
> What shall I tell you more?
> What I know, thou too knowest[117].

There is thus good reason to suppose that Tammuz counted his sheep just as THOTH counted the stars.

[Elsewhere in Egypt, the sun counts the stars (thereby slaying them)[118]; and of God Psalm 147, line 4, says: "He telleth the number of the stars; he calleth them all by their name." In the first case, the moon is exchanged for the sun; in the second, it is displaced by God.]

16. The Sand Reckoner

It may be objected that the argument is being founded on mere metaphors, on images which spring quite arbitrarily to a writer's mind. "For example", it may be objected, "in *Genesis* XXIII:17, wherein the Lord and Abraham make a covenant, the Lord says:

> ... in blessing I will bless thee, and in multiplying
> I will multiply thy seed as the stars of the heaven,
> and as the sand which is upon the sea...

According to this verse, you would write:

The Lord's people = the stars of the heaven,

and conclude that if one of these sets is counted, then so is the other. In fact, you would prove it citing Psalm 147, 4. But it is clear that we have in the above verse a mere metaphor, for according to it we could also conclude:

The Lord's people = the sand upon the seashore.

Do you propose that once sand was counted ritually?"

The problem is:

The Lord: His people = X: sand.

To solve for X.

---

[115] Following HOCART, *Kings and Councillors.*

[116] BUDGE, *Gods of the Egyptians*, vol. 1, p. 400.

[117] For the equality Marduk = Tammuz, see S. LANGDON, *Tammuz and Ishtar*, p. 30. For the quotation, see SAYCE, *Origin*, p. 472. On Ea, see R.W. ROGERS, *Cuneiform Parallels to the Old Testament*, p. 63, where he appears under the name of Oannes.

[118] BUDGE, *Egyptian Ideas of the Future Life*, pp. 33–35.

Buddha, in order to win the maiden he loved, had to pass an examination in arithmetic. One of the questions was to name large numbers. Another was to compute the number of "primary atoms which when placed one against the other, would form a line one mile in length. Buddha found the required answer in this way: 7 primary atoms make a very minute grain of dust, 7 of these make a minute grain of dust, 7 of these, etc.[119]" In short,

Buddha counts sand,

and hence

$$X = \text{Buddha}$$

is a solution.

Nor is it the sole known solution: the epithet "Counter of the Sands" must once have been common. HORACE, in writing of the death (by shipwreck) of the Pythagorean philosopher and mathematician ARCHYTAS, contemporary of PLATO, says[120]:

> The scanty present of a little dust
> Near the Mantinian shore confines thee, O Archytas,
> Measurer of the sea, the earth, and the innumerable sand.

Of course, HORACE may have poetically detached an incident from the life of ARCHIMEDES, who actually did count, or compute rather, a number greater than the number of grains of sand in the universe. He does this in a work called "The Sand Reckoner", which is also of great value because it incidentally mentions that ARISTARCHOS OF SAMOS had put forward the heliocentric hypothesis: this is done in the course of ARCHIMEDES' making assumptions on the size of the universe. Although there was a definite scientific problem involved and the sand enters in only incidentally as far as the scientific value of the work is concerned, nonetheless it is clear from ARCHIMEDES' preface that sand-counting was to some extent on people's minds. He wrote[121]:

> There are some, King Gelon, who think that the number of sands is infinite in multitude; and I mean by sand not only that which exists about Syracuse and the rest of Sicily but also that which is found in every region whether inhabited or uninhabited. Again there are some who, without regarding it as infinite, yet think that no number has been named which is great enough to exceed its multitude.

He then goes on to make assumptions about the size of the universe and a grain of sand, and imagines the whole universe filled with sand. He assumes 10000 grains of sand fill a poppy seed; and takes 100000000 as the base of his system of numeration. The number he writes down would require 64 digits in our system of numeration of base 10. (This solves the problem, but he also names numbers that in our notation would require 80000 million million digits[122].)

The love of large numbers reached Japan. CONANT says: "Taken altogether, the Japanese number system is the most remarkable I have ever examined, in the extent and variety of the higher numerals with well-defined descriptive names." They have words for 10^4, 10^8, and so on up to 10^{48}. There are also

[119] D.E. SMITH & L.C. KARPINSKI, *The Hindu Arabic Numerals*, p. 15; F. CAJORI, *A History of Mathematics*, p. 90.

[120] D.E. SMITH, *History of Mathematics*, vol. 1, p. 85.

[121] See T.L. HEATH, *The Works of Archimedes*, p. 221.

[122] HEATH, *Greek Mathematics*, vol. 2, p. 81.

words for (definite) small numbers, "sand grain" being one, and "dust", another[123]. Buddha in his match with the great arithmetician Arjuna, gave well-defined number names as high as 10^{53}, and claimed he could go further[124].

If we bring together the various homologies given, another suggests itself. We write:

The Lord: His people = the shepherd: his sheep = the moon: the stars = Buddha: sand = the counter: the things counted.

Now we have seen reason to write, for example, the homologies:

The Lord = the shepherd = the moon = *et cetera*

and in particular:

The Lord = The Counter.

In short, if we regard the above series of homologies, we shall not be surprised if ancient thought ascribed a godly character to counting.

We have already mentioned the hereditary offices of Counter and of Tallyer of the Kwakiutl. "Yupanqui", name of the favorite hero in Inca history and frequently occurring as a name for the Inca, is the second person of the future tense of a verb, and signifies "you will count[125]." The natives of Pukapuka in Polynesia can count to very high numbers, and even have in this connection a word for infinity: the BEAGLEHOLES, who report this, find it puzzling:

> The number of terms that the Pukapukan uses to indicate high numbers is interesting, though it is a little hard to see the function of high numeral concepts in an atoll culture. It was a favorite jest among informants that the Pukapukan could count to a higher power than we could; proof of this they argued was not only the presence of words indicating progression to infinity, but also the ability of the culture hero Maui to find Pukapukan words which enabled him to enumerate the stars in the sky, the fish in the sea, the sands on the beach, and so forth[126].

One of the ninety-nine beautiful names of Allah was "The Counter"; another was "The Reckoner[127]." Nor does the Qu'ran leave us in the dark as to the character of the rites to which, we have reason to believe, these titles refer. In Chapter XV, in God's own words, we are told:

> And there is not a thing but the storehouses thereof are with Us and We send it not down save in determined quantities.

In Chapter XIX we find:

> There is none of all that are in the heavens and the earth but he shall come unto the Compassionate as a servant. He hath known them and numbered them with an exact numbering.
>
> And each of them shall come unto Him on the day of resurrection, alone.

The Jews regarded every letter of the Torah as a living being, and a special class of scholars devoted themselves to the careful counting of the number of letters in it. There are, incidentally, in round numbers, 300000 letters in

---

[123] CONANT, *op. cit.*, p. 94.

[124] SMITH & KARPINSKI, *op. cit.*, p. 15.

[125] MARKHAM, *Inca Civilization*, p. 231n. GARCILASSO interprets it as one who will count as wise, virtuous, powerful.

[126] BEAGLEHOLE, *op. cit.*, p. 354.

[127] T. P. HUGHES, *Dictionary of Islam*, p. 143.

the Torah out of 1100000 in the Bible. Similar reports are made of the Veda[128].

In Akkadian the word for "working out a sum" is the same as that for "performing a ritual act[129]."

Previously we mentioned the Pomo, who had equipment for counting up to 40000. With it large quantities of beads were counted. In a Pomo myth, the first Bear Shaman offers forty thousand beads in pretended sympathy for the victim whose death he has caused. One is apt to be impressed by the wealth involved in so many beads and to overlook that the counting out of these beads must have been *ipso facto* a significant thing and a sign of sympathy.

"Everything", said THALES, "is full of gods." Perhaps the Pomo beads are gods – if so, the counting ceremony becomes an image of the procession of the gods at Creation. What is here suggested is elsewhere explicit; the Buddhist rosary in Japan, where it receives its most elaborate form, is clearly but a model of the pantheon; in the Marquesas, likewise, knotted strings are used as "mnemonic devices" for memorizing the Creation genealogies previously mentioned; and the quipu, a string device for recording numbers, was used similarly by the Incas for liturgical purposes[130].

17. The ritual challenge

The above considerations can be applied to the following, which is taken from a myth given by the Kacha Nagas, a hill tribe of Assam, in their explanation of the diversity of languages[131]:

> The king of the men then on earth had a daughter named Sitoyle. She was wondrous fleet of foot and loved to roam the jungle the livelong day, far from home, thereby causing much anxiety to her parents, who feared lest she should be devoured by wild beasts. One day her father conceived a plan for keeping her at home. He sent for a basket of linseed, and upsetting it on the ground he ordered his daughter to put the seeds back, one by one, into the basket, counting them as she did so. Then thinking that the task he had set her would occupy the maiden the whole day, he withdrew. But by sunset his daughter had counted all the seeds and put them back in the basket, and no sooner had she done so than away she hurried to the jungle. So when her parents returned, *et cetera.*

In short, it's miraculous to be able to count quickly.

The same theme, counting as a task, is found in European folklore. Also some amulets in Europe appear to depend on the same idea: they contain a great number of small things that the devil must count before he may proceed with his nefarious work[132]. While the idea is only implicit in the amulet, it is elsewhere explicit in the folk tale. In the Mentawei Islands, west of Sumatra, the fetish

[128] *Jewish Enc.*, article "Torah", vol. **12**, pp. 197 and 196; M. MÜLLER, cited in W. R. LETHABY, *Architecture, Mysticism, and Myth*, p. 241.

[129] G. CHILDE: *What Happened in History*, p. 129.

[130] *Encyclopaedia of Religion and Ethics*, article "Rosaries", vol. 10, p. 851; HANDY, *op. cit.*, p. 342; W. C. BENNETT, in *Handbook of the South American Indians*, vol. 5, p. 613. In the Torres Straits, a collection of sticks tied to a string is called a *kupe* or *kopei*; one principal use of the *kupe* is as a "fornication tally" (*Camb. Anth. Exp. to Torres Sts.*, vol. 4, p. 234f.). The similarity of the word *kupe* with the Quechuan word *quipu* for a similar device has not, so far as we know, been commented upon.

[131] FRAZER, *Folklore*, p. 151.

[132] W. L. HILDBURGH, "Indeterminability and Confusion as Apotropaic Elements in Italy and in Spain", *Folklore*, vol. **55** (1944), p. 135.

poles foil ghosts by requiring them to count leaves[133]. Amongst the Ekoi, in Africa, the ghosts cannot count to seven: this fact is used in eluding them[134].

In a folk tale of the Copper Eskimos, two hunters return, one with a wolf, the other with a caribou. They begin arguing as to which hide has the most hairs, and in order to settle the argument, decide to have a contest, each pulling the hairs out one at a time. They count and count and become so engrossed in what they are doing that days pass and they die of hunger. "That is what happens", the Eskimo storyteller adds, "when one starts to do useless and idle things that can never lead to anything[135]." Counting as a contest is not only widespread but also very ancient: in the *Satapatha Brahmana* (I, 5, 4, 6), the gods and the Asuras (both descended from Prajapati) are at first contending for superiority with staves and bows, but unable thus to come to a decision, the Asuras propose that they "try to overcome one another by speech, by sacred writ (brahman)! He who cannot follow up our uttered speech by (making up) a pair shall be defeated, and lose everything." The gods agree, and Indra starts for the gods saying: "'One (eka, m., unus) for me!' The others then said, 'One (ekâ, f., una) for us!' and thus found that desired pair." Thus they continue, whereaupon Indra wins by saying "Five", because "then the others found no pair, for then both (masculine and feminine) are panka[136]."

In Siam, before a witness is allowed to testify, he is required to count to ten. This has been represented as a test of intelligence, but it is fairly clear that it is not a real, but merely a ritual, challenge, quite homologous to Buddha's efforts[137]. Similarly, the ancient Shrewsbury custom of deeming a person to be of age when he knew how to count up to twelve pence would appear to be the residue of a puberty ceremony[138]. In England they also say: "He knows

---

[133] E.M. LOEB, *Mentawei Religious Cults*, p. 224.

[134] P.A. TALBOT, *In the Shadow of the Bush*, pp. 9, 240, 337.

[135] K. RASMUSSEN, "Intellectual Culture of the Copper Eskimos", *Fifth Thule Expedition*, vol. 9, p. 122.

[136] *Satapatha Brahmana*, I, 5, 4, 6, *Sacred Books of the East*, vol. 12, p. 153.

[137] TYLOR, *op. cit.*, vol. 1, p. 242.

[138] *Ibid.* It is amusing to see the notion that a person can be humanlike only if he can count making its appearance in recent scientific literature. Thus H. FREUDENTHAL in his book *Lincos* is concerned with the problem of designing a language (*viz*, Lincos) for cosmic intercourse. He supposes (p. 14) that "the person who is to receive my messages is human or at least humanlike as to his mental state and experiences" and he proposes "to exclude or at least restrict excessively the opportunities of showing." "Lincos", he continues (p. 21), "has to be taught to the receiver. Therefore our program to be broadcast cannot have the character of a newsreel. On the contrary, in the beginning we shall communicate facts which may be supposed to be known to the receiver... As our means of showing are heavily restricted, we cannot start with concrete subject material. Mathematics is the most abstract subject we know and at the same time a subject that may be supposed to be universally known to humanlike intelligent beings. So we have decided to start our program with mathematics. Natural numbers are introduced..." It is quite clear that the view on which FREUDENTHAL bases his program is false, as babies are humanlike intelligent beings long before they can count; and not long ago, all humans spent their whole lives without counting. Perhaps (though this is by no means clear) FREUDENTHAL only meant to assume that the beings are intelligent enough to learn counting; maybe he will make this point more clear in the promised second part of his work. There is, by the way, another widespread

how many beans make five[139]." Knowing answers is frequently equated with intelligence.

The view one takes of such facts will depend upon one's views on ritual in general. The evolutionary theory of ritual sees in them a dramatic heightening of mundane activities: counting is something one needs in daily life, so it becomes elaborated in ritual. Or to take an example of wider scope, the coronation of the king is considered to be but a more elaborate copy of an initiation ceremony. According to HOCART'S theory of the kingship, however, it is just the other way around: the ideas and details of the ritual are first worked out with respect to the kingship, and afterwards applied to other things. A person is assimilated to the king (or god) and in the process is required to do a kingly (or godly) thing[140]. Sometimes, as in the case of the Tibet witness, this godly thing is counting.

18. The creative number

We recall once more the Creation myth found in the Marquesas: it is simply a genealogy, consisting of two lists of about 140 names each. The myth is chanted on ceremonial occasions. "The chanting, whatever the occasion, was always done by women. At formal festivals two old women skilled in the art were chosen — these two stood up together and recited alternately, one the men's names, the other the women's." In other words, taking the myth as descriptive of a rite, the men and women entered alternately onto the ritual scene. The Pawnee in one story say that the children born of the first parents were alternately boys and girls, who married each other when they arrived at maturity[141].

It occurs to us, just now and with some surprise, that there were two censors at Rome (it has been suggested to us that there were two so that each could keep an eye on the other). Going over our evidence, we find that in several cases there are two counters. Thus with the Kwakiutl there were *two* counting offices, *The Counter* and *The Tallyer*. In the census of the Chichimecs we spoke about, there were two heaps. Similarly with the Nootka, in potlatch invitations the speaker had two bundles of small splints, one for the chiefs and one for persons of lower rank, and "as he called each name in order of rank, he or an assistant threw down the stick from the proper bundle[142]." On Florida Island, "When yams are counted two men count out each five, making ten, and as each ten is made they call out 'one', 'two', and so on[143]." And we note that two of the ninety-nine beautiful names of *Allah* refer to counting.

In a list collected by BRUGSCH of the attributes of the Egyptian god we find that "God is father of fathers and mother of mothers... His names are innumerable... He multiplieth himself millions of times[144]." This is to be compared

confusion that bedevils the discussion on origins: this is the confusion between being able to learn the use of a thing and being able to invent it. We have seen a monkey ride a bicycle, but no one expects a monkey ever to invent one.

[139] TYLOR, *loc. cit.*

[140] This is the main point, but for a more exact statement see HOCART, *Kingship*, Chap. XII, especially pp. 154—159.

[141] G. A. DORSEY, *Traditions of the Skidi Pawnee*, pp. 20—22.

[142] P. DRUCKER, "The Northern and Central Nootkan Tribes", *Smithsonian Inst. Bur. Amer. Ethn.*, Bull. 144 (1951), p. 117.

[143] CODRINGTON, *op. cit.*, p. 353.

[144] BUDGE, *Egyptian Ideas of the Future Life*, p. 20f.

with the Pythagorean notion that the One is both even and odd. Both notions appear to be the result of an ancient movement to eliminate, or severely restrict, the role of women in religion[145].

Explicit serializing with numbers of lists of names are to be found in the ancient Babylonian and Sumerian documents. The Seventh Tablet of the Babylonian Creation Series contains the ceremonial proclamation by the assembly of the gods of the great Fifty Names of the god Marduk. In the Tablet we find that "...Ziku (or Zi-azag) was the third name they gave him — holder (that is, possessor) of holiness, God of the favorable wind, *et cetera, et cetera...*, (he is) the god Aga-ku (or Aga-azag) in the fourth place — let men exult... the god Mu-ku (or Mu-azag) in the fifth place..." Then he is the god Shazu, but here the tablet from lines 39 to 106 is badly broken, and whether the numbers seventh, eighth, ninth, *et cetera*, occur, we do not know[146]. In the Sixth Tablet Anu names the names of the bow thus: "The first is Long Bow, the second... its third is Bow-Star in heaven..." In a Sumerian legend from the sixteenth Tablet of the Evil Demon Spirit, seven evil demons are enumerated: "Of these seven, the first is the south wind, the second is a dragon whose mouth is opened... that none can measure. The third is, *et cetera...*[147]."

In the Bible, amongst numerous genealogies, we read, for example, that "Eleazar begat Phinehas, Phinehas begat Abashua, and Abashua begat Bukki, and Bukki begat Uzzi" *et cetera, et cetera*. In a Babylonian incantation for toothache we find: "After Anu (had created the heavens), the Heavens created (the Earth), the Earth created the Rivers, the Rivers created the Canals, *etc.*[148]." The incantation, by incorporating a genealogy, refers itself to the Creation ritual. The Besisi of Malaya have the following incantation[149]:

> One, two, three, four, five, six, seven,
> Be cool, O Fever, cool and frigid...

Here the Creation myth is abbreviated to a count to seven.

In the Tao-Te-King, LAO-TSE gives a Chinese version of the Creation thus[150]:

> Tao produced unity; unity produced duality; duality produced trinity; and trinity produced the innumerable objects; the innumerable objects, carrying the feminine or shadow principle on one side, and the masculine or sunshine principle on the other, created a just harmony by their respective clashes of primitive impulse or ether.

The Pythagoreans, as we have seen, held ten to be perfect. PHILOLAUS called the decad "great, all-powerful and all-producing, the beginning and the guide of the divine as of the terrestial life[151]." This ten, conceived as

---

[145] See RAGLAN, *Origins*, Chap. XIII; SEIDENBERG, *Separation of Sky and Earth*, p. 480.

[146] *The Babylonian Legends of Creation*, British Museum, p. 70f. For the variant reading, see A. UGNAD, *Religion der Babylonier und Assyrer*, p. 49.

[147] ROGERS, *op. cit.*, p. 63.

[148] *Ibid.*, p. 52.

[149] W. S. SKEAT & C. O. BLAGDEN, *Pagan Races of the Malay Peninsula*, vol. 2, p. 309.

[150] *Encyclopaedia of Religion and Ethics*, article "Cosmogony and Cosmology", vol. 4, p. 140.

[151] E. ZELLER, *A History of Greek Philosophy*, vol. 1 (4th ed.), p. 427.

the sum of the first four numbers, was called the Tetractys. An oath of theirs runs[152]:

Yes, I swear by him who has given our soul the Tetractys, source of ever-flowing nature.

C. LEVIAS sums up the theoretic basis of Jewish gematria thus[153]:

All creation has emanated from the En Sof. The first degree of that evolution are the ten Sefirot, from the last of which, Kingdom, developed the 22 letters of the Hebrew alphabet. Through the latter the whole finite world has come into existence. These letters are dynamic powers. Since these powers are numbers, everything that has sprung from them is number. Number is the essence of things, whose local and temporal relations ultimately depend on numerical proportions. Everything has its prototype in the world of spirit, that spiritual prototype being the germ from which the thing has been developed. As the essence of things is number, the identity of things in number demonstrates their identity in essence.

The image we originally projected as a hypothesis is given explicitly in *Isaiah* XL: 26: "Lift up your eyes on high and behold who hath created these *things*, that bringeth out their host by number: he calleth them all by names by the greatness of his might, for that *he is* strong in power; not one faileth."

In the *Satapatha Brahmana* (VIII, 4, 3, 1 ff.), Prajapati "produces creatures" by counting the odd numbers from 1 to 33. And we recall that the Egyptian Creator of the gods, Khepera, creates himself by uttering the number One.

The Creative Word has become the Creative Number.

19. Summary and conclusion

Various peculiar features of counting practices led us to the supposition that they were not spontaneously generated, but were diffused from civilized centers. The archaic basis of society was ritual, so once a civilized origin for counting was indicated, the possibility, one might even say the probability, arose that it had a ritual origin. This by no means meant that we could say what the origin was, because for one thing the evidence might have been completely destroyed or have proved to be so diffuse and incoherent as not to allow for a reconstruction. Starting from such mystic sayings as "Odd numbers are male, even numbers female" and "Number rules the universe", supported by the theory that a myth "has nothing to do with speculations or explanations, any more than it has to do with historical facts... but [is] the form of words associated with a rite[154]", we looked for counting rituals and found, amongst other things, that counting was frequently the central feature of a rite, and that participants in ritual were numbered. This suggested to us the hypothesis that counting was invented as a means of calling participants in ritual onto the ritual scene. With this hypothesis, we examined ancient thought for support, found it, and the hypothesis in turn illuminated some obscure ancient ideas.

[152] The oath is Verse 47 of the Golden Verses (see A. DELATTE, *Étude sur la littérature pythagoricienne*, p. 253). A triangular number (*i.e.*, a number of the form $1+\cdots+n$) occurs in a myth found on Bowdich Island, in the Union Group (J. J. LISTER, "Notes on the Natives of Fakaofu", *Journal of the Royal Anthropological Institute*, vol. 21, p. 60): There were ten brothers whose names were simply the numbers from one to ten. Their parents distribute axes to them, 10 to 10, 9 to 9, etc.

[153] *Op. cit.*, *The Jewish Encyclopedia*, vol. 5, p. 90.

[154] RAGLAN, *The Hero*, p. 130.

Most of the explanations, it may be noted, are compatible with a practical origin of counting, that is, they depend solely on the observation (or hypothesis) that participants in ritual were called forth by number. The ideas encountered here, however, also explain pure 2-counting, which is the oldest stratum of counting we can detect. Thus these ideas appear to be coeval with the origin of counting.

Our considerations point to the following conclusion:

Counting was invented in a civilized center, in elaboration of the Creation ritual, as a means of calling participants in ritual onto the ritual scene, once and only once, and thence diffused.

Acknowledgment: Thanks are due EDWIN M. LOEB for reading an earlier version of the text and giving helpful suggestions. The author also thanks Professor VAN DER WAERDEN for comments leading to greater precision of statement.

Bibliography

ABBOTT, J., The Keys of Power. London 1932.
ARISTOTLE, Metaphysica, transl. by W. D. Ross in The Works of Aristotle, vol. 8. Oxford, 1928.
—, De Anima, transl. by J. A. SMITH in The Works of Aristotle, vol. 3:2. Oxford, 1931.
—, Problemata, transl. by E. S. FORSTER in The Works of Aristotle, vol. 7. Oxford, 1927.
ARMSTRONG, W. E., Rossel Island. Cambridge, 1928.
BANCROFT, H. H., The Native Races of the Pacific States of North America, 5 vols. New York, 1875—76.
BEAGLEHOLE, E. & P., Ethnology of the Pukapuka, B. P. Bishop Museum Bull., No. 150. Honolulu, 1934.
BELL, E. T., The Magic of Numbers. New York ,1946.
BENEDICT, L. W., "A Study of Bagobo Ceremonial, Magic, and Myth", Ann. N.Y. Acad. Sci., vol. **28** (1916).
BENNETT, W. C., "Lore and Learning, Numbers, Measures, Weights and Calendars", in Comp. Ethn. of the S. A. Indians, vol. 5 of the Handbook of S. A. Indians, Smithsonian Inst. Bur. of Amer. Ethn. Bull. 143. Washington, 1949.
BOAS, E., "The Potlatch of the Kwakiutl Indians" in A. L. KROEBER & T. T. WATERMAN, Source Book in Anthropology (New York, 1931).
—, "Contribution to the Ethnology of the Kwakiutl", Columbia Univ. Contr. Anthro., vol. 3 (1925).
BREASTED, J. H., Ancient Records of Egypt, 5 vols. Chicago, 1906.
BRIFFAULT, R., The Mothers, 3 vols. New York, 1927.
BRINTON, D. G., Myths of the New World. New York, 1868.
BUDGE, E. A. WALLIS, The Gods of the Egyptians, 2 vols. Chicago, 1904.
— —, Egyptian Ideas of the Future Life. London, 1908.
— —, Amulets and Superstitions. London, 1930.
— —, Transl. of The Book of the Dead, 3 vols. Chicago, 1901.
— —, (Ed.), The Babylonian Legends of the Creation, British Museum, 1931.
CAJORI, F., A History of Mathematics. New York, 1929.
CHILDE, V. GORDON, The Aryans. New York, 1928.
—, What Happened in History. New York, 1946.
CODRINGTON, R. H., Melanesians, Their Anthropology and Folklore. London, 1891.
CONANT, L. L., The Number Concept. New York, 1910.
CORNFORD, F. M., From Religion to Philosophy. London, 1912.
CRAWFURD, J., "Numerals as Evidence of Civilization", Trans. Eth. Soc. of London, n.s., vol. 2 (1863).
DANTE ALIGHIERI, De Vulgari Eloquentia, Book I, Chap. XVI, trans. in The Portable Dante, ed. by PAULO MILANO. New York, 1948.

DANTZIG, T., Number, the Language of Science. New York, 1939.
DARMESTETER, A., The Life of Words. London, 1886
DELATTE, A., Étude sur la littérature pythagoricienne. Paris, 1915.
DENNETT, R. E., At the Back of the Black Man's Mind. London, 1906.
DIONYSIUS OF HALICARNASSUS, Roman Antiquities, transl. by E. CARY, 7 vols. London, 1939.
DIXON, R. B., "The Creation According to the Maidu", in A. L. KROEBER & T. T. WATERMAN, Source Book in Anthropology (New York, 1931).
DORSEY, G. A., Traditions of the Skidi Pawnee (Mem. of the Amer. Folklore Soc., vol. 8). Boston, 1894.
DREYER, J. L. E., A History of Astronomy from Thales to Kepler. 1953.
DRUCKER, P., The Northern and Central Nootkan Tribes, Bur. Amer. Eth. Bull. 144. Washington, 1951.
DURKHEIM, E., The Rules of Sociological Method. Trans. by G. E. G. CATLIN, 8th ed. Glencoe, 1950.
Encyclopaedia of Religion and Ethics, ed. by J. HASTINGS, 12 vols. Edinburgh, 1908—21.
ENGELS, Lt., "Les Wangata", Rev. Congolaise, vol. 2 (1911).
FARBRIDGE, M. H., Studies in Biblical and Semitic Symbolism. London, 1923.
FESTUGIÈRE, P., Révélation d'Hermès Trismégiste, vol. 4. Paris, 1954.
FETTWEIS, E., Das Rechnen der Naturvölker, 35 pages. Leipzig, 1927.
FRAZER, J. G., The Magic Art and the Evolution of Kings (2 vols.), in The Golden Bough. London, 1911.
—, Folklore in the Old Testament (Abridged Edition). New York, 1923.
—, The Golden Bough (Abridged Edition). New York, 1940.
FREGE, G., The Foundations of Arithmetic. Transl. by J. L. AUSTIN. 2nd ed. New York, 1960.
FREUDENTHAL, H., Lincos, Part I. Amsterdam, 1960.
FROBENIUS, L., Vom Kulturreich des Festlandes. Munich, 1923.
GANZFRIED, S., Code of Jewish Law. New York, 1927.
Great Appendix to the Yi-King, transl. by J. LEGGE, in The Sacred Books of the East, ed. by F. MAX MÜLLER (Oxford, 1879—1910; 50 vols.), vol. 16 (1882).
GREY, G., "The Creation According to the Maori", in A. L. KROEBER & T. T. WATERMAN, Source Book in Anthropology (New York, 1931).
HANDY, E. S. C., Native Culture in the Marquesas. B. P. BISHOP Museum Bull., No. 9. Honolulu, 1923.
HEATH, T. L., A History of Greek Mathematics, 2 vols. Oxford, 1921.
HILDBURGH, W. L., "Indeterminability and Confusion as Apotropaic Elements in Italy and in Spain", Folklore, vol. 55 (1944).
HOLLIS, A. C., The Nandi. Oxford, 1909.
HOCART, A. M., Kingship, 1927.
—, The Progress of Man. London, 1933.
—, Kings and Councillors. Cairo, 1936.
—, Caste, A Comparative Study. London, 1950.
—, The Life-Giving Myth. London, 1952.
HOSE, C., & W. MCDOUGALL, The Pagan Tribes of Borneo, 2 vols. London, 1912.
HUGHES, T. P., Dictionary of Islam. London, 1895.
JENSEN, A. E., Beschneidung und Reifezeremonien bei Naturvölkern. Stuttgart, 1933.
Jewish Encyclopaedia, 12 vols. New York, 1901—25.
JONES, W., "Ethnology of the Fox Indians", Bureau of Am. Ethn. Bull. 125 (1939).
KLUGE, T., Zahlenbegriffe der Völker Amerikas, Nordeurasiens, der Munda, und der Palaioafricaner. Mimeographed notes, 3 vols., paged continuously. Berlin, 1939.
KROEBER, A. L., "Elements of Culture in Native California", Univ. Calif. Publ. Amer. Arch. and Ethn., vol. 13 (1922).
— & T. T. WATERMAN, Source Book in Anthropology. New York, 1931.
VAN DER KROEF, J. M., "The Origin of Trade in Indonesia", The Scientific Monthly, vol. 76, No. 5 (1953).

KUBARY, J., Ethnographische Beiträge zur Kenntnis der Karolinischen Inselgruppe und Nachbarschaft, Heft 1, Die Socialen Einrichten der Pelauer. Berlin, 1885.
LANGDON, S., Tammuz and Ishtar. Oxford, 1941.
LETHABY, W. R., Architecture, Mysticism, and Myth. New York, 1892.
LEVIAS, C., "Gematria", in The Jewish Encyclopedia, vol. 5 (New York, 1901–25).
LINCOLN, J. S., "The Maya Calendar of the Ixil of Guatemala", Carnegie Contr. to Amer. Anth. and Hist., No. 38 (1942).
LISTER, J. J., "Notes on the Natives of Fakaofu (Bowdich Island), Union Group", J. Royal Anthropological Inst., vol. **21** (1892).
LOEB, E. M., "Pomo Folkways", Univ. Calif. Publ. Amer. Arch. and Ethn., vol. **19** (1926).
—, "Mentawei Religious Cult", Univ. Calif. Publ. Amer. Arch. and Ethn., vol. **25** (1929).
MAAS, A., Durch Zentral-Sumatra, 2 vols. Berlin, 1910.
MARKHAM, C. R., Narrative of the Rites and Laws of the Yncas. London, 1873.
—, "The Inca Civilization in Peru", Chap. IV in Vol. I of J. WINSOR, Narrative and Critical History of America (8 vols., Boston, 1884–89).
—, The Incas of Peru. London, 1910.
MEISSNER, B., Babylonien und Assyrien, 2 vols. Heidelberg, 1925.
MEYEROWITZ, E. L. R., The Sacred State of the Akan. London, 1951.
MÜLLER, F., Grundriß der Sprachwissenschaft, 3 vols. Vienna, 1876–84.
MURDOCK, G. P., Our Primitive Contemporaries. New York, 1934.
NORDENSKIÖLD, E., Comparative Ethnological Studies, 10 vols. Göteborg, 1919–38.
POEBEL, A., Grundzüge der Sumerische Grammatik. Rostock, 1923.
RAGLAN, Lord, Jocasta's Crime. 2nd ed. London, 1940.
—, How Came Civilization? London, 1939.
—, Death and Rebirth. London, 1945.
—, The Hero. 2nd ed. London, 1949.
—, The Origins of Religion. London, 1949.
RASMUSSEN, K., "Intellectual Culture of the Copper Eskimos", in vol. 9 of Report of the Fifth Thule Expedition. 10 vols. Copenhagen, 1927–52.
Real-Encyclopedie der Classischen Altertumswissenschaft, ed. by A. F. v. PAULY & G. WISSOWA. Stuttgart, 1894.
REICHARD, P., "Gebärden und Mienenspiel der Neger", Ausland, vol. **63** (1890).
Reports of the Cambridge Expedition to the Torres Straits, 6 vols. Cambridge, 1901–35.
ROGERS, R. W., Cuneiform Parallels to the Old Testament. London, 1912.
RUSSELL, B., The Principles of Mathematics. Cambridge, 1903.
Sacred Books of the East, ed. by F. MAX MÜLLER, 50 vols. Oxford, 1879–1910.
Satapatha-Brâhmana, trans. by J. EGGELING (The Sacred Books of the East, vols. 12, 26, 41, 43, 44). Oxford, 1882–1900.
SAYCE, A. H., Origin and Growth of Religion among the Ancient Babylonians. London, 1888.
—, The Religions of Ancient Egypt and Babylonia. Edinburgh, 1902.
SCHMIDT, W., Sprachfamilien und Sprachenkreise der Erde. Heidelberg, 1926.
SCHOOLCRAFT, H. R., Archives of Aboriginal Knowledge, 6 vols. Philadelphia, 1860.
SEIDENBERG, A., "The Separation of Sky and Earth at Creation", Folklore, vol. **70** (1959).
—, "The Diffusion of Counting Practices", Univ. Calif. Publ. Math., vol. **3** (1960).
—, "The Ritual Origin of Geometry", Archive for History of Exact Sciences, vol. **1** 488–527 (1960/1961).
SKEAT, W. W., & C. O. BLAGDEN, Pagan Races of the Malay Peninsula, 2 vols. London, 1906.
SMITH, D. E., History of Mathematics, 2 vols. New York, 1958.
—, & L. C. KARPINSKI, The Hindu-Arabic Numerals. Boston, 1911.
STOW, G. W., The Native Races of South Africa. London, 1905.
SWANTON, J. R., "Indians of the Southeastern United States", Bur. Amer. Ethn. Bull. 137 (1946).

TAITTIRIYA SAMHITA, transl. by A.B.KEITH. Harvard Oriental Series, vols. 18, 19. Cambridge, 1914.
TALBOT, P.A., In the Shadow of the Bush. London, 1912.
THOMAS, I., Greek Mathematics, 2 vols. London, 1951.
THOMPSON, J.E.S., "Maya Arithmetic", Contr. to Am. Anthr. and Hist. 36, Carnegie Inst. of Wash., Publ. 528 (1941), vol. 403.
TYLOR, E.B., Primitive Culture, 2 vols. New York, 1958.
UGNAD, A., Religion der Babylonier und Assyrer. Jena, 1921.
Universal Jewish Encyclopedia, ed. by I.LANDMAN, 10 vols, New York, 1939—43.
VAILLANT, G.C., The Aztecs of Mexico. Harmondsworth, 1950.
VAN DER WAERDEN, B.L., Science Awakening. Transl. by A.DRESDEN. Groningen, 1954 (2nd. ed., 1961).
WHITE, D.A., The Science of Culture. New York, 1949.
ZELLER, E., A History of Greek Philosophy. Transl. by S.F.ALLEYNE, 2 vols. London, 1881.

Department of Mathematics
University of California
Berkeley 4, California

(Received July 7, 1962)