Mathematics of the Yoruba People and of Their Neighbors in Southern Nigeria

Claudia Zaslavsky

Claudia Zaslavsky is the author of "Black African Traditional Mathematics," *published in the April 1970 issue of* The Mathematics Teacher. *She has been interested in the history of African mathematics for over a decade. Her work has been described by Howard Eves as "outstanding and perhaps the finest in the field."*

This article is part of her forthcoming book on African mathematics. The editors elected to print the entire selection rather than narrow the range of its content, even though the article includes some non-mathematical digressions.

Yoruba Numeration System

The reader with an interest in the development of indigenous mathematics in Africa will find little information in the mathematics history books except for a treatment of ancient Egypt. Of the few existing accounts of other Africans' mathematical development, one well-known story is that of the Damara people of Southwest Africa, now called the country of Namibia; the Damaras wandered in nomadic bands and were among the least advanced, from the point of view of technology, of all Africans. Their tale was first told by Sir Francis Galton, the British scientist, explorer, and anthropometrist, in his book, *Narrative of an Explorer in Tropical South Africa,* published in London in 1889. Here it is, as retold in Howard Eves' *In Mathematical Circles:*

... the primitive Damaras of Africa, in bartering two sticks of tobacco for one sheep as the rate of exchange, became hopelessly confused when a white trader, desiring two sheep, offered four sticks of tobacco at once. Fraud was suspected by the Damaras, and the transaction had to be revised and carried out more slowly. First two sticks of tobacco were given and one sheep driven away, then two more sticks of tobacco and the second sheep claimed. When shown that the result came out the same as the trader's original proposal, the tribesmen regarded the trader as one possessed of magic powers.

Eves concludes the narrative with a telling comment that is omitted from most other histories:

Yet, these Damaras were not unintelligent. They knew precisely the size of a flock of sheep or a herd of oxen, and would miss an individual at once, because they knew the faces of all of the animals. To us, this form of intelligence, which is true and keen observation, would be infinitely more difficult to cultivate than that involved in counting.

76

I should like to suggest another explanation. There is a widespread fear among Africans, as well as other peoples, that the counting of people and other living creatures will lead to their destruction. Therefore counting is done indirectly, by setting up a one-to-one correspondence between the animals and some type of counting object. In this case there was a two-to-one correspondence between sticks of tobacco and sheep. The superstition about counting is treated at great length by A. Seidenberg in his article, "The Ritual Origin of Counting." (Archive for the History of the Exact Sciences, Vol. II, pp. 1-40). One can recall, too, the Biblical story of King David, who acted against the advice of Joab and the other army captains in ordering a census of his people. After the count had been brought to him, he realized his error, but it was too late. Jehovah visited a terrible pestilence on the people, and many died. Only the offering of a sacrifice succeeded at last in staying the hand of Jehovah.

L. L. Conant's The Number Concept, published in 1896, is one of the few books in English which discuss the numeration systems of many African peoples. However, Conant's point of view is completely colored by the prevailing attitude toward Africans as "primitive savages"; they were deemed hardly human. He dismisses the amazingly complex numeration system of the Yoruba people of southwest Nigeria with these words:

Nor, on the other hand, is the development of a numeral system an infallible index of mental power, or of any real approach toward civilization. A continued use of the trading and bargaining faculties must and does result in a familiarity with numbers sufficient to enable savages to perform unexpected feats in reckoning. Among some of the West African tribes this has actually been found to be the case; and

among the Yorubas of Abeokuta the extraordinary saying, "You may seem very clever, but you can't tell nine times nine", shows how surprisingly this faculty has been developed, considering the general level of savagery in which the tribe lived.

Conant sees the occurrence of numbers up to a million among South African tribes as "remarkable exceptions" to the "law" that "the growth of the number sense keeps pace with the growth of the intelligence in other respects."

Such was the extent of the prejudice against darkskinned peoples that all the principles of logic were turned upside down. One would expect that a scientist, when confronted by evidence that refutes his "laws," might begin to doubt their validity. This "scientific" attitude is analyzed in an unpublished manuscript, Science and Africa, by Frank E. Chapman, Jr., a young black man now serving a life imprisonment.

There is so much talk about a "primitive type of mind" and an "advanced type of mind." These conceptualists rarely pause to consider what it is in fact that they are talking about; they never stop to consider that this whole business of "mind types" is merely a collocation of convenient verbalizations; indeed, the scientist's behavior is very similar to the "primitive" he is talking about when he verbalizes about "mind types." This stifling "mind" concept cripples scientific analysis, and only when greater emphasis is put on psychological behavior patterns (in a given social context) will it be understood once and for all . . . that the difference in psychological make-up is due, more or less, to the differences in social conditions, which have nothing whatsoever to do with "mind types."*

There is ample evidence of the Africans' skills in the use of numbers. The British trader, Mr. Clapperton, reported in

*Quoted with permission of the author.

77

1826 on the use of cowrie shell currency in a region that is now part of Nigeria, declaring that it was very convenient because it allowed no possibility of forgery. He praised the "dexterity of the natives in counting the largest sums." Einzig states that merchants had to count in large figures, and they developed the advanced arithmetical faculty required for the purpose. Marion Johnson writes: "The use of cowries for larger transactions depends on a rapid system of counting them."

Michael Crowder, in *West Africa under Colonial Rule,* mentions the Yoruba people specifically. Part of the culture that each generation transmitted to the succeeding generation was the ability to handle the various kinds of currency then in use. Since a low-valued (cowrie) currency was used as the base, considerable arithmetic skill was necessary to conduct trade outside of the confines of the village. "Contrary to a generally European held opinion that Africans could not count beyond ten, the Yorubas could count to a million." Crowder adds that "works by Negro Muslims on philosophy, law, theology, history, and medicine exist all over the Western Sudan," a reference to the region of West Africa just below the Sahara Desert.

Let us now examine the Yoruba system of numeration, called by Conant "one of the most peculiar number scales in existence." A summary of the system is given by the Rev. Samuel Johnson in the introduction to his book, *The History of the Yorubas.*[*]

From one to ten, different terms are used, then for 20, 30, 200 and 400; the rest are multiples and compounds. Thus 11, 12, 13 and 14 are reckoned as ten plus one, plus two, plus three and plus four; 15 to 20 are reckoned as 20 less five, less four,

less three, less two, less one, and then 20.

In the same way we continue 20 and one, to 20 and four, and then 30 less five (25), less four, and so on to 30, and so for all figures reckoned by tens.

There is no doubt that the digits form the basis of enumeration to a large extent, if not entirely so. Five, ten, twenty, i.e., the digits of one hand, of two, and the toes included, and their multiples form the different stages of enumeration.

Beginning from the first multiple of 20 we have *Ogoji,* a contraction of *ogun meji,* i.e., two twenties (40), *Ogota,* three twenties (60), *Ogorin,* four twenties (80), *Ogorun,* five twenties (100), and so on to ten twenties (200), when the new word *Igba* is used.

The intermediate numbers (30 having a distinct terminology), 50, 70, 90, 110, 130 to 190 are reckoned as: 60 less ten (50), 80 less ten (70), a hundred less ten (90), and so on up to 200.

The figures from 200 to 2000 are reckoned as multiples of 200 (400, however, which is 20 X 20, the square of all the digits, has a distinct terminology, *Irinwo* or *Erinwo,* i.e., the elephant of figures—meaning the highest coined word in calculation, the rest being multiples). . . .

By a system of contraction, elision, and euphonic assimilation, for which the Yoruba language is characteristic, the long term *Orun-din-ni* (*Egbeta* or *Egberin* and so on) is contracted to *Ede* or *Ode,* e.g. Edegbeta (500) . . . and so on. . . .

Summary. Thus we see that with numbers that go by tens five is used as the intermediate figure—five less than the next higher stage. In those by 20, ten is used as the intermediate. In those by 200, 100 is used, and in those of 2000, 1000 is used.

The figure that is made use of for calculating indefinite numbers is 20,000 (*Egbawa*), and in money calculation especially it is termed *Oke kan,* i.e., one bag (of cowries). Large numbers to an indefinite amount are so many "bags" or rather "bags" in so many places.

We have here an example of a vigesimal system, one based on twenty, of which we find numerous examples in western Africa, as well as in other parts of the world. In

English we have the word "score," and in French *quatre-vingt* (4-20) represents eighty, while *quatre-vingt-dix* (4-20-10) is used for ninety. The unusual feature of the Yoruba system is that it is subtractive to a very high degree.

I have relied heavily for the analysis of Yoruba numerals upon Robert G. Armstrong's study, *Yoruba Numerals*. Armstrong states: "It is testimony to the Yoruba capacity for abstract reasoning that they could have developed and learned such a system." The original system, whose age is not given, was expanded for the purpose of counting cowries.

Table I shows the words for the first ten numbers in the four principal applications

Table I

Cardinal	Counting
1. okan	ookan = eni
2. eji	eeji
3. eta	eeta
4. erin	eerin
5. arun	aarun
6. efa	eefa
7. eje	eeje
8. ejo	eejo
9. esan	eesan
10. ewa	eewaa

Adjectival	Ordinal
1. kan	ekin:ni = ikin:ni = akoko
2. meji	ekeji = ikeji
3. meta	eketa = iketa
4. merin	ekerin = ikerin
5. marun	ekarun = ikarun
6. mefa	ekefa = ikefa
7. meje	ekeje = ikeje
8. mejo	ekejo = ikejo
9. mesan	ekesan = ikesan
10. mewaa	ekewaa = ikewaa

The double vowel with which each of the counting numbers begins is actually a contracted form of the word *owo*, meaning "cowrie" or "money."

The following are the names of the numbers, as well as the derivations, for the counting series:

1	ookan	6	eefa
2	eeji	7	eeje
3	eeta	8	eejo
4	eerin	9	eesan
5	aarun	10	eewaa

11 ookan laa (*laa* from *le ewa* = in addition to ten)
12 eeji laa
13 eeta laa
14 eerin laa
15 eedogun (from *arun din ogun* = five reduces twenty)
16 eerin din logun $(20 - 4)$
17 eeta din logun $(20 - 3)$
18 eeji din logun $(20 - 2)$
19 ookan din logun $(20 - 1)$
20 ogun
21 ookan le logun ("one on twenty" = $20 + 1$)
25 eedoogbon $(30 - 5)$
30 ogbon
35 aarun din logoji (five less than two twenties = $(20 \times 2) - 5$)
40 ogoji ("twenty twos")
50 aadota $(20 \times 3 - 10)$
60 ogota $(3 \times 20$, or more literally, "twenty in three ways")
100 ogorun = orun (20×5)
105 aarun din laadofa $(20 \times 6 - 10 - 5)$
200 igba

After 200 the system becomes quite irregular, and these irregularities are maintained on the higher levels. A few examples follow:

300   oodunrun = oodun $[20 \times (20 - 5)]$

79

315	orin din nirinwo odin marun [400 − (20 × 4) − 5]
400	irinwo
2000	egbewa (200 × 10)
4000	egbaaji (2 × 2000)
20,000	egbaawaa (2000 × 10)
40,000	egbaawaa lonan meji (ten 2000s in two ways)
1,000,000	egbeegberun (idiomatically 1000 × 1000)

The construction of the numerals from 35 through 54 is represented in Table II. Of the twenty numerals, only five do not involve subtraction at all, and five involve subtraction in two columns!

Armstrong ventures the opinion that the pattern originated so that one could count the ten numbers with the fingers of one hand. If the multiples of ten are understood, and not shown by finger gestures, then one finger at a time can be extended to denote 21, 22, 23, and 24, respectively. When the fifth finger is extended, it is subtracted from 30; and when it is retracted, the remaining four fingers are deducted from 30 to give 26, etc.

Besides the numerals already described, there is an additional set for counting cowries. This system is based on the cowrie equivalents in shillings: 4000 cowries = one shilling. The special name for 20,000 cow-ries is *oke kan* = one bag, or five shillings. Threepence, or *toro,* represents 1000 cow-ries, but a penny had a value of only 300 cowries at the time the system was adopted. The subtractive principle is used again in the following constructions:

two (shillings) and threepence = *(m)eji le toro*

two (shillings) and ninepence = *(m)eta din toro* (three less threepence)

The cowrie reckoning is still used today in referring to large numbers: a farmer might say he has "shilling threepence" rather than 5000 yam heaps. The term "bag" may be used instead of "five shillings."

The idea of "infinity" is expressed in the Yoruba proverb: "There is nothing as numerous as the locusts; they are found at home and in the farm." Although some farms were as much as twenty miles from the towns in which the farmers lived, the locusts covered every bit of foliage on the route. Compare this simile with the ancient Egyptian symbol of a tadpole to represent 100,000; its name, *hfn,* also means "innumerable." After the Nile floods receded, these creatures could be seen squirming in the mud, too numerous to be counted.

A traditional folk query that reminds us of our highways and city subways is:

Table II

	twenty	ten	unit			twenty	ten	unit
35	2	0	−5		45	3	−1	−5
36	2	0	−4		46	3	−1	−4
37	2	0	−3		47	3	−1	−3
38	2	0	−2		48	3	−1	−2
39	2	0	−1		49	3	−1	−1
40	2	0	0		50	3	−1	0
41	2	0	1		51	3	−1	1
42	2	0	2		52	3	−1	2
43	2	0	3		53	3	−1	3
44	2	0	4		54	3	−1	4

80

"Which is the very long coffin that can accommodate 1400 corpses?" The answer is "the path," depicted as a long coffin containing many bodies arranged end-to-end in single file. This picture represents the hundreds of farmers who file along the paths on their way to and from their farms during "rush" hours! The number 1400 is composed of the factors 7 and 200, both considered special numbers.

Dr. Akinpelu, of the University of Ife, gave me the following constructions for unit fractions, for doubling, and for powers of a base:

ebu = fraction
Idameta = one-third (Divided into three)
Idamerin = one-fourth
Idamarun = one-fifth
etc.
Ilopomeji = two times, or doubling
Erin lona meji = 4^2 (4 in 2 places)
Erin lona meta = 4^3
Erin lona merin = 4^4
etc.

Dr. Ajayi, of the University of Ibadan, has stated: "Yoruba vocabulary covers, apart from numeration, a wide range of mathematical concepts, including fractions, squares and square roots, etc." On methods of computation, he writes that they are usually performed mentally; "sometimes also marks on walls, beans or sticks in a jar, etc. to represent large units of what is being counted; e.g., a hundred or thousand cowries or heads of cattle, etc. owed, or years of a monarch's reign. In some kingdoms, censuses of the number of families in each village or district are kept in the same manner."

I have not thus far been able to determine what computational methods were used in past centuries by Yoruba merchants in commercial transactions involving many thousands of cowrie shells. Nor have I yet found whether they kept written records of debts, or whether trade was strictly on a cash basis.

During the colonial period the languages of the dominating European powers were used in African schools, except possibly in the primary grades. Since they gained independence, however, the African peoples have been eager to revive interest in their own languages and culture; hence there is a new desire to expand the native vocabulary to include concepts hitherto unexpressed. Although English is still used today in Nigerian institutions of higher learning as a common means of communication for students of extremely varied linguistic backgrounds, the Yoruba language is being expanded to accommodate new ideas.

Dr. Armstrong, the Director of the Institute of African Studies at the University of Ibadan, has developed a decimal number system which uses Yoruba words throughout, and eliminates all the irregularities of the traditional system. Thus modern arithmetic would become readily accessible to average people and to youngsters in the elementary grades, without requiring that they learn a language other than their own. Dr. Armstrong's reforms include terms for all the arithmetic operations, as well as fractions, decimal fractions, and percents. Dr. Armstrong has confidence that these reforms will encourage people to take a great interest in mathematics, as they realize they are citizens of an increasingly mathematical world. He concludes: ". . . a nation that could develop and transmit the complexities of their [numeration] system has obviously a great deal of mathematical talent and interest."

81

History of Southwest Nigeria

The development of a number system depends upon the need. In a small self-contained economy, typical of large sections of Africa, in which all or most of the necessities of life are produced within the community, there is little need for an extensive reckoning system. The names of numbers are frequently connected with the objects to be counted, just as we have special names for certain sets—flock, herd, brace, etc., dating back to a pastoral or agricultural society. Finger and other body gestures might accompany or be used instead of spoken words. Gesture-counting is especially necessary in the market place, where people speaking various languages gather to exchange goods. It might be customary to use beads, shells, nuts, or pebbles as media of exchange or as counting materials (the word *calculate* is derived from *calculus,* Latin for pebble), and to arrange them in sets, thus giving rise to special words.

Many African societies, however, required the use of large numbers for their well-developed economies. Most Americans and Europeans are just beginning to learn of the great empires that have existed in various parts of Africa since the time of ancient Egypt. Kush, with its iron-working city, Meroë, flourished just south of Egypt before the Christian era. In the western part of the Sudan region, there were ancient Ghana, which did an extensive trade in gold; the cities of Timbuktu and Djenne, centers of advanced learning; the kingdoms of Mali, Songhay, and Kanem, to name a few. Further south lie the extensive ruins of Zimbabwe, in present Rhodesia. Early in the Christian era this area was a source of gold, copper, tin and iron, particularly for the Eastern world. The kingdoms of Kitwara and Kongo, of Nubia and ancient Ethiopia were highly developed many centuries ago. Cattle-herding, the occupation of peoples such as the Masai of Kenya and the Hottentots of South Africa, required extensive systems of numeration, as did large-scale trade, carried on by the advanced ancient societies.

It is only by learning the history and development of a people that we can understand their need for mathematics. We are just beginning to discover the history of southern Nigeria, the most densely populated region of the whole continent of Africa. Since the peoples of this area left no written records, the key to their history must lie in archaeological excavations, works of art, oral traditions, language analysis, and reports of foreign visitors.

The recently developed technique of radiocarbon dating has brought infinitely greater accuracy to the field of archaeological research. By early 1967 thirty-one dates were known for all of Nigeria. It is estimated that five thousand dates are needed for the period 500 B.C.—A.D. 1500 to enable archaeologists to make an adequate reconstruction of the history of the country.

In the Nok area of northern Nigeria have been found stone implements whose age is estimated at more than 39,000 years. The iron-based Nok culture is believed to have existed in approximately 900 B.C.—A.D. 200; the terracotta art figures of this period are thought to have directly influenced the later art of the Yoruba and of Benin.

Concentrated efforts are being made to gather the oral traditions, but the difficulties are great. On the site of the former Oyo Empire of the Yorubas one now finds ruined settlements, some deserted during the Nupe invasion of the fifteenth and sixteenth centuries, some sacked by the Alafins (kings of Oyo) in the seventeenth and eighteenth centuries and many

82

emptied by the nineteenth-century invasion of the Islamic Fulani from the north, as well as the Dahomean slave raids from the west. Lions occasionally greet the present visitors to these sites.

Essential to every African royal household was the professional historian, whose duty it was to memorize and recite the dynastic lists of the kingdom. His function was similar to that of the rhapsodists of the Homeric age. No doubt the facts were colored somewhat to please the current rulers; nevertheless, these lists constitute a fairly reliable record.

Toward the end of the nineteenth century the Rev. Samuel Johnson (Anla Ogun), a Yoruba Anglican minister, undertook to write down these oral traditions, so that the history of his fatherland might not be lost. Although educated Yorubas, schooled in the Western tradition, were familiar with the history of Greece and Rome, they knew nothing about their own land. Johnson spent over twenty years collecting his material and recorded it in *The History of the Yorubas,* which comprises the myths, history, and customs of his people.

All the traditions indicate that the Yoruba people came originally from the east. There are many similarities to the ancient Egyptian culture in religious observances, works of art, burial customs, and the institution of divine kingship; however, these cultural traits are shared by other African peoples. The town of Ife, also called Ile-Ife, was the spiritual center and cradle of the Yoruba people, and it was from Ife that the people of the neighboring state of Benin got their long line of kings. At this site have been found the remarkable bronze, stone, iron and terracotta works of art, dating back almost a thousand years.

According to one version of the crea-tion legend, the Oba of Benin and the heads of the six Yoruba kingdoms were all descended from a common ancestor, Oduduwa. Oranyan, the youngest king, is supposed to have been the founder of the Oyo state, which by the fifteenth century had become a mighty empire.

Another version of the creation myth begins with the Flood. Olorun, the supreme god, let his son Oduduwa down on a chain, carrying a handful of earth, a cockerel, and a palm nut. Oduduwa scattered the earth over the water, and the cockerel scratched it so that it became the land on which the palm tree grew, spreading its sixteen branches. The sacred number sixteen is believed to represent the sixteen crowned heads of Yorubaland.

By the year A.D. 1300, the Yoruba people had built numerous walled cities surrounded by farms. Trade was carried on with the peoples of the north; they exchanged cloth and kola nuts for products they needed. In turn the Yoruba states were exposed to the intellectual stimulation of of the northern neighbors and of the Islamic University in Timbuktu. Many historical records of Africa, written in Arabic and dating back as far as the seventh century, have yet to be translated to give us a more complete picture of African life.

During the following centuries, the state of Oyo expanded until its dominion extended over a vast area, including even Dahomey to the west. Meanwhile the kingdom of Benin, to the southeast, had become independent of the Yorubas and had grown into a mighty empire. When the Portuguese, the first Europeans to visit this part of Africa, entered Benin City in the late fifteenth century, they were truly astounded by the level of culture they encountered. Later European travelers described the thirty main streets of the metropolis, all straight and wide, the longest

of which was four miles in length. "The people are as clean as the Dutch, their houses shine like a looking glass," reported a Dutch visitor. The Oba's palace alone was reputed to be as large as a Dutch town. Brass-casting by the lost-wax method had been introduced from Ife, making possible the marvelous plaques on the walls of the palace, a history of Benin in art form.

With the Europeans came missionaries, gin, firearms, and the intensification of the slave trade. Slave raiding and wars with neighboring peoples alternated with periods of stability and peaceful trade—until the dissolution of the empires and the conquest by the British at the end of the nineteenth century. A conservative estimate gives 24,000,000 as the number of slaves exported from West Africa and Angola. Dr. W. E. B. DuBois believed that 100,000,000 Africans were lost in the course of the slave trade. Many revolted, died in battle, jumped overboard, or perished in the infamous "Middle Passage," the journey to the New World, where the institution of slavery became the foundation for American prosperity. It was also the wealth produced by the slave trade that helped to lay the basis for the expansion of the Yoruba empire. Every year the armies of the kings scoured neighboring territories in slave raids. In turn, the Yoruba towns were attacked by other peoples with the same reprehensible motives.

In 1897 a British delegation insisted upon seeing the Oba of Benin at a time when his religion forbade him to meet with strangers. Several of the British were killed in this incident. In retaliation the British sent a punitive expedition to burn the entire city. They removed 2500 beautiful Benin bronzes; these are now on exhibit in the museums of Europe and the United States.

The Yoruba city of Ibadan is the largest black city in Africa, a metropolis of more than 1,400,000 people, and the seat of the famous University of Ibadan. Although axes dating back to the Stone Age have been found in the area, Ibadan was only a small village built around a central market prior to the nineteenth century. With the internal wars it became a settlement for the army, a town free of the fear of invasion, a refuge from strife. Today three-quarters of the inhabitants are farmers who live in the city and work on the farms which surround it in a ring twenty miles wide. Actually it is a city-village; farmers, craftsmen and traders live in large compounds in the town center.

Currency and Trade

The Yoruba people of southwest Nigeria have been known for centuries past as a nation of traders; this reputation extends to both men and women. Markets were—and still are—held at regular intervals, usually every four days, to coincide with the traditional Yoruban four-day week. The location and the products of the markets rotate. Today the cloth market in Ibadan, held every sixteen days, attracts customers from points as distant as Ghana. Since the market women combine the roles of food producer, trader and customer, the periodicity of the market is a necessity.

In some parts of West Africa, the names of the days of the week are actually the names of the main towns in the area in which markets are held on those days. Among the Ibo people, the village cluster is divided so that the various sections have their rest periods on different days within the four-day week, or within a period of two weeks, called the "big week." On the rest day, the villagers abstain from farm work to do household chores, practice their hobbies, and visit their friends. It is on these special days that festivals, ceremonials

and markets are held, frequently all in the same location. Most Ibo markets now adhere to an eight-day schedule.

Although goods were often exchanged by barter arrangements, the merchants of southern Nigeria had adopted currency long before the arrival of the Europeans. As the number words indicate, the cowrie was the basic unit of currency. These shells have been treated with disdain by Europeans, partly because of the debasement of their value during the nineteenth century. However, they are truly a sophisticated form of currency. Marion Johnson quotes an anonymous Dutch gentleman writing in 1747: "...those who are pleased to show a contempt of them (cowries) don't reflect that shells are as fit for a common standard of pecuniary value as either gold or silver."

Pictures of cowrie shells appear on the walls of caves, executed by Paleolithic man. The ancient Egyptians considered the cowrie a magic agent, a talisman of fertility, and in some cases used it as currency in foreign exchange. Archaeologists have found millions of them in the tombs of the Pharoahs. By the thirteenth century Africa had been flooded with these small shells. Large quantities have been excavated in ancient Ife.

According to one of the Yoruba legends, Oranyan, the founder of Oyo, was the youngest of King Oduduwa's grandchildren. When the King died, all his fortune in cowries went to the Oba of Benin, while Oranyan was left with nothing but the land. But clever Oranyan charged rent for the use of the land, and eventually acquired all the wealth from his brothers.

Ibn Battuta, the traveler from Tangier, in North Africa, reports in the book he wrote in the mid-fourteenth century: "The buying and selling of its (Gao's) inhabitants is done with cowry-shells, and the same is the case at Malli." The editor's note ex-plains that these cowries were imported from the north into the western Sudanic kingdoms.

When the Portuguese paid their first visit to Benin in the fifteenth century, they found cowrie shells in common use. In 1588 James Welsh, an English trader, bought two gallons of palm wine in Benin for twenty shells. A year later two London merchants named Bird and Newton reported that "pretty white shells" were used as Europeans used gold and silver. They were able to purchase two gallons of honey and a honeycomb for a sum of one hundred cowries.

About the year 1700 a Dutch trader told of the royal monopoly of the Oba of Benin. No specific duties were imposed on imports or exports, but there was an annual tax in cowries for the privilege of trading. Each territorial governor was required to raise a specified number of bags of boesies (cowries) for the Oba's use, while officials of lower rank delivered produce for the royal household. There were no poor people in the land; the wealthy were obligated to see that none went hungry.

Cowrie shells were introduced from the Maldives of the Indian Ocean by Arab caravans, which brought them from Egypt across the Sahara to the western Sudan region. With them came the sexagesimal system of counting, according to the theory of Dr. Jeffreys. He bases this conclusion upon the Ibo system of counting cowries by sixes, as well as the fact that the Mandingo "hundred" was actually sixty. Jeffreys' theory, however, is discounted by other authorities. A later method of entry was by way of the Guinea Coast ports of West Africa, with the Dutch and English as middlemen.

An analysis of the relationship of cowrie currency to the numeration systems of the various peoples of West Africa is a

fascinating study. Here we shall consider only the peoples of southern Nigeria. How were these small shells handled? How does their value compare with that of European currencies? I have relied most heavily on Marion Johnson's fine analysis, "The Cowrie Currencies of West Africa" and on A. H. M. Kirk-Greene's excellent article, "The Major Currencies in Nigerian History."

In the northern parts of the region, the cowrie shells were counted out in groups of five, while along the coast they were pierced and threaded, generally in strings of forty. The Ibo method was an exception; there the basic unit was six cowries. It is not known whether cowries were strung at the time the Portuguese first began to trade. We know they were counted in units of forty, named *galinhas* (Portuguese for "hens"). Later this name was applied to a bunch of five strings, or two hundred shells, no doubt to correspond to the devaluation of the cowrie in terms of its purchasing power. As the commercial language changed from Portuguese to English, later equivalents were given in English.

In areas where cowries were not strung, their use depended upon a rapid method of grouping them in successively higher units. Let us remember that in Nigeria trade was carried on by both men and women, and that cowries had to be counted up into the high denominations. Furthermore, they were counted out by both the buyer and the seller! Certainly this should have dispelled the myth that Africans could barely count to ten.

The early Yoruba system was based on a combination of vigesimal and decimal counting: 20, 200, 2000, and 20,000 (*oke kan* = one bag). The system at Lagos was later adopted further north:

$$40 = 1 \text{ string}$$
$$2000 = 1 \text{ head} = 50 \text{ strings}$$

$$20,000 = 1 \text{ bag} = 10 \text{ heads.}$$

However, the 200 unit was recognized; a discount of two cowries was allowed on every five strings.

The Yoruba, Osifekunde, who was sold into slavery in Brazil in the early nineteenth century had spent his youth in the Ijebu area, northeast of Lagos. His recollections of life in his homeland included remembrance of the currency values. He gave the following cowrie equivalents:

ogoji = string = 40 cowries
ogwao = bunch (of five strings) = 200 cowries
egwegwa = head (of ten strings) = 2000 cowries
oke = bag (of ten heads) = 20,000 cowries.

The only fixed measure he knew was a standard unit of gold dust called *ochouon,* about a thimbleful, worth approximately 1000 cowries. An average price for a slave at that time was two bags.

In parts of northern Nigeria, the *rotl,* or pound (originally of copper), was the equivalent of 32 cowries. Each time a *rotl* was counted out, an additional shell was set aside as a tally, so that three *rotls* approximated one hundred cowries. Perhaps this method was an attempt to reconcile the northern system with that of the south, where two hundred were threaded in five strings of forty each, three strings of sixty-six, or two strings of one hundred with a discount of one percent.

All large trading centers in the western Sudan area employed cowrie counters. Imagine having to count daily up to 300,000 of these small curved shells, particularly in the inland regions, where they were not strung. An attempt by the Niger Expedition of 1841 to substitute measure for number proved to be unpopular. Perhaps the seller feared he would be cheated!

86

In the 1880's cowries at Lokoja, on the Niger River, were strung in bunches of one thousand, with a value of one shilling. The woman employed by the trading station to count them was paid ten shillings a month—in merchandise. Women of West Africa are notable traders to this day, and in some Ibo markets the women's councils set the rate of cowrie exchange. Yoruba women have a reputation for knowing where to buy cheap and sell dear. They go directly to the farms several miles from town, or wait on the farm paths to purchase produce on its way to the local market.

In the 1860's the cowrie table and the British equivalents read (with variations depending upon time and place):

40 cowries = one string = ¾ − 1 penny
5 strings = one bunch = 3 − 6 pence
10 bunches = one head = 1¾ − 2 shillings
10 heads = one bag = 14 − 18 shillings.

By the end of the century, one thousand cowries were worth three pence in silver, but a copper penny could be exchanged for only 300 cowries.

During the early nineteenth century the larger Zanzibar cowries were introduced; European merchants found they could scoop them up by the ton and sell them at a handsome profit. With the added weight of the shells, and the depreciation in value owing to the introduction of European currency, by the end of the century it was hardly worthwhile to transport them. On the lower Niger River the cowrie became merely a measure of value— prices were quoted in so many cowrie units. It had become impractical to use them as a medium of exchange except for small purchases in the local markets. The fluctuations in the value of the cowries and the need to convert to British units must have taxed the skills of the shrewdest of merchants. As an example, in 1902 the rate was four thousand to a shilling at Ilorin, in the northern Yoruba region, while at Sokoto, in northern Nigeria, a shilling would fetch only 1200 shells, since coinage was harder to come by away from the Coast. Imports of cowries were banned by Proclamation in 1904 and coinage was introduced by the government. However, since the smallest unit was a threepenny piece, cowries continued to be used in local trade until the introduction of the *anini*, worth one-tenth of a penny.

The cowrie units remain useful as a means of expressing large numbers. A farmer might say his farm has "three-pence" (1000) yam heaps. In earlier times it was recorded that the King of Dahomey was beaten by the Yorubas with a loss of "two heads, twenty strings, and twenty", or 4820 soldiers. The enemy were the famous Dahomean women warriors, who were "advancing in the order of battle, marching steadily and solidly onward, ignoring the fire of the Egbas (Yorubas) and paying no attention to those among themselves who fell, but kept marching stolidly onward. They never fired but at the word of command, and when they did, their volleys were demoralizing. By this we can see that the Dahomean soldiers were disciplined troops such as the Egbas had never faced before.... When those who actually entered the town were caught and slain, ... then the Egbas knew that these terrible fighters were the Amazons!" So runs the account of the Rev. Samuel Johnson. He continues: "Immediately the news spread among all ranks that they have been fighting with women, and for very shame all the Egba men were exasperated beyond measure and rushed upon them with one accord and compelled them to retreat." This battle was fought in 1851.

By no means did cowrie shells disappear after the British government introduced coinage. Cowries are an integral part of daily life in many regions of Africa, for use as decoration, religious symbols, and special-purpose currency. Even as ordinary money they were still used in recent times. In the 1920's the Ibo people kept them in circulation, particularly in the inland areas. In Yoruba and Nupe territory they reappeared during the severe depression of the 1930's, when even the *anini* (one-tenth of a penny) was too large a unit of exchange. As late as 1942 payments in some parts of Nigeria were expressed in cowries rather than in coinage.

Among the Ibo people of southeastern Nigeria a unique system of cowrie equivalents was in use. Cowrie usage was still widespread in 1920, when G. T. Blasden wrote *Among the Ibos of Nigeria*. He states:

> 6 *Nkpulu* (single shells) = 1 *Ekpetti* = 6 cowries
> 10 *Ekpetti* = 1 *Ukwu*   = 60 cowries
> 20 *Ukwu*   = 1 *Akpa*   = 1200 cowries.

The person who counts first separates out groups of six, and then makes piles of ten such groups.

In some parts of the land Ibo people refused to sell for any currency but cowries. Ironically, the value rose after 1900, when the government outlawed their importation. Furthermore, the purchasing power of the cowrie was greater than that of metal coinage. Cowries distinctly had the advantage over coins, due to custom, and utility for other purposes. Small wonder that people hoarded them for decades!

The complete cowrie numeration system of the Umundri (Akwa Ibo), based on units of six and sixty, is given by Dr. D. W. Jeffreys in "The Cowry Shell" in a 1938 publication of *Nigeria*. He lists number words up to 96,000,000, and compares these numerals to the decimal system used by the same people for non-cowrie counting.

Although the use of cowries as ordinary currency has been discouraged or outlawed, these small shells have a function as special-purpose money—as bridewealth and for various ceremonial payments. Most African societies require a material consideration to legitimize and stabilize the marriage, recompense the bride's parents for the loss of their daughter, and guarantee that the husband will fulfill his obligations. The payment of the brideprice, which may take several years, permits the man to claim his children; otherwise they would be retained by the mother's family. If the wife dies without children, or if the couple separates, the brideprice must be returned. Europeans might consider it a dowry in reverse.

At the time Samuel Johnson wrote his book, wealthy families required more than ten heads of cowries (over 20,000), as compared with earlier times when a token payment of one head was considered ample. Today the brideprice is generally tendered in cash. With the government's introduction of general-purpose money, brides "entered the market." This has created a moral problem, contributing to the modern African's "identity crisis." In 1969 maximum brideprice payments were set by the government in some parts of Nigeria, since the matter was getting out of hand—the higher the girl's education, the greater the brideprice!

Among the Yoruba ceremonial occasions which require cowrie payments are funerals, initiation into secret societies, and certain fines. As decoration cowries are seen everywhere—on clothing, drums, divining chains, headdresses, ritual masks, and furniture.

88

We are accustomed to think of money as embodying at least three functions: it is a measure of value, a medium of exchange, and a method of storing wealth. We take for granted that coins and paper notes have no inherently functional value. The traditional African attitude was quite different, and the African felt, for example, not that yams were becoming more expensive, but that cowries were getting cheaper. The European merchants had to meet the demand for currency objects that had intrinsic value.

We shall mention briefly the various articles which have been used as currency in European trade with the territories that today make up Nigeria. In 1510 one could buy a slave for eight or ten copper *manillas* (Portuguese for "bracelet"). There were five different patterns of manillas in Nigeria, each accepted only in certain areas, and in use into the present century. By the end of the nineteenth century, five standard manillas bought one bottle of gin. Copper, iron and brass rods were in great demand; they were manufactured into ornaments, works of art, weapons and tools, and special-purpose currency. The Rev. Johnson complains that "soon doubts will begin to be expressed as to whether Yorubas ever knew the art of smelting iron from the ores!" The iron bar gave rise to the terminology "a bar of tobacco" or "a bar of rum". In southern Nigeria the *Ogoja* penny, a Y-shaped iron bar, was worth about a half-penny. Basden speaks of a unique currency in one part of the Ibo region, tiny pieces of iron with arrow-shaped heads, used in olden times for the acquisition of slaves. "How many thousands had to be counted when making such a purchase baffles one's imagination." The higher currency used in this area was brass rods. Beads were widely reported as currency, and valued for their decorative attributes. The Rev. Johnson reports that when one went on a long journey, he took beads instead of cowries.

Of all the currencies in use in the nineteenth century, only guns and alcohol achieved any stability of exchange rates, according to the African historian K. O. Dike. Bottles of gin passed from hand to hand for years without having been opened, and might represent the entire wealth of a chief. Basden reported seeing huge collections of empty gin bottles—a record of past transactions!

Sacred Numbers

The city of Ife is the spiritual and cultural center of the Yoruba people. Here archaeologists have found beautiful heads, masks and figure groups in cast brass and terracotta, and figures in stone, dating back to the thirteenth century. Here still stands the "staff of Oranyan", the stone obelisk marking the burial spot of the legendary founder of the Yoruba kingdom of Oyo. Here one finds the ancient shadow clocks, stone monoliths that served to tell the time of day and fix the dates for festivals. Here the Oba of Benin was given token burial, even though the kingdom of Benin had achieved independence from Yoruba domination. The influence of the religious beliefs of Ife spread to Benin, to the Ibos, to the Nupe, and elsewhere.

Certain numbers are held to be sacred, and the number four occupies the principal position among them. Thus we find that a four-day week is traditional among the people of southern Nigeria. Among the Yorubas each day is dedicated to one of the four major deities or its local counterpart: Shango (Sango, Jakuta), an early mythical king, later worshipped as the god of thunder, is represented by the double-axe symbol of the lightening bolt; Obatala (Orisala, Orisha-nla), the creative god, co-

89

worker with the supreme god Olorun, the god of purity, is protector of the town gates and patron of the physically deformed; Orunmila is the oracular deity of the Ifa divining system; and Oduduwa (Ogun), the legendary founder of Ife, is god of war and patron of iron-workers. In the past, the week in each region began with the name of the most popular god of that area. More recently the day of the market determined the names of the days: "market day", "market's second day," "market's third day," "tomorrow is market day," and finally another "market day."

"The world has four corners" is a widespread Yoruba expression; similarly, the approach to the earth from the outer world is through the four gates. This image is carried out in the four gates of the walls of each town. One of the Yoruba deities is Olori Merin, the four-headed being, whose image was set up in a prominent place in the town so that each head faced one of the four points: east, north, west and south. The four major deities, whose names were given to the days of the week, were linked with these points; Shango with the east, Obatala with the north, Orunmila with the west, and Oduduwa with the south. Each of the four directional quadrants was divided again into four parts, each being under the patronage of one of the sixteen deities who were responsible for the formation of the earth.

Of great import are the powers of four: 16, or 4^2, and 256, or 4^4. These numbers are central to the art of divination known as Ifa.

Other important numbers are 40 (4 X 10) and 200, as well as their successors 41 and 201. The significance of the latter numbers may be due to the Yoruba practice of including the first of the sequence twice when counting cyclically. Thus, some authors state that the Yorubas have a five-day week; the first day of the week is counted both at the beginning and at the end.

The sacred numbers of the Bini (people of Benin), according to Peter Idehen, are "20, 2, 4, 7, 14, 40, 200 and 201. The Binis usually give kolanuts to strangers in twos, or fours. If the number of people is great, they give 7, 14 or 20. If the number is greater, as for example, a whole village, they give 200 or 201. When they offer sacrifices to their gods, they follow the same order. Only very rich people or the Oba can offer 200 or 201 kolanuts or sacrificial victims."

The Yoruba people are renowned for their Ifa divining system, the means of consulting the oracular deity Orunmila. The advice of the god is solicited prior to every important step involving a decision. The apparatus includes sixteen nuts of the palm tree, whose importance is unique in the life of the people. A seventeenth nut might lie nearby in a ring of cowrie shells, called "money of Ifa." The diviner first shakes the sixteen nuts in his two hands; this process is called "beating the palm nuts." He then places them all in his left hand, and tries to pick up as many as possible with his right hand. If exactly one nut remains in the left hand, he traces two strokes on the powdered surface of the beautifully decorated Ifa tray; if two nuts remain, he makes one stroke on the Ifa tray. A record is made only when exactly one or two nuts remain in the left hand.

This whole process is repeated until eight single or double strokes have been recorded in two columns on the tray. One arrangement might be:
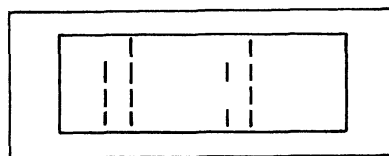
Each column has a distinctive name and significance, and since there may be either one or two strokes in each position, there are 2^4, or 16 different arrangements in each column. The names vary from region to region. As given by Bascom, four arrangements are:

Ogbe	Oyeku	Iwori	Edi
I	I I	I I	I
I	I I	I	I I
I	I I	I	I I
I	I I	I I	I

The right column is considered male, and is more powerful than the left, or female, column. Each of these double-column arrangements is called a "road of Ifa" or an *Odu*. Altogether there are $2^4 \times 2^4$, or 256 different *odus*, which are ranked from 1 to 256 in the order of their importance. With each *odu* there is associated a number of verses, each verse being related to a problem in real life, but couched in the oblique language so characteristic of Yoruba. As the diviner recites the verses associated with the *odu*, the client listens for the words appropriate to his own situation. The priests are also renowned as skilled physicians.

The Rev. Johnson suggests that the Ifa system resembles that of the oracle at Delphi. The following verse indicates a similarity to present-day psychoanalysis; it gives the supplant the confidence necessary to carry out the desired undertaking—and exacts a price.

Orunmila says each should take his own row;[1] I say each should take his own row; he says that Twenty Cowries takes his own row but cannot finish it.
Orunmila says each should take his own row; I say each should take his own row; he says that Thirty Cowries takes his own row but cannot finish it.

Orunmila says each should take his own row; I say each should take his own row; he says that Forty Cowries takes his own row but cannot finish it.
I say, "Well then, my father Agbonnire,[2] who can complete his row?" He says Fifty Cowries alone can complete his row, because we cannot count money and forget Fifty Cowries.

Ifa says he will not allow the person for whom this figure was cast to be forgotten. This person wants to do something; he will "complete his row" in the thing he wants to do.

-----

1. The row refers to a row in the fields to be hoed or weeded. Here, and elsewhere in these verses, it is often used in a broader sense to mean any undertaking, so that "completing one's row" means being successful in a given venture.
2. Agbonnire is a shortened form of Agbonniregun, another name for Orunmila or Ifa.*

A simpler system of divination, used for minor decisions, calls upon Opele, a lesser deity. For this purpose the oracle casts a divining chain on which eight half-pods or coins are strung at regular intervals, with a greater space between the fourth and fifth symbol. The diviner picks up the chain in the middle and lets it fall upon a flat surface in a two-column arrangement. The appropriate *odu* is determined by the sequence of convex and concave surfaces of the half-pods, or heads and tails on the coins, and the interpretation is exactly as with the palm nuts.

Some authors, including Ojo, claim that there are 16^3, or 4096 *odus* (roads of Ifa), while others state that there are as many as 16^4, or 65,536. Bascom maintains that the number is precisely 256.

91

For centuries the Yoruba rulers have maintained a hierarchy of Ifa diviners. At one time these oracles held a powerful position in the government of the state, even to the responsibility for the deposition of the reigning Alafin. Europeans reported witnessing the practise of Ifa at least as far back as the year 1705. The cult has spread far and wide—to Dahomey, Togo and parts of Ghana. Ifa geomantic divination has been preserved among the Yoruba descendents in Cuba and Brazil, where it has merged with Catholicism, and a Yoruba temple was recently opened on Seventh Avenue in New York City.

As mentioned previously, the number sixteen occurs in one of the creation legends, that of the palm tree with its sixteen branches representing the sixteen kings of the Yoruba.

In Ile-Ife, there stands an ancient sun-clock, a triangular monolith around which a circle has been drawn. This circle is divided into sixteen parts, and the position of the shadow in relation to the circle indicated in earlier days the time for the observance of certain festivals.

The state funeral of Lt. Col. Adekunle Fajuyi in January, 1967 was marked by the chanting of the Ekiti traditional dirge. At one point the singer cried:

I call you, won't you please answer?
I call you five times, six times!
I call you seven times, eight times!
I call you sixteen times. . . .

Later the cry was repeated in a different form:

Your father calls you five times, six times!
He calls you seven times, eight times!
He calls you sixteen times
Where the Olubije-mushrooms grow all over the road!
He calls you without stopping!
Your mother calls you too.

Reference was made to the sacred number 200:

"The one who enlightened 200 persons is your father."

Included in the gifts which a young man presents to his betrothed are forty kola nuts. Ritual requires that they be split and divided among the guests, indicating that they have witnessed the betrothal. The symbolic image associated with Ori, the household deity, is a crown of forty-one cowries.

The Yorubas recognize many subsidiary gods, or orishas (orisas), each associated with a specific function or event. The Rev. Johnson states 401 as the supreme number in the hierarchy; other authorities claim 201, 401, or 1600.

The worship of Orisha-nla, the deity of purity, has an important place in Yoruba life. The god's responses are thought to be interpreted by casting the four-valved kola nut. It can fall in one of five different positions, each carrying a certain symbolism. Sacrifice to this Orisha includes sixteen snails, sixteen roasted rats, sixteen dried fish, and sixteen kola nuts. In another phase of the festivities the priests strip 201 leaves from the branches of certain trees.

The number seven occurs in connection with the seven-day harvest festival, and with the Egugun celebration, which is dedicated to departed ancestors and observed with great homecoming festivities. One version of the creation myth refers to the seven grandchildren of Oduduwa, who subsequently became the rulers of the Yoruba and Benin peoples. Initiation into the mysteries of the worship of Shango, the god of thunder, required the payment of seven head of cowries (14,000 shells), according to Johnson.

A fascinating subject is the origin and

meaning of the symbols carved into the obelisk to the founder of Oyo, the "staff of Oranyan," still standing in Ile-Ife. The Rev. Johnson writes that the symbols are ☧ ⅂ , The Phoenician letters Resh Yod (read from right to left), representing the name "Oranyan." Precisely these letters were used in classical Hebrew, which was derived from Phoenician, as symbols for the numerals 200 and 10, respectively. The sacred number 200 again!

If we go further back to the Egyptian hieroglyphs, we discover that the letter Resh can be traced to the image of a head, while Yod represents a hand. Are these letters possibly linked with Ra, the sun-god of the Egyptians, and with Yahweh, the forbidden name of the Hebrew god? Recent investigations dash cold water on any such speculative interpretation. The eminent authorities, William Fagg and Frank Willett, in their 1960 article "Ancient Ife", state that there is "no justification at all for the interpretation of the relief carving on the Opa Oranmiyan in terms of Hebrew of Egyptian characters, nor for any explanations offered to account for the iron nails." They claim that the sketch of Oranyan's staff in Johnson's *The History of the Yorubas* bears little resemblance to the original, and that the number of iron nails driven into the granite monolith does not agree with that given in Johnson's description. It may take many more turns of the archaeologist's shovel to discover the true genesis and significance of the obelisk.

Africa Comes into Its Own

Until just a few years ago most of the available information about the continent of Africa originated from European sources—anthropologists, linguists, missionaries and administrative officers, each with his own axe to grind in the service of the colonial powers. The anthropologists and linguists studied African life and languages, thus enabling the administrative officers to set up the most efficacious governing apparatus. The missionaries introduced salvation through Christianity and Western education, and in return, the Africans served as police, soldiers, and lower level clerks in the employ of the colonial powers. Africa was the "Dark Continent," to which the Europeans were bringing light.

And the Europeans did an excellent job of brain-washing. "African societies frequently had a philosophy of great depth and value and beauty, they had poetry, and above all had *dignity*. It is this dignity that many African peoples all but lost in the colonial period, and it is this that they must now regain." So states the Ibo writer Chinua Achebe. When Christianity came to the Ibos, he says further, Nigerian dances were outlawed, and the people used cheap imported enamelware instead of the beautiful Ibo clay pots and bowls. Anything Ibo-made was branded as inferior.

Educated Africans were taught to scorn their own culture and languages. The Rev. Johnson wrote his History for the benefit of his Yoruba compatriots; they were knowledgeable about ancient Greece and Rome, but ignorant of their own past. These people became an elite, ideologically separated from their uneducated (by Western standards) fellow Africans.

I have in my possession a paper entitled "How the Binis Count and Measure," written by Peter Idehen, a Nigerian student in a teacher-training course in Abudu, Nigeria. One realizes the extent to which Africans have been robbed of their heritage when one reads in this essay: "It was said the the Portuguese taught the Binis (people of Benin) how to carve and do brass work." This was written at a time when

93

archaeologists and artists had firmly established the African origins of the techniques for creating these beautiful works. Later Idehen states that the Bini had no precise measuring units. "This condition was a bit improved when the Europeans especially the Portuguese came to Benin in the 16th century. They introduced bottles when they brought trade gin to the country. They brought kegs of gun-powder and many other containers. . . . They use the empty gun-powder kegs for dry measure; this they called Epipa." Indeed something to be thankful for! In relation to counting in their mother tongue, Idehen writes: "In schools teachers often stop at 30 or 50 because they themselves do not know how to count." Idehen himself had to seek assistance in writing the higher numerals.

Seventy-five years ago, L. L. Conant, in *The Number Concept,* called the Africans "savages." More recent authors have attributed every African accomplishment to the Europeans, to the Arabs, to the Indians, to the Mesopotamians, to ancient Egypt, whose people they classified as "Caucasian" in spite of evidence that many Egyptians were dark-skinned—in short, to any source but black Africans themselves.

Not only does one encounter a racist bias in seeking information about Africa; in addition, missionaries, anthropologists and colonial officers frequently misinterpreted or failed to understand aspects of culture and language. Ojo finds it necessary to criticize Ellis and Dennett for their interpretation of the Yoruba calendar. The errors are compounded as the same material appears in various books. For example, Conant translates the Yoruba word for "eleven" as "great ten"; no doubt this error appeared in the source from which Conant obtained his material. In fact, Migeod classifies the Yoruba numeration system as having ten, not twenty, as its base. Apparently his comprehension of the language was insufficient to cope with the contractions and elisions.

With the development of the new African nations and the rise of native universities staffed by Africans, the true story of Africa is emerging. European and American authors can afford—and are required—to be more objective. How can the image of Africa be stripped of the stereotypes, the misinformation, the Dark Continent prejudices developed over the centuries? To this end, I recommend the report issued by UNESCO of the meeting in Paris in 1968, dealing with educational methods designed to combat racial prejudice. Of particular interest to an educator is the statement, "Recommendations Concerning Terminology in Education on Race Questions," by Mr. A. Babs Fafunwa, Dean of the Faculty of Education, University of Ife, at Ile-Ife. After a brief, but pointed, explanation of the three factors that contributed to the development of racial prejudice between the 16th and 20th centuries— the slave trade, religion, and colonialism— Mr. Fafunwa gives this description of the "good" African of recent years: "one who was only African in blood, Christian by religion, and British or French in culture and intellect. He must shun things African such as images, artifacts, local attire, African mores and customs—all in the name of Christianity and civilization." The substance of Fafunwa's report lay in an analysis of the many terms which continue to be used in a derogatory sense in relation to Africa, words such as "tribe," "primitive," and "vernacular" (instead of "language").

The poignant story of the publication of the Rev. Samuel Johnson's history of the Yoruba people furnishes yet another example of racism. It is best told in the words of the editor, Dr. O. Johnson

(Ajagbe Ogun), brother of the author:

A singular misfortune, which happily is not of everyday occurrence, befell the original manuscripts of this history, in consequence of which the author never lived to see in print his more than twenty years of labour.

The manuscripts were forwarded to a well-known English publisher through one of the great Missionary Societies in 1899 and—*mirabile dictu*—nothing more was heard of them!

The editor who was all along in collaboration with the author had occasion to visit England in 1900, and called on the publisher, but could get nothing more from him than that the manuscripts had been misplaced, that they could not be found, and that he was prepared to pay for them! This seemed to the editor and all his friends who heard of it so strange that one could not help thinking that there was more in it than appeared on the surface, especially because of other circumstances connected with the so-called loss of the manuscripts. However, we let the subject rest there. The author himself died in the following year (1901), and it has now fallen to the lot of the editor to rewrite the whole history anew, from the copious notes and rough copies left behind by the author.

Due to other tragic circumstances, the book did not appear until the year 1921. After more than forty years of labor, *The History of the Yorubas* was published; it has since become a major source of information for all scholars in the field of Yoruba history and culture.

Can we evaluate the loss in human progress directly attributable to the consequences of racism? An attempt at such an evaluation staggers the imagination. Not only were the peoples of Africa considered less than human; the same racist attitude has prevented the black people of the United States from fulfilling their aspirations. Few are able to overcome the almost insuperable obstacles imposed by society,

to reach the level of achievement attained by Frank E. Chapman, the author of the as yet unpublished book *Science and Africa*. The following excerpts from Chapman's autobiography throw some light on the misery of his existence and his determination to devote his life to "the search for truth, for this is my only true religion."

On October 5, 1961, I was sentenced to life imprisonment and fifty years for murder and robbery. I was nineteen years of age at this time.

The circumstances which led to my present imprisonment greeted me the day I was born, and are shaping the destinies of millions of black men and women even now. These are the circumstances of material and spiritual poverty. . . .

I was the first-born of eleven children. . . . When I was about six or seven years old, my father, an unskilled black worker, turned thief, deserted the family and went on a hustling escapade (stealing, confidence games, gambling, etc.), across the country. Nevertheless, I intensely loved my father and his desertion of the family hurt me deeply. Although my mother was left alone to provide for us, and although we suffered a great deal from lack of food and clothing, I never hated my father for any of this. I just hated the way we had to live. . . .

By the time Chapman was eleven years old he had been arrested fifty or sixty times. Then followed several stints in reform schools.

During all this time, I had acquired a real, genuine hatred for society. I hated going to school, and staying home. I hated being on welfare, and my mother having to beg people for food so we could eat. I never could understand when I was a child why my mother had to suffer so much and why she had to beg "big shot white people" for food and clothing for her children. But deep within me I violently rebelled against this humiliation which had become a way of life for my family. I was powerless to eliminate our poverty, but I was not powerless to hate. Then there was the

brutality of racism. Every time I came in touch with white people, I was abused and spat on because of my so-called "Nigger-hood". . . .

When I was enrolled in Soldan High School in February 1957 (at the age of fourteen), I had a personal interview with one of the assistant principals by the name of De Shields. He told me that while in Booneville [State Reform School], I made an excellent academic record for myself and that I could possibly win a scholarship if I applied.

For the first couple of weeks, I enjoyed school work, and I was becoming absorbed in science, history, and literature studies. . . . Then one night around 1:30 police banged on our door and threw their flash-lights in my face demanding "Are you Frank Chapman?" I was taken to the Page and Union police station and charged with car theft. The police knew that I didn't steal the car but they wanted to clean up the books, and I was a likely suspect because I had just gotten out of Booneville for car stealing. . . . 1957 was a decisive year in my life because this was the year I gave up all hope of ever living a so-called normal life. I rationalized that with my past record, the police would never let me alone anyway, so I might as well make the most of it.

Chapman proceeded to "make it" in the only way he knew. Between crimes were several sojourns in the juvenile home and the state hospital for the mentally ill. At last he made his way to Chicago early in 1960, where he obtained a job in a hospital and was married at the age of seventeen.

After I got married I wanted to make it work. I got a job in Evanston, Illinois working as an assistant printer. I averaged about eighty-seven dollars every two weeks. This was just not enough money to support my family. . . . We separated. Our separation had nothing to do with the way we felt toward each other; it was simply a matter of survival. On the night we separated, I felt total despair, because this was one thing in life I wanted. . . .

I returned to St. Louis penniless and desperate in February 1961. My plans were to organize a stick-up ring and rob until I accumulated enough money to support my family comfortably.

I forget on just what day in March 1961 it was, but I remember it was dreary and raining. I was at a fellow's house I had just recently met, drinking wine, when he suddenly suggested to me, "Let's stick up that shoe shop and get some money." I replied "Okay." I walked into the shoe shop with a loaded twenty-two pistol. An old white man about seventy years old was sitting on a bench. When I said, "This is a stick-up," he leaped from the bench and grabbed me by the arm and the hand the pistol was in. In the process of wrestling, the gun went off and a bullet entered the head of the old man. To this day, I can't remember all the things I did right after I killed this man. I know I ran for blocks before I regained control of myself. The man I committed this crime with, I hardly knew, for we had only met two days before this incident. . . .

On April 6, 1961, I was apprehended by the police in Evanston, Illinois for suspicion of drug addiction. Two weeks later I was in St. Louis facing a charge of first-degree murder.

Presently, I am in prison, confined in a box-like cell, which is about six feet in width, seven and a half feet in length, and ten feet high. . . . Prison is a place where a few men acquire new dreams and new hopes, and where most men lose even the ability to hope for anything except a successful crime career. . . . But I left the courtroom with this conviction; I must know the truth about myself, I must become conscious of whatever forces have shaped my life and made me what I am. On that day life for me took a new and sudden turn. I wanted to live only to know myself better, and the world. I wanted to discover for myself my own humanity.

In many respects prison is almost an ideal place for study, for one has a great deal of leisure time. . . . First I enrolled in school, in the eighth grade. In a few months I graduated. This was the second time I had graduated from grade school. As soon as I thoroughly refreshed myself on the fundamentals, I began to study seri-

ously. The first subject I attacked was mathematics. In a couple of months I was doing advanced algebra. I read and studied such books as Eric T. Bell's *Development of Mathematics,* Lancelot Hogben's *Mathematics for the Million,* and *Mathematica Principia* by Bertrand Russell and Alfred N. Whitehead. After reading *Mathematics for the Million,* I had little difficulty in understanding the other books.

The study of mathematics led Chapman to natural science, then to philosophy and African culture and history.

I was determined to know everything the human race had done, as well as everything it is doing.

In 1964 I decided to write a book demonstrating the scientific contributions of African peoples to mankind. In June 1964 I wrote a brief synopsis of my ideas, and submitted it in the form of an article entitled "Mathematics in Antiquity" to the editors of *Freedomways* Magazine in New York. . . . Mr. John H. Clarke, an editor of *Freedomways,* got the article accepted by a Parisian magazine entitled *Presence Africaine.* After my article was accepted, I began to work on my book. . . .

Within a year *Science and Africa* was finished. Upon finishing I wrote the following: I would be the first to admit that this is a stupendous task for anyone to undertake, but it is a little more than that for a man in prison endeavoring to write and carry on scientific research under severe and trying circumstances; yet, I was and am determined to get the job done, and I am confident that this work (*Science and Africa*) will provide a useful and socially constructive outlet for the outpouring of that social energy I have inherited. I have spared no effort in the endeavor to make myself fully cognizant of the impact the modern world has had on me and my fellow human beings. And out of this has been born an outlook which has enabled me to link up my own individual social experience of mankind. . . . Such an outlook is not merely born out of dreams and fantastic longings for a better way of life; it is born out of man's efforts to grapple with his objective existence and it is the cul-

mination of all his constructive achievements. . . .

Reflections of this nature have led me to the conclusion that the most pressing task of African philosophers, scientists, and political leaders is the laying of ideological foundations by assessing the nature of Africa's role in the modern world, and thereby arriving at some concrete conception of her historical mission. . . . My *Science and Africa* deals with only one of the many significant effects of European imperialism. After conquering the world, the white man has falsely claimed that he and he alone is the benefactor of human civilization. In this book I try to destroy, theoretically, the white man's racial monopoly in the field of natural science; and to the extent that I succeed I will have contributed to the happiness and well-being of mankind.

I sent the manuscript to John Clarke, editor of *Freedomways* in the summer of 1966. *Freedomways* published some excerpts from *Science and Africa.* . . .

Through knowledge and understanding, I have freed myself from my past errors and have created for myself a bright and beautiful future. My great ambition in life is to try to keep others from repeating the mistakes I have made and to free my brothers and sisters from the humiliation of being black and poor. . . . I cannot accept the argument that I and I alone am responsible for what happened, for the crimes I committed. If that be the case, then the major premise of modern sociology and psychiatry is false. However, what I wish to bring out is the fact that I am a new man, with new interests, dreams and ambitions.

. . . I am not trying to conceal anything I have done behind glittering generalizations; I only want the reader of these cold and lifeless words to understand that ours is not the story of just a solitary man who presently destroyed his chances to be a fine fellow, but a man born into a social situation that chokes and cripples man's infinite capacity to produce and create. Therefore, what I have done, and what has been done to me, is in no way purely unique.

To tell the truth, my story is the story

97

of millions. One black brother has appropriately called us "The Wretched of the Earth".

Undaunted by failure to have *Science and Africa* published, Mr. Chapman has continued to work on the subsequent volumes, *Science, Society and Truth,* and *Race and Society.* We can only hope that such genius will soon receive the recognition it deserves, and that Mr. Chapman will be able to enjoy the relative freedom of life outside of prison.

Bibliography

Yoruba Numeration System

Ajayi, J. F. Ade. University of Ibadan. (personal communication).

Akinpelu, Jones A. (personal communication).

Armstrong, Robert G. *Yoruba Numerals.* Ibadan, Nigeria: Oxford University Press, 1962.

Chapman, Frank E., Jr. *Science and Africa.* Unpublished manuscript.

Conant, Levi Leonard. *The Number Concept.* New York: Macmillan, 1896.

Crowder, Michael. *West Africa Under Colonial Rule.* Evanston, Ill.: Northwestern University Press, 1968.

Delano, Chief Isaac O. *Conversations in Yoruba and English.* New York: Frederick A. Praeger, 1963.

Einzig, Paul. *Primitive Money,* 2nd ed. Oxford: Pergamon Press, 1966.

Eves, Howard. *In Mathematical Circles.* Boston: Prindle, Weber & Schmidt, 1969.

Hodgkin, Thomas. *Nigerian Perspectives.* London: Oxford University Press, 1960.

Johnson, Marion. "The Cowrie Currency of West Africa," *Journal of African History* XI, 1 (1970): 17-49.

Johnson, Samuel. *The History of the Yorubas.* London: Routledge and Kegan Paul, 1921, 1966.

Menninger, Karl. *Number Words and Number Symbols.* Cambridge, Mass.: The M.I.T. Press, 1969.

Murdock, George P. *Africa: Its People and their Culture History*. New York: McGraw-Hill, 1959.

Ojo, G. J. Afolabi. *Yoruba Culture.* London: University of Ife and University of London Press, 1966.

Seidenberg, A. "The Ritual Origin of Counting," *Archive for the History of the Exact Sciences II:* 1-40.

History of Southwest Nigeria

Aderibigbe, A. A. B. "Peoples of Southern Nigeria," In J. F. Ade Ajayi and Ian Esprie (eds.), *A Thousand Years of West African History,* 2nd ed. Ibadan: Ibadan University Press, 1968.

Apple, R. W. Jr. "Singsong Voices, Bright Caps Mark Ibadan's Yorubas," *The New York Times* (June 14, 1969).

Babayemi, S. O. "Oyo Ruins," *African Notes.* Institute of African Studies, University of Ibadan, Vol. 5, No. 1 (1968).

Crowder, Michael. *The Story of Nigeria.* London: Faber & Faber, 1966.

Davidson, Basil. *African Kingdoms.* New York: Time-Life Books, 1966.

DuBois, W. E. B. *The World and Africa.* New York: International Publishers, 1965.

Hodgkin. *Nigerian Perspectives.*

Johnson, Samuel. *History of the Yorubas.*

Lloyd, P. C.; Awe, B.; and Mabogunje, A. L. *The City of Ibadan.* Cambridge University Press, 1967.

McCall, Daniel F. *Africa in Time Perspective.* New York: Oxford University Press, 1969.

Shaw, Thurstan. "Radiocarbon Dates from Nigeria," *Journal of the Historical Society of Nigeria* III, 4 (June 1967).

Shinnie, Margaret. *Ancient African Kingdoms.* London: Edward Arnold, 1965.

Currency and Trade

Abraham, Roy C. *Dictionary of Modern Yoruba.* London: University of London Press, 1958.

Apple. "Singsong Voices, Bright Caps."

Basden, G. T. *Among the Ibos of Nigeria.* New York: Barnes & Noble, 1921, 1966.

Bohannan, Paul. *Africa and Africans.* New York: The American Museum of Natural History, 1964.

Conant. *Number Concept.*

Einzig. *Primitive Money.*

Herskovits, Melville J. *Economic Anthropology.* New York: Alfred A. Knopf, 1952.

Hodgkin. *Nigerian Perspectives.*

Ibn Battuta. *Travels in Asia and Africa, 1325-1354,* trans. and ed. H. A. R. Gibbs. New York: Robert M. McBride, 1929.

Jeffreys, M. D. W. "The Cowry Shell," *Nigeria,* Lagos, No. 15, 1938.

Johnson, M. "Cowrie Currency."

Johnson, S. *History of the Yorubas.*

Kirk-Greene, A. H. M. "The Major Currencies in Nigerian History," *Journal of the Historical Society of Nigeria,* II, 1 (December 1960).

Lloyd, P. C. "Osifekunde of Ijebu." In Philip Curtin (ed.), *Africa Remembered.* Madison: University of Wisconsin Press, 1967.

Murdock. *Africa: People and Culture History.*

Ojo. *Yoruba Culture.*

Ryder, A. F. C. "Dutch Trade on the Nigerian Coast during the Seventeenth Century," *Journal of the Historical Society of Nigeria* III, 2 (December 1965).

Smith, Homer W. *Man and His Gods.* New York: Grosset and Dunlap, 1952.

Ukwu, Ukwu I. "The Development of Trade and Marketing in Iboland," *Journal of the Historical Society of Nigeria* III, 4 (June 1967).

Sacred Numbers

Armstrong, R. G., Olayemi, V. and Adu, B. "Ekiti Traditional Dirge of Lt. Col. Adekunle Fajuyi's Funeral," *African Notes.* Ibadan, Vol. 5, No. 2 (January 1969).

Bascom, William. *Ifa Divination.* Bloomington: Indiana University Press, 1969.

Crowder. *Story of Nigeria.*

Crowe, D. W. "Mathematics in the Everyday Environment," *Entebbe Mathematics Workshop,* 1962.

Dennett, R. E. *Nigerian Studies.* London: Frank Cass, 1910, 1968.

Fagg, William, and Willett, Frank. "Ancient Ife," *Odu,* Ibadan, No. 8 (1960).

Forde, Daryll. *The Yoruba-Speaking Peoples of South Western Nigeria.* London: International African Institute, 1951.

Frobenius, Leo. *Voice of Africa.* New York: Benjamin Blom, 1913, 1968.

Idehen, Peter. "How the Binis Count and Measure." Unpublished paper written for a teacher training course at P.T.T.C., Abudu, Nigeria, 1962 (sent to the author by Jim Karns, Ohio University, Lancaster, Ohio).

Johnson, S. *History of the Yorubas.*

Leuzinger, Elsy. *Africa, the Art of the Negro Peoples.* New York: Crown Publishers, 1960.

Menninger. *Number Words and Symbols.*

Morton-Williams, Peter. "An Outline of the Cosmology and Cult Organization of the Oyo Yoruba," *Africa,* No. 34 (1964).

Ojo. *Yoruba Culture.*

Parrinder, Geoffrey. *Religion in an African City.* London: Oxford University Press, 1953.

Smith. *Man and His Gods.*

Stevens, Phillips. "Orisha-nla Festival," *Nigeria,* Lagos, No. 90 (September 1966).

Africa Comes into Its Own

Achebe, Chinua. "The Role of the Writer in a New Nation," In Barbara Nolen (ed.), *Africa is People,* New York: E. P. Dutton, 1967.

Conant. *Number Concept.*

Crowder. *West Africa under Colonial Rule.*

Fafunwa, A. Babs. "Recommendations Concerning Terminology in Education on Race Questions." In *Final Report of Meeting of Experts on Educational Methods Designed to Combat Racial Prejudice,* UNESCO: Paris, 1968.

Idehen. "How Binis Count and Measure."

Johnson, S. *History of Yorubas.*

Migeod, W. L. *Languages of West Africa.* London: Kegan, Paul, Trench, Trubner & Co., 1911.

Ojo. *Yoruba Culture.*