Chapter 3

THE ORIGIN OF NUMBER WORDS.

In the comparison of languages and the search for primitive root forms, no class of expressions has been subjected to closer scrutiny than the little cluster of words, found in each language, which constitutes a part of the daily vocabulary of almost every human being—the words with which we begin our counting. It is assumed, and with good reason, that these are among the earlier words to appear in any language; and in the mutations of human speech, they are found to suffer less than almost any other portion of a language. Kinship between tongues remote from each other has in many instances been detected by the similarity found to exist among the every-day words of each; and among these words one may look with a good degree of certainty for the 1, 2, 3, etc., of the number scale. So fruitful has been this line of research, that the attempt has been made, even, to establish a common origin for all the races of mankind by means of a comparison of numeral words. But in this instance, as in so many others that will readily occur to the mind, the result has been that the theory has finally taken possession of the author and reduced him to complete subjugation, instead of remaining his servant and submitting to the legitimate results of patient and careful investigation. Linguistic research is so full of snares and pitfalls that the student must needs employ the greatest degree of discrimination before asserting kinship of race because of resemblances in vocabulary; or even relationship between words in the same language because of some chance likeness of form that may exist between them. Probably no one would argue that the English and the Babusesse of Central Africa were of the same primitive stock simply because in the language of the latter *five atano* means 5, and *ten kumi* means 10. But, on the other hand, many will argue that, because the German *zehn* means 10, and *zehen* means toes, the ancestors of the Germans counted on their toes; and that with them, 10 was the complete count of the toes. It may be so. We certainly have no evidence with which to disprove this; but, before accepting it as a fact, or even as a reasonable hypothesis, we may be pardoned for demanding some evidence aside from the mere resemblance in the form of the words. If, in the study of numeral words, form is to constitute our chief guide, we must expect now and then to be confronted with facts which are not easily reconciled with any pet theory.

The scope of the present work will admit of no more than a hasty examination of numeral forms, in which only actual and well ascertained meanings will be considered. But here we are at the outset confronted with a class of words whose original meanings appear to be entirely lost. They are what may be termed the numerals proper—the native, uncompounded words used to signify number. Such words are the one, two, three, etc., of English; the eins, zwei, drei, etc., of German; words which must at some time, in some prehistoric language, have had definite meanings entirely apart from those which they now convey to our minds. In savage languages it is sometimes possible to detect these meanings, and thus to obtain possession of the clue that leads to the development, in the barbarian's rude mind, of a count scale—a number system. But in languages like those of modern Europe, the pedigree claimed by numerals is so long that, in the successive changes through which they have passed, all trace of their origin seems to have been lost.

The actual number of such words is, however, surprisingly small in any language. In English we count by simple words only to 10. From this point onward all our numerals except "hundred" and "thousand" are compounds and combinations of the names of smaller numbers. The words we employ to designate the higher orders of units, as million, billion, trillion, etc., are appropriated bodily from the Italian; and the native words *pair*, *tale*, *brace*, *dozen*, *gross*, and *score*, can hardly be classed as numerals in the strict sense of the word. German possesses exactly the same number of native words in its numeral scale as English; and the same may be said of the Teutonic languages generally, as well as of the Celtic, the Latin, the Slavonic, and the Basque. This is, in fact, the universal method observed in the formation of any numeral scale, though the actual number of simple words may vary. The Chiquito language has but one numeral of any kind whatever; English contains twelve simple terms; Sanskrit has twenty-seven, while Japanese possesses twenty-four, and the Chinese a number almost equally great. Very many languages, as might be expected, contain special numeral expressions, such as the German *dutzend* and the French *dizaine*; but these, like the English *dozen* and *score*, are not to be regarded as numerals proper.

The formation of numeral words shows at a glance the general method in which any number scale has been built up. The primitive savage counts on his fingers until he has reached the end of one, or more probably of both, hands. Then, if he wishes to proceed farther, some mark is made, a pebble is laid aside, a knot tied, or some similar device employed to signify that all the counters at his disposal have been used. Then the count begins anew, and to avoid multiplication of words, as well as to assist the memory, the terms already used are again resorted to; and the name by which the first halting-place was designated is repeated with each new numeral. Hence the thirteen, fourteen, fifteen, etc., which are contractions of the fuller expressions three-and-ten, four-and-ten, five-and-ten, etc. The specific method of combination may not always be the same, as witness the *eighteen*, or eight-ten, in English, and *dix-huit,* or ten-eight, in French; *forty-five*, or four-tens-five, in English, and _fuenf und vierzig_, or five and four tens in German. But the general method is the same the world over, presenting us with nothing but local variations, which are, relatively speaking, entirely unimportant. With this fact in mind, we can cease to wonder at the small number of simple numerals in any language. It might, indeed, be queried, why do any languages, English and German, for example, have unusual compounds for 11 and 12? It would seem as though the regular method of compounding should begin with 10 and 1, instead of 10 and 3, in any language using a system with 10 as a base. An examination of several hundred numeral scales shows that the Teutonic languages are somewhat exceptional in this respect. The words *eleven* and *twelve* are undoubtedly combinations, but not in the same direct sense as *thirteen*, *twenty-five*, etc. The same may be said of the French *onze*, *douze*, *treize*, *quatorze*, *quinze*, and *seize*, which are obvious compounds, but not formed in the same manner as the numerals above that point. Almost all civilized languages, however, except the Teutonic, and practically all uncivilized languages, begin their direct numeral combinations as soon as they have passed their number base, whatever that may be. To give an illustration, selected quite at random from among the barbarous tribes of Africa, the Ki-Swahili numeral scale runs as follows:

1. moyyi,

2. mbiri,

3. tato,

4. ena,

5. tano,

6. seta,

7. saba,

8. nani,

9. kenda,

10. kumi,

11. kumi na moyyi,

12. kumi na mbiri,

13. kumi na tato,

etc.

The words for 11, 12, and 13, are seen at a glance to signify ten-and-one, ten-and-two, ten-and-three, and the count proceeds, as might be inferred, in a similar manner as far as the number system extends. Our English combinations are a little closer than these, and the combinations found in certain other languages are, in turn, closer than those of the English; as witness the *once*, 11, *doce*, 12, *trece*, 13, etc., of Spanish. But the process is essentially the same, and the law may be accepted as practically invariable, that all numerals greater than the base of a system are expressed by compound words, except such as are necessary to establish some new order of unit, as hundred or thousand.

In the scale just given, it will be noticed that the larger number precedes the smaller, giving 10 + 1, 10 + 2, etc., instead of 1 + 10, 2 + 10, etc. This seems entirely natural, and hardly calls for any comment whatever. But we have only to consider the formation of our English "teens" to see that our own method is, at its inception, just the reverse of this. Thirteen, 14, and the remaining numerals up to 19 are formed by prefixing the smaller number to the base; and it is only when we pass 20 that we return to the more direct and obvious method of giving precedence to the larger. In German and other Teutonic languages the inverse method is continued still further. Here 25 is *fuenf und zwanzig*, 5 and 20; 92 is *zwei und neunzig*, 2 and 90, and so on to 99. Above 100 the order is made direct, as in English. Of course, this mode of formation between 20 and 100 is permissible in English, where "five and twenty" is just as correct a form as twenty-five. But it is archaic, and would soon pass out of the language altogether, were it not for the influence of some of the older writings which have had a strong influence in preserving for us many of older and more essentially Saxon forms of expression.

Both the methods described above are found in all parts of the world, but what I have called the direct is far more common than the other. In general, where the smaller number precedes the larger it signifies multiplication instead of addition. Thus, when we say "thirty," *i.e*. three-ten, we mean 3_10; just as "three hundred" means 3_100. When the larger precedes the smaller, we must usually understand addition. But to both these rules there are very many exceptions. Among higher numbers the inverse order is very rarely used; though even here an occasional exception is found. The Taensa Indians, for example, place the smaller numbers before the larger, no matter how far their scale may extend. To say 1881 they make a complete inversion of our own order, beginning with 1 and ending with 1000. Their full numeral for this is *yeha av wabki mar-u-wab mar-u-haki*, which means, literally, 1 + 80 + 100_8 + 100_10. Such exceptions are, however, quite rare.

One other method of combination, that of subtraction, remains to be considered. Every student of Latin will recall at once the *duodeviginti*, 2 from 20, and *undeviginti*, 1 from 20, which in that language are the regular forms of expression for 18 and 19. At first they seem decidedly odd; but familiarity soon accustoms one to them, and they cease entirely to attract any special attention. This principle of subtraction, which, in the formation of numeral words, is quite foreign to the genius of English, is still of such common occurrence in other languages that the Latin examples just given cease to be solitary instances.

The origin of numerals of this class is to be found in the idea of reference, not necessarily to the last, but to the nearest, halting-point in the scale. Many tribes seem to regard 9 as "almost 10," and to give it a name which conveys this thought. In the Mississaga, one of the numerous Algonquin languages, we have, for example, the word *cangaswi*, "incomplete 10," for 9. In the Kwakiutl of British Columbia, 8 as well as 9 is formed in this way; these two numbers being *matlguanatl*, 10 – 2, and *nanema*, 10 – 1, respectively. In many of the languages of British Columbia we find a similar formation for 8 and 9, or for 9 alone. The same formation occurs in Malay, resulting in the numerals *delapan*, 10 – 2, and *sambilan* 10 – 1. In Green Island, one of the New Ireland group, these become simply *andra-lua*, "less 2," and *andra-si*, "less 1." In the Admiralty Islands this formation is carried back one step further, and not only gives us *shua-luea*, "less 2," and *shu-ri*, "less 1," but also makes 7 appear as *sua-tolu*, "less 3."[59] Surprising as this numeral is, it is more than matched by the Ainu scale, which carries subtraction back still another step, and calls 6, 10 – 4. The four numerals from 6 to 9 in this scale are respectively, *iwa*, 10 – 4, *arawa*, 10 – 3, *tupe-san*, 10 – 2, and *sinepe-san*, 10 – 1. Numerous examples of this kind of formation will be found in later chapters of this work; but they will usually be found to occur in one or both of the numerals, 8 and 9. Occasionally they appear among the higher numbers; as in the Maya languages, where, for example, 99 years is "one single year lacking from five score years," and in the Arikara dialects, where 98 and 99 are "5 men minus" and "5 men 1 not." The Welsh, Danish, and other languages less easily accessible than these to the general student, also furnish interesting examples of a similar character.

More rarely yet are instances met with of languages which make use of subtraction almost as freely as addition, in the composition of numerals. Within the past few years such an instance has been noticed in the case of the Bellacoola language of British Columbia. In their numeral scale 15, "one foot," is followed by 16, "one man less 4"; 17, "one man less 3"; 18, "one man less 2"; 19, "one man less 1"; and 20, one man. Twenty-five is "one man and one hand"; 26, "one man and two hands less 4"; 36, "two men less 4"; and so on. This method of formation prevails throughout the entire numeral scale.

One of the best known and most interesting examples of subtraction as a well-defined principle of formation is found in the Maya scale. Up to 40 no special peculiarity appears; but as the count progresses beyond that point we find a succession of numerals which one is almost tempted to call 60 – 19, 60 – 18, 60 – 17, etc. Literally translated the meanings seem to be 1 to 60, 2 to 60, 3 to 60, etc. The point of reference is 60, and the thought underlying the words may probably be expressed by the paraphrases, "1 on the third score, 2 on the third score, 3 on the third score," etc. Similarly, 61 is 1 on the fourth score, 81 is one on the fifth score, 381 is 1 on the nineteenth score, and so on to 400. At 441 the same formation reappears; and it continues to characterize the system in a regular and consistent manner, no matter how far it is extended.

The Yoruba language of Africa is another example of most lavish use of subtraction; but it here results in a system much less consistent and natural than that just considered. Here we find not only 5, 10, and 20 subtracted from the next higher unit, but also 40, and even 100. For example, 360 is 400 – 40; 460 is 500 – 40; 500 is 600 – 100; 1300 is 1400 – 100, etc. One of the Yoruba units is 200; and all the odd hundreds up to 2000, the next higher unit, are formed by subtracting 100 from the next higher multiple of 200. The system is quite complex, and very artificial; and seems to have been developed by intercourse with traders.

It has already been stated that the primitive meanings of our own simple numerals have been lost. This is also true of the languages of nearly all other civilized peoples, and of numerous savage races as well. We are at liberty to suppose, and we do suppose, that in very many cases these words once expressed meanings closely connected with the names of the fingers, or with the fingers themselves, or both. Now and then a case is met with in which the numeral word frankly avows its meaning—as in the Botocudo language, where 1 is expressed by *podzik*, finger, and 2 by *kripo*, double finger; and in the Eskimo dialect of Hudson's Bay, where *eerkitkoka* means both 10 and little finger. Such cases are, however, somewhat exceptional.

In a few noteworthy instances, the words composing the numeral scale of a language have been carefully investigated and their original meanings accurately determined. The simple structure of many of the rude languages of the world should render this possible in a multitude of cases; but investigators are too often content with the mere numerals themselves, and make no inquiry respecting their meanings. But the following exposition of the Zuni scale, given by Lieutenant Gushing leaves nothing to be desired:

1. toepinte = taken to start with.

2. kwilli = put down together with.

3. ha'[=i] = the equally dividing finger.

4. awite = all the fingers all but done with.

5. oepte = the notched off.

This finishes the list of original simple numerals, the Zuni stopping, or "notching off," when he finishes the fingers of one hand. Compounding now begins.

6. topalik'ya = another brought to add to the done with.

7. kwillilik'ya = two brought to and held up with the rest.

8. hailik'ye = three brought to and held up with the rest.

9. tenalik'ya = all but all are held up with the rest.

10. aestem'thila = all the fingers.

11. aestem'thla topayae'thl'tona = all the fingers and another over above held.

The process of formation indicated in 11 is used in the succeeding numerals up to 19.

20. kwillik'yenaestem'thlan = two times all the fingers.

100. aessiaestem'thlak'ya = the fingers all the fingers.

1000. aessiaestem'thlanak'yenaestem'thla = the fingers all the fingers times all the fingers.

The only numerals calling for any special note are those for 11 and 9. For 9 we should naturally expect a word corresponding in structure and meaning to the words for 7 and 8. But instead of the "four brought to and held up with the rest," for which we naturally look, the Zuni, to show that he has used all of his fingers but one, says "all but all are held up with the rest." To express 11 he cannot use a similar form of composition, since he has already used it in constructing his word for 6, so he says "all the fingers and another over above held."

The one remarkable point to be noted about the Zuni scale is, after all, the formation of the words for 1 and 2. While the savage almost always counts on his fingers, it does not seem at all certain that these words would necessarily be of finger formation. The savage can always distinguish between one object and two objects, and it is hardly reasonable to believe that any external aid is needed to arrive at a distinct perception of this difference. The numerals for 1 and 2 would be the earliest to be formed in any language, and in most, if not all, cases they would be formed long before the need would be felt for terms to describe any higher number. If this theory be correct, we should expect to find finger names for numerals beginning not lower than 3, and oftener with 5 than with any other number. The highest authority has ventured the assertion that all numeral words have their origin in the names of the fingers; substantially the same conclusion was reached by

Professor Pott, of Halle, whose work on numeral nomenclature led him deeply into the study of the origin of these words. But we have abundant evidence at hand to show that, universal as finger counting has been, finger origin for numeral words has by no means been universal. That it is more frequently met with than any other origin is unquestionably true; but in many instances, which will be more fully considered in the following chapter, we find strictly non-digital derivations, especially in the case of the lowest members of the scale. But in nearly all languages the origin of the words for 1, 2, 3, and 4 are so entirely unknown that speculation respecting them is almost useless.

An excellent illustration of the ordinary method of formation which obtains among number scales is furnished by the Eskimos of Point Barrow, who have pure numeral words up to 5, and then begin a systematic course of word formation from the names of their fingers. If the names of the first five numerals are of finger origin, they have so completely lost their original form, or else the names of the fingers themselves have so changed, that no resemblance is now to be detected between them. This scale is so interesting that it is given with considerable fulness, as follows:

1. atauzik._

2. madro.

3. pinasun.

4. sisaman.

5. tudlemut.

6. atautyimin akbinigin [tudlimu(t)] = 5 and 1 on the next.

7. madronin akbinigin = twice on the next.

8. pinasunin akbinigin = three times on the next.

9. kodlinotaila = that which has not its 10.

10. kodlin = the upper part—*i.e*. the fingers.

14. akimiaxotaityuna = I have not 15.

15. akimia. [This seems to be a real numeral word.]_20. inyuina = a man come to an end.

25. inyuina tudlimunin akbinidigin = a man come to an end and 5 on the next.

30. inyuina kodlinin akbinidigin = a man come to an end and 10 on the next.

35. inyuina akimiamin aipalin = a man come to an end accompanied by 1 fifteen times.

40. madro inyuina = 2 men come to an end.

In this scale we find the finger origin appearing so clearly and so repeatedly that one feels some degree of surprise at finding 5 expressed by a pure numeral instead of by some word meaning *hand* or _fingers of one hand_. In this respect the Eskimo dialects are somewhat exceptional among scales built up of digital words. The system of the Greenland Eskimos, though differing slightly from that of their Point Barrow cousins, shows the same peculiarity. The first ten numerals of this scale are:

1. atausek.

2. mardluk.

3. pingasut.

4. sisamat.

5. tatdlimat.

6. arfinek-atausek = to the other hand 1.

7. arfinek-mardluk = to the other hand 2.

8. arfinek-pingasut = to the other hand 3.

9. arfinek-sisamat = to the other hand 4.

10. kulit.

The same process is now repeated, only the feet instead of the hands are used; and the completion of the second 10 is marked by the word *innuk*, man. It may be that the Eskimo word for 5 is, originally, a digital word, but if so, the fact has not yet been detected. From the analogy furnished by other languages we are justified in suspecting that this may be the case; for whenever a number system contains digital words, we expect them to begin with *five*, as, for example, in the Arawak scale, which runs:

1. abba.

2. biama.

3. kabbuhin.

4. bibiti.

5. abbatekkabe = 1 hand.

6. abbatiman = 1 of the other.

7. biamattiman = 2 of the other.

8. kabbuhintiman = 3 of the other.

9. bibitiman = 4 of the other.

10. biamantekabbe = 2 hands.

11. abba kutihibena = 1 from the feet.

20. abba lukku = hands feet.

The four sets of numerals just given may be regarded as typifying one of the most common forms of primitive counting; and the words they contain serve as illustrations of the means which go to make up the number scales of savage races. Frequently the finger and toe origin of numerals is perfectly apparent, as in the Arawak system just given, which exhibits the simplest and clearest possible method of formation. Another even more interesting system is that of the Montagnais of northern Canada.[73] Here, as in the Zuni scale, the words are digital from the outset.

1. inl'are = the end is bent.

2. nak'e = another is bent.

3. t'are = the middle is bent.

4. dinri = there are no more except this.

5. se-sunla-re = the row on the hand.

6. elkke-t'are = 3 from each side.

7.{ t'a-ye-oyertan = there are still 3 of them.

{ inl'as dinri = on one side there are 4 of them.

8. elkke-dinri = 4 on each side.

9. inl'a-ye-oyert'an = there is still 1 more.

10. onernan = finished on each side.

11. onernan inl'are ttcharidhel = 1 complete and 1.

12. onernan nak'e ttcharidhel = 1 complete and 2, etc.

The formation of 6, 7, and 8 of this scale is somewhat different from that ordinarily found. To express 6, the Montagnais separates the thumb and forefinger from the three remaining fingers of the left hand, and bringing the thumb of the right hand close to them, says: "3 from each side." For 7 he either subtracts from 10, saying:

“there are still 3 of them,” or he brings the thumb and forefinger of the right hand up to the thumb of the left, and says: “on one side there are 4 of them.” He calls 8 by the same name as many of the other Canadian tribes, that is, two 4’s; and to show the proper number of fingers, he closes the thumb and little finger of the right hand, and then puts the three remaining fingers beside the thumb of the left hand. This method is, in some of these particulars, different from any other I have ever examined.

It often happens that the composition of numeral words is less easily understood, and the original meanings more difficult to recover, than in the examples already given. But in searching for number systems which show in the formation of their words the influence of finger counting, it is not unusual to find those in which the derivation from native words signifying *finger, hand, toe, foot*, and *man*, is just as frankly obvious as in the case of the Zuni, the Arawak, the Eskimo, or the Montagnais scale. Among the Tamanacs, one of the numerous Indian tribes of the Orinoco, the numerals are as strictly digital as in any of the systems already examined. The general structure of the Tamanac scale is shown by the following numerals:

5. amgnaitone = 1 hand complete.

6. itacono amgna pona tevinitpe = 1 on the other hand.

10. amgna aceponare = all of the 2 hands.

11. puitta pona tevinitpe = 1 on the foot.

16. itacono puitta pona tevinitpe = 1 on the other foot.

20. tevin itoto = 1 man.

21. itacono itoto jamgnar bona tevinitpe = 1 on the hands of another man.

In the Guarani language of Paraguay the same method is found, with a different form of expression for 20. Here the numerals in question are

5. asepopetei = one hand.

10. asepomokoi = two hands.

20. asepo asepi abe = hands and feet.

Another slight variation is furnished by the Kiriri language,[76] which is also one of the numerous South American Indian forms of speech, where we find the words to be

5. mi biche misa = one hand.

10. mikriba misa sai = both hands.

20. mikriba misa idecho ibi sai = both hands together with the feet.

Illustrations of this kind might be multiplied almost indefinitely; and it is well to note that they may be drawn from all parts of the world. South America is peculiarly rich in native numeral words of this kind; and, as the examples above cited show, it is the field to which one instinctively turns when this subject is under discussion. The Zamuco numerals are, among others, exceedingly interesting, giving us still a new variation in method. They are

1. tsomara.

2. gar.

3. gadiok.

4. gahagani.

5. tsuena yimana-ite = ended 1 hand.

6. tsomara-hi = 1 on the other.

7. gari-hi = 2 on the other.

8. gadiog-ihi = 3 on the other.

9. gahagani-hi = 4 on the other.

10. tsuena yimana-die = ended both hands.

11. tsomara yiri-tie = 1 on the foot.

12. gar yiritie = 2 on the foot.

20. tsuena yiri-die = ended both feet.

As is here indicated, the form of progression from 5 to 10, which we should expect to be “hand-1,” or “hand-and-1,” or some kindred expression, signifying that one hand had been completed, is simply “1 on the other.” Again, the expressions for 11, 12, etc., are merely “1 on the foot,” “2 on the foot,” etc., while 20 is “both feet ended.”

An equally interesting scale is furnished by the language of the Maipures of the Orinoco, who count

1. papita.

2. avanume.

3. apekiva.

4. apekipaki.

5. papitaerri capiti = 1 only hand.

6. papita yana pauria capiti purena = 1 of the other hand we take.

10. apanumerri capiti = 2 hands.

11. papita yana kiti purena = 1 of the toes we take.

20. papita camonee = 1 man.

40. avanume camonee = 2 men.

60. apekiva camonee = 3 men, etc.

In all the examples thus far given, 20 is expressed either by the equivalent of “man” or by some formula introducing the word “feet.” Both these modes of expressing what our own ancestors termed a “score,” are so common that one hesitates to say which is of the more frequent use. The following scale, from one of the Betoya dialects of South America, is quite remarkable among digital scales, making no use of either “man” or “foot,” but reckoning solely by fives, or hands, as the numerals indicate.

1. tey.

2. cayapa.

3. toazumba.

4. cajezea = 2 with plural termination.

5. teente = hand.

6. teyentetey = hand + 1.

7. teyente cayapa = hand + 2.

8. teyente toazumba = hand + 3.

9. teyente caesea = hand + 4.

10. caya ente, or caya huena = 2 hands.

11. caya ente-tey = 2 hands + 1.

15. toazumba-ente = 3 hands.

16. toazumba-ente-tey = 3 hands + 1.

20. caesea ente = 4 hands.

In the last chapter mention was made of the scanty numeral systems of the Australian tribes, but a single scale was alluded to as reaching the comparatively high limit of 20. This system is that belonging to the Pikumbuls, and the count runs thus:

1. mal.

2. bular.

3. guliba.

4. bularbular = 2-2.

5. mulanbu.

6. malmulanbu mummi = 1 and 5 added on.

7. bularmulanbu mummi = 2 and 5 added on.

8. gulibamulanbu mummi = 3 and 5 added on.

9. bularbularmulanbu mummi = 4 and 5 added on.

10. bularin murra = belonging to the 2 hands.

11. maldinna mummi = 1 of the toes added on (to the 10 fingers).

12. bular dinna mummi = 2 of the toes added on.

13. guliba dinna mummi = 3 of the toes added on.

14. bular bular dinna mummi = 4 of the toes added on.

15. mulanba dinna = 5 of the toes added on.

16. mal dinna mulanbu = 1 and 5 toes.

17. bular dinna mulanbu = 2 and 5 toes.

18. guliba dinna mulanbu = 3 and 5 toes.

19. bular bular dinna mulanbu = 4 and 5 toes.

20. bularin dinna = belonging to the 2 feet.

As has already been stated, there is good ground for believing that this system was originally as limited as those obtained from other Australian tribes, and that its extension from 4, or perhaps from 5 onward, is of comparatively recent date.

A somewhat peculiar numeral nomenclature is found in the language of the Klamath Indians of Oregon. The first ten words in the Klamath scale are:

1. nash, or nas.

2. lap = hand.

3. ndan.

4. vunep = hand up.

5. tunep = hand away.

6. nadshkshapta = 1 I have bent over.

7. lapkshapta = 2 I have bent over.

8. ndankshapta = 3 I have bent over.

9. nadshskeksh = 1 left over.

10. taunep = hand hand?

In describing this system Mr. Gatschet says: “If the origin of the Klamath numerals is thus correctly traced, their inventors must have counted only the four long fingers without the thumb, and 5 was counted while saying *hand away! hand off!* The ‘four,’ or *hand high! hand up!* intimates that the hand was held up high after counting its four digits; and some term expressing this gesture was, in the case of *nine*, substituted by ‘one left over’ ... which means to say, ‘only one is left until all the fingers are counted.’” It will be observed that the Klamath introduces not only the ordinary finger manipulation, but a gesture of the entire hand as well. It is a common thing to find something of the kind to indicate the completion of 5 or 10, and in one or two instances it has already been alluded to. Sometimes one or both of the closed fists are held up; sometimes the open hand, with all the fingers extended, is used; and sometimes an entirely independent gesture is introduced. These are, in general, of no special importance; but one custom in vogue among some of the prairie tribes of Indians, to which my attention was called by Dr. J. Owen Dorsey, should be mentioned. It is a gesture which signifies multiplication, and is performed by throwing the hand to the left. Thus, after counting 5, a wave of the hand to the left means 50. As multiplication is rather unusual among savage tribes, this is noteworthy, and would seem to indicate on the part of the Indian a higher degree of intelligence than is ordinarily possessed by uncivilized races.

In the numeral scale as we possess it in English, we find it necessary to retain the name of the last unit of each kind used, in order to describe definitely any numeral employed. Thus, fifteen, one hundred forty-two, six thousand seven hundred twenty-seven, give in full detail the numbers they are intended to describe. In primitive scales this is not always considered necessary; thus, the Zamucos express their teens without using their word for 10 at all. They say simply, 1 on the foot, 2 on the foot, etc. Corresponding abbreviations are often met; so often, indeed, that no further mention of them is needed. They mark one extreme, the extreme of brevity, found in the savage method of building up hand, foot, and finger names for numerals; while the Zuni scale marks the extreme of prolixity in the formation of such words. A somewhat ruder composition than any yet noticed is shown in the numerals of the Vilelo scale, which are:

1. agit, or yaagit.

2. uke.

3. nipetuei.

4. yepkatalet.

5. isig-nisle-yaagit = hand fingers 1.

6. isig-teet-yaagit = hand with 1.

7. isig-teet-uke = hand with 2.

8. isig-teet-nipetuei = hand with 3.

9. isig-teet-yepkatalet = hand with 4.

10. isig-uke-nisle = second hand fingers (lit. hand-two-fingers).

11. isig-uke-nisle-teet-yaagit = second hand fingers with 1.

20. isig-ape-nisle-lauel = hand foot fingers all.

In the examples thus far given, it will be noticed that the actual names of individual fingers do not appear. In general, such words as thumb, forefinger, little finger, are not found, but rather the hand-1, 1 on the next, or 1 over and above, which we have already seen, are the type forms for which we are to look. Individual finger names do occur, however, as in the scale of the Hudson's Bay Eskimos, where the three following words are used both as numerals and as finger names:

8. kittukleemoot = middle finger.

9. mikkeelukkamoot = fourth finger.

10. eerkitkoka = little finger.

Words of similar origin are found in the original Jiviro scale, where the native numerals are:

1. ala.

2. catu.

3. cala.

4. encatu.

5. alacoetegladu = 1 hand.

6. intimutu = thumb (of second hand).

7. tannituna = index finger.

8. tannituna cabiasu = the finger next the index finger.

9. bitin oetegla cabiasu = hand next to complete.

10. catoegladu = 2 hands.

As if to emphasize the rarity of this method of forming numerals, the Jiviros afterward discarded the last five of the above scale, replacing them by words borrowed from the Quichuas, or ancient Peruvians. The same process may have been followed by other tribes, and in this way numerals which were originally digital may have disappeared. But we have no evidence that this has ever happened in any extensive manner. We are, rather, impelled to accept the occasional numerals of this class as exceptions to the general rule, until we have at our disposal further evidence of an exact and critical nature, which would cause us to modify this opinion. An elaborate philological study by Dr. J.H. Trumbull of the numerals used by many of the North American Indian tribes reveals the presence in the languages of these tribes of a few, but only a few, finger names which are used without change as numeral expressions also. Sometimes the finger gives a name not its own to the numeral with which it is associated in counting—as in the Chippeway dialect, which has *nawi-nindj*, middle of the hand, and *nisswi*, 3; and the Cheyenne, where *notoyos*, middle finger, and *na-nohhtu*, 8, are closely related. In other parts of the world isolated examples of the transference of finger names to numerals are also found. Of these a well-known example is furnished by the Zulu numerals, where "*tatisitupa*, taking the thumb, becomes a numeral for six. Then the verb *komba*, to point, indicating the forefinger, or 'pointer,' makes the next numeral, seven. Thus, answering the question, 'How much did your master give you?' a Zulu would say, '*U kombile*,' 'He pointed with his forefinger,' *i.e*. 'He gave me seven'; and this curious way of using the numeral verb is also shown in such an example as '*amahasi akombile*,' 'the horses have pointed,' *i.e*. 'there were seven of them.' In like manner, *Kijangalobili*, 'keep back two fingers,' *i.e*. eight, and *Kijangalolunje*, 'keep back one finger,' *i.e*. nine, lead on to *kumi*, ten."

Returning for a moment to the consideration of number systems in the formation of which the influence of the hand has been paramount, we find still further variations of the method already noticed of constructing names for the fives, tens, and twenties, as well as for the intermediate numbers. Instead of the simple words "hand," "foot," etc., we not infrequently meet with some paraphrase for one or for all these terms, the derivation of which is unmistakable. The Nengones, an island tribe of the Indian Ocean, though using the word "man" for 20, do not employ explicit hand or foot words, but count

1. sa.

2. rewe.

3. tini.

4. etse.

5. se dono = the end (of the first hand).

6. dono ne sa = end and 1.

7. dono ne rewe = end and 2.

8. dono ne tini = end and 3.

9. dono ne etse = end and 4.

10. rewe tubenine = 2 series (of fingers).

11. rewe tubenine ne sa re tsemene = 2 series and 1 on the next?

20. sa re nome = 1 man.

30. sa re nome ne rewe tubenine = 1 man and 2 series.

40. rewe ne nome = 2 men.

Examples like the above are not infrequent. The Aztecs used for 10 the word *matlactli*, hand-half, *i.e*. the hand half of a man, and for 20 *cempoalli*, one counting. The Point Barrow Eskimos call 10 *kodlin*, the upper part, *i.e*. of a man. One of the Ewe dialects of Western Africa has *ewo*, done, for 10; while, curiously enough, 9, *asieke*, is a digital word, meaning "to part (from) the hand."

In numerous instances also some characteristic word not of hand derivation is found, like the Yoruba *ogodzi*, string, which becomes a numeral for 40, because 40 cowries made a "string"; and the Maori *tekau*, bunch, which signifies 10. The origin of this seems to have been the custom of counting yams and fish by "bunches" of ten each.

Another method of forming numeral words above 5 or 10 is found in the presence of such expressions as second 1, second 2, etc. In languages of rude construction and incomplete development the simple numeral scale is often found to end with 5, and all succeeding numerals to be formed from the first 5. The progression from that point may be 5-1, 5-2, etc., as in the numerous quinary scales to be noticed later, or it may be second 1, second 2, etc., as in the Niam Niam dialect of Central Africa, where the scale is

1. sa.

2. uwi.

3. biata.

4. biama.

5. biswi.

6. batissa = 2d 1.

7. batiwwi = 2d 2.

8. batti-biata = 2d 3.

9. batti-biama = 2d 4.

10. bauwe = 2d 5.

That this method of progression is not confined to the least developed languages, however, is shown by a most cursory examination of the numerals of our American Indian tribes, where numeral formation like that exhibited above is exceedingly common. In the Kootenay dialect, of British Columbia, *qaetsa*, 4, and *wo-qaetsa,* 8, are obviously related, the latter word probably meaning a second 4. Most of the native languages of British Columbia form their words for 7 and 8 from those which signify 2 and 3; as, for example, the Heiltsuk, which shows in the following words a most obvious correspondence:

2. matl. 7. matlaaus. 3. yutq. 8. yutquaus.

In the Choctaw language the relation between 2 and 7, and 3 and 8, is no less clear. Here the words are:

2. tuklo. 7. untuklo. 3. tuchina. 8. untuchina.

The Nez Perces repeat the first three words of their scale in their 6, 7, and 8 respectively, as a comparison of these numerals will show.

1. naks. 6. oilaks. 2. lapit. 7. oinapt. 3. mitat. 8. oimatat.

In all these cases the essential point of the method is contained in the repetition, in one way or another, of the numerals of the second quinate, without the use with each one of the word for 5. This may make 6, 7, 8, and 9 appear as second 1, second 2, etc., or another 1, another 2, etc.; or, more simply still, as 1 more, 2 more, etc. It is the method which was briefly discussed in the early part of the present chapter, and is by no means uncommon. In a decimal scale this repetition would begin with 11 instead of 6; as in the system found in use in Tagala and Pampanaga, two of the Philippine Islands, where, for example, 11, 12, and 13 are:

11. labi-n-isa = over 1.

12. labi-n-dalaua = over 2.

13. labi-n-tatlo = over 3.

A precisely similar method of numeral building is used by some of our Western Indian tribes. Selecting a few of the Assiniboine numerals as an illustration, we have

11. ak kai washe = more 1.

12. ak kai noom pah = more 2.

13. ak kai yam me nee = more 3.

14. ak kai to pah = more 4.

15. ak kai zap tah = more 5.

16. ak kai shak pah = more 6, etc.

A still more primitive structure is shown in the numerals of the Mboushas of Equatorial Africa. Instead of using 5-1, 5-2, 5-3, 5-4, or 2d 1, 2d 2, 2d 3, 2d 4, in forming their numerals from 6 to 9, they proceed in the following remarkable and, at first thought, inexplicable manner to form their compound numerals:

1. ivoco.

2. beba.

3. belalo.

4. benai.

5. betano.

6. ivoco beba = 1-2.

7. ivoco belalo = 1-3.

8. ivoco benai = 1-4.

9. ivoco betano = 1-5.

10. dioum.

No explanation is given by Mr. du Chaillu for such an apparently incomprehensible form of expression as, for example, 1-3, for 7. Some peculiar finger pantomime may accompany the counting, which, were it known, would enlighten us on the Mbousha's method of arriving at so anomalous a scale. Mere repetition in the second quinate of the words used in the first might readily be explained by supposing the use of fingers absolutely indispensable as an aid to counting, and that a certain word would have one meaning when associated with a certain finger of the left hand, and another meaning when associated with one of the fingers of the right. Such scales are, if the following are correct, actually in existence among the islands of the Pacific.

BALAD. UEA.

1. parai. 1. tahi.

2. paroo. 2. lua.

3. pargen. 3. tolu.

4. parbai. 4. fa.

5. panim. 5. lima.

6. parai. 6. tahi.

7. paroo. 7. lua.

8. pargen. 8. tolu.

9. parbai. 9. fa.

10. panim. 10. lima.

Such examples are, I believe, entirely unique among primitive number systems.

In numeral scales where the formative process has been of the general nature just exhibited, irregularities of various kinds are of frequent occurrence. Hand numerals may appear, and then suddenly disappear, just where we should look for them with the greatest degree of certainty. In the Ende, a dialect of the Flores Islands, 5, 6, and 7 are of hand formation, while 8 and 9 are of entirely different origin, as the scale shows.

1. sa.

2. zua.

3. telu.

4. wutu.

5. lima

6. lima sa = hand 1.

7. lima zua = hand 2.

8. rua butu = 2x4.

9. trasa = 10 – 1?

10. sabulu.

One special point to be noticed in this scale is the irregularity that prevails between 7, 8, 9. The formation of 7 is of the most ordinary kind; 8 is 2 fours—common enough duplication; while 9 appears to be 10 – 1. All of these modes of compounding are, in their own way, regular; but the irregularity consists in using all three of them in connective numerals in the same system. But, odd as this jumble seems, it is more than matched by that found in the scale of the Karankawa Indians, an extinct tribe formerly inhabiting the coast region of Texas. The first ten numerals of this singular array are:

1. natsa.

2. haikia.

3. kachayi.

4. hayo hakn = 2x2.

5. natsa behema = 1 father, *i.e*. of the fingers.

6. hayo haikia = 3x2?

7. haikia natsa = 2 + 5?

8. haikia behema = 2 fathers?

9. haikia doatn = 2d from 10?

10. doatn habe.

Systems like the above, where chaos instead of order seems to be the ruling principle, are of occasional occurrence, but they are decidedly the exception.

In some of the cases that have been adduced for illustration it is to be noticed that the process of combination begins with 7 instead of with 6. Among others, the scale of the Pigmies of Central Africa and that of the Mosquitos of Central America show this tendency. In the Pigmy scale the words for 1 and 6 are so closely akin that one cannot resist the impression that 6 was to them a new 1, and was thus named.

MOSQUITO. PIGMY.

1. kumi. ujju.

2. wal. ibari.

3. niupa. ikaro.

4. wal-wal = 2-2. ikwanganya.

5. mata-sip = fingers of 1 hand. bumuti.

6. matlalkabe. ijju.

7. matlalkabe pura kumi = 6 and 1. bumutti-na-ibali = 5 and 2.

8. matlalkabe pura wal = 6 and 2. bumutti-na-ikaro = 5 and 3.

9. matlalkabe pura niupa = 6 and 3. bumutti-na-ikwanganya = 5 and 4.

10. mata wal sip = fingers of 2 hands. mabo = half man.

The Mosquito scale is quite exceptional in forming 7, 8, and 9 from 6, instead of from 5. The usual method, where combinations appear between 6 and 10, is exhibited by the Pigmy scale. Still another species of numeral form, quite different from any that have already been noticed, is found in the Yoruba scale, which is in many respects one of the most peculiar in existence. Here the words for 11, 12, etc., are formed by adding the suffix *-la*, great, to the words for 1, 2, etc., thus:

1. eni, or okan.

2. edzi.

3. eta.

4. erin.

5. arun.

6. efa.

7. edze.

8. edzo.

9. esan.

10. ewa.

11. okanla = great 1.

12. edzila = great 2.

13. etala = great 3.

14. erinla = great 4, etc.

40. ogodzi = string.

200. igba = heap.

The word for 40 was adopted because cowrie shells, which are used for counting, were strung by forties; and *igba*, 200, because a heap of 200 shells was five strings, and thus formed a convenient higher unit for reckoning. Proceeding in this curious manner, they called 50 strings 1 *afo* or head; and to illustrate their singular mode of reckoning—the king of the Dahomans, having made war on the Yorubans, and attacked their army, was repulsed and defeated with a loss of “two heads, twenty strings, and twenty cowries” of men, or 4820.

The number scale of the Abipones, one of the low tribes of the Paraguay region, contains two genuine curiosities, and by reason of those it deserves a place among any collection of numeral scales designed to exhibit the formation of this class of words. It is:

1. initara = 1 alone.

2. inoaka.

3. inoaka yekaini = 2 and 1.

4. geyenknate = toes of an ostrich.

5. neenhalek = a five coloured, spotted hide,_or hanambegen = fingers of 1 hand.

10. lanamrihegem = fingers of both hands.

20. lanamrihegem cat gracherhaka anamichirihegem = fingers of both hands together with toes of both feet.

That the number sense of the Abipones is but little, if at all, above that of the native Australian tribes, is shown by their expressing 3 by the combination 2 and 1. This limitation, as we have already seen, is shared by the Botocudos, the Chiquitos, and many of the other native races of South America. But the Abipones, in seeking for words with which to enable themselves to pass beyond the limit 3, invented the singular terms just given for 4 and 5. The ostrich, having three toes in front and one behind on each foot presented them with a living example of 3 + 1; hence “toes of an ostrich” became their numeral for 4. Similarly, the number of colours in a certain hide being five, the name for that hide was adopted as their next numeral. At this point they began to resort to digital numeration also; and any higher number is expressed by that method.

In the sense in which the word is defined by mathematicians, *number* is a pure, abstract concept. But a moment’s reflection will show that, as it originates among savage races, number is, and from the limitations of their intellect must be, entirely concrete. An abstract conception is something quite foreign to the essentially primitive mind, as missionaries and explorers have found to their chagrin. The savage can form no mental concept of what civilized man means by such a word as “soul”; nor would his idea of the abstract number 5 be much clearer. When he says *five*, he uses, in many cases at least, the same word that serves him when he wishes to say *hand*; and his mental concept when he says *five* is of a hand.

The concrete idea of a closed fist or an open hand with outstretched fingers, is what is upper-most in his mind. He knows no more and cares no more about the pure number 5 than he does about the law of the conservation of energy. He sees in his mental picture only the real, material image, and his only comprehension of the number is, "these objects are as many as the fingers on my hand." Then, in the lapse of the long interval of centuries which intervene between lowest barbarism and highest civilization, the abstract and the concrete become slowly dissociated, the one from the other. First the actual hand picture fades away, and the number is recognized without the original assistance furnished by the derivation of the word. But the number is still for a long time a certain number *of objects*, and not an independent concept. It is only when the savage ceases to be wholly an animal, and becomes a thinking human being, that number in the abstract can come within the grasp of his mind. It is at this point that mere reckoning ceases, and arithmetic begins.