The starting point of this study is the apparent contradiction between the existence in Yupno (Papua New Guinea) culture of an elaborate number system and the lack of importance attributed to counting in everyday life. The study is designed to answer two questions: To what extent is the model described by the socially most prestigious expert shared by other Yupno men? How can the system be used to solve new, unfamiliar problems? Indeed, the variability found in the description and use of the number system is very important, to the extent where almost each subject uses it in a slightly different, idiosyncratic way. Without the help of a psychological perspective, this astounding variability may have gone unnoticed. However, to the anthropologist, it is too early to speak of a "requiem for the omniscient informant" because the ideal model "fits" with the rest of the culture—for example, the symbolic separation between the left and right parts of the body. Arithmetic computations can be performed by the older Yupno men using the traditional Yupno system and by children using school algorithms but not by those young men who are in between two cultures.

YUPNO NUMBER SYSTEM AND COUNTING

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Cultural anthropologists and cross-cultural psychologists do not work together as often as they should (Jahoda, 1982). The purpose of this article is to report on such a collaborative effort. The subject of the study is the number system of the Yupno of Papua New Guinea. It will be described in its ethnographic context, linking it to the culture as a system and studying its traditional use and individual variations in present-day use of the system in various segments of the population.

Lancy (1978, 1983) describes four types of number systems in Papua New Guinea (PNG) on the basis of data for 225 languages. Type 1 is a body-part tally system. Here, parts of the body above the waist are enumerated, beginning with the fingers on one hand and going up one side of the body and down the other. The Type 2 counting system is also a tally system, where objects are "tallied" using sticks to stand for collections or certain kinds of commodities are grouped into named sets of fixed size and these sets are counted. The Type 2 system has a base of 2, 3, 4, or 5, with 3-4 discrete

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number words; that is, the number words are primary lexemes and do not also name parts of the body. Type 3 systems are true counting systems that may have evolved from Type 1 and Type 2 systems. Most have a mixed base of 5 and 20, where the number for 56, for example, would be 20 by 2 and 5 by 3 and 1. The word(s) for 5 is *hand*, for 10, *two hands*, for 15, *three hands* or *two hands and one foot*, and for 20, *one man*. Usually only 1-4 are discrete number words. Type 4 counting systems have a base of 10, no body parts are used, and there are several discrete number words. That is, there are terms for number 1-6, 100, and 1,000 that have no other meaning. Type 4 systems are "very economical in terms of number word construction and can be flexibly used in a variety of applications. The concept of number is truly abstract" (Lancy, 1978, p. 7). Hallpike (1979) concurs that Type 1 and 2 systems do not entail a "true" number concept because they do not use cardinal number names and only produce a one-to-one correspondence between objects and body parts. Thus Lancy (1978) hypothesizes that these traditional number systems are interfering with schooling: "Perhaps their native mathematics system acted as a barrier in some fashion to the acquisition of modern mathematics" (p. 3).

Saxe (1981, 1982a) studied the ontogenetic development of the number concept and knowledge of a Type 1 body-count number system among the Oksapmin of PNG. Saxe's research showed that Oksapmin follow the same stages as Western children, with an additional stage linked to the specific problem of distinguishing the cardinal value of left and right symmetrical body parts. Older unschooled Oksapmin children (12-16 years) and adults could handle the system flexibly—for example, compare the cardinal value of a same body part when starting to count on the left (which is never done in practice) as well as on the right. Saxe (1982b) found that due to the sociohistorical change (introduction of cash, work on plantations, small shops, and schooling) the Oksapmin system had been adapted to handle addition and subtraction.

Mimica (1984), studying the base 5 and 20 (Type 3) number system of the Ilkawe found that the system is potentially infinite: 20 is one man, 20 by 20 is "as many persons as one person with all their hands and legs", although it is cumbersome and never used for large numbers. One of his (fairly acculturated) informants could translate numbers from Tok Pisin (Melanesian Pidgin English) up to 1,000.

Thune (1978) describing the Type 3 counting system in Loboda, Normanby Island, remarks that, in that society, numbers were hardly ever used in traditional life. Categories of things were exchanged as uncounted groups (e.g., evaluated in piles), without the possibility of exchange between categories; even money was evaluated in the same way. Thune concludes that number is not valued in this society (contrary to, for example, the Kapauku of Irian Jaya). He warns that introducing the English base 10 system (and a worldview compatible with it) may be disruptive to the society.

The purpose of this article is to follow up on some of the issues raised by previous research. The Yupno number system is interesting to document because it does not fit clearly into Lancy's classification scheme; it is a combination of Type 3 (said to be current in Morobe Province) and Type 1 (current in Madang Province) as well as aspects of Type 2 (use of tally sticks). An additional orientation of the study is methodological: The goal is to integrate the ethnographic approach with the psychological concern for interindividual variations (Wassmann, 1988). Thus the following two research questions were asked: To what extent does "the Yupno number system," as derived from a single "omniscient informant," correspond to the knowledge and representations of other Yupno people, are there variations, and do the younger Yupno still know the system? How can the Yupno number system be applied to solve new problems (addition, subtraction, multiplication) that do not occur in traditional situations but are now more and more part of daily life because of the introduction of the monetary system.

METHOD

ETHNOGRAPHIC BACKGROUND INFORMATION

The Yupno inhabit a rugged and isolated region in the Eastern part of the Finisterre Range, Madang Province, Papua New Guinea, at an altitude of approximately 2000 m. The Yupno are seminomadic; for several months in the year, they leave their villages to live in dispersed settlements at even higher altitudes, collecting screw-pine (Pandanus) nuts and hunting marsupials, feral pigs, cassowaries, and possums. Around their villages they cultivate sweet potatoes, and more recently, introduced vegetables. Their houses, surrounded by high fences, look like big haystacks; they occur only in this area of PNG and are well adapted to the cold climate. They have no windows, and in the middle there burns an elongated fire (as much as 10 meters long), which provides the only light (as well as large amounts of smoke and the opportunity to roast sweet potatoes and to cook food inside bamboo pipes).

The Yupno are the only people in PNG to have the *kongap*: Each individual owns a short tune that belongs to the person as a name does and that has either been invented by the individual or provided by bush spirits in a dream. When crossing a particular garden or stretch of bush, the Yupno will sing the tune of the owner of that land, thus showing that they are knowledgeable, and clearly indicating their own position; only strangers (i.e., enemies) are silent.

Because of the social fragmentation and individualism that characterizes Yupno culture, it is well suited for the study of intracultural variation; the question remains open whether the "omniscient informant," on whom traditional ethnography usually relies, really exists among the Yupno.

SAMPLE

This study was carried out in the village of Gua_ The full ethnographic study is reported elsewhere (Wassmann, 1991). The following subjects took part in this particular study: 5 old men, without schooling or knowledge of Tok Pisin; 5 middle-aged men, without schooling or knowledge of Tok Pisin; 4 middle-aged men, with some schooling and knowledge of Tok Pisin; and 6 schoolchildren (Grades 2 and 4, aged 10 to 16 years.

The sample does not include any women because tradition does not allow them to count in public; attempts to question some of them in spite of this failed because the situation was too strange for them. The interviews were conducted in Yupno with the help of an interpreter, who then also helped to translate the tape recordings into Tok Pisin. Given the local conditions, it was difficult to obtain a very large sample. Even the men were not completely at ease with the questioning, and they resented the difficulty of the problem-solving tasks, even though much care was taken to keep the experimental situation casual and flexible.

The sample is very small compared to most other studies in cross-cultural psychology, but given the field study conditions, it took several weeks to collect the data. The small sample is not a drawback, however, because a qualitative data analysis will be sufficient to answer our questions.

TASKS

The subjects were given the following tasks:

1. Count throughout the system, in the abstract, or when this proved difficult, with tallies (sticks).
2. Solve the following arithmetic problems, first in the abstract (orally, without objects), then with tallies (sticks) or money; schoolchildren were asked for written solutions: 11 + 8; 12 + 13; 23 + 7; 19 + 16; 22 + 23; 19 – 8; 85 – 45; 3 × 8; 8 × 3; 16 × 40; 1.20 + 1.30; 2.30 + 0.70; and 1.90 + 1.60.

The following are some of the wordings that were used:

Addition seemed to be fairly easy to translate into Yupno: *tumt tumit* (*timut* = to hold, to group).

Subtraction: *urok mavi kit* (*urok* = to throw out; *mavi* = to throw away; *kit* = movement—thus to take away). Despite an acceptable translation, subtraction is always understood as an inverse addition. Thus 19 – 8 is interpreted as "I have 8. How many do I need to reach 19?"

Multiplication: This operation cannot be translated exactly;; 8 × 3 is expressed as "8" *yan ong kabi* "3" (*yan* = thus; *ong* = this; *kabi* = many, group). Approximately: "Here are 8, make many with 3."

Division: cannot be translated exactly; the following may be used: *koki nok* (*koki* = to divide; *nok* = to separate). Division was not investigated beyond a pilot study.

RESULTS

THE TRADITIONAL YUPNO COUNTING SYSTEM

This description will follow the information gained from the most prestigious competent man in the community, who was used to working with the anthropologist, and described the system in a systematic and coherent fashion.

The system starts with counting the left hand from the little finger to the thumb: the fingers of the left hand are successively folded down with the index of the right hand. Distinct number words exist for 1, 2, and 3; 4 is expressed as "2 and 2", 5 is always "the finger with which one peals bamboo shoots" (i.e., the thumb), and usually the sum is indicated by saying "one hand," showing the closed fist. Numbers 6 through 9 are counted in the same way on the right hand, but adding "hand on the other side of the body." Ten is two hands, also called "mother."

Numbers 11 through 20 are counted on the feet; the index of the right hand points to each toe in succession, starting with the small toe of the left foot. Counting on the feet is done through using the same numerals as with the hands (adding "foot" and "foot on the other side of the body"), 15 is summarized as two hands and one foot, or "stepfather," and 20 by two hands and two feet, saying "a man is dead," meaning "one complete man" (or "the head of a pig is dead", in reference to the two-*kina* notes that show the head of a pig).

For numbers 21 through 33, the old number system continues with body parts, but the system is quite different from the Type 1 described by Lancy (1978) and by Saxe (1981) because it does not start on one side of the body to move up to the head and back down on the other side. Rather, two symmetrical body parts (left and right of the central body line) are used consecutively, then two others (ears and eyes, nostrils and breasts, testicles), intermixed, to mark each group of five (and number 33) with parts on the central body line (nose, bellybutton, penis). The testicles and penis are never named but are hinted at with phrases, such as "the bow strings" and "the man thing."

Once the last body part is reached, the sum is expressed as "one dead man" (the same words as for 20). The process can be repeated on a second person if there is a need to count beyond 33; thus 34 is "one man dead, one.") The Yupno body count system is illustrated in Figure 1.

Although our informant was asked to demonstrate the system without counting objects, this is unusual in everyday life. Usually, objects are counted, or one uses sticks as tallies standing for the objects (Type 2). With sticks, the system of counting up to 20 and beyond is to make groups of 5 through counting 2, 2, and 1, without calling out each digit name; the fifth stick is therefore called 1, or it may be called thumb, or one hand, or a "bunch." While each successive bunch of sticks is being set aside with one hand, the other hand designates the appropriate body part to make the increasing sum (5, 10, 15, 20). From 21 to 33, the body parts may be used as above, as they fit the succession 2, 2, 1.

USING THE SYSTEM IN EVERYDAY LIFE

No doubt Lancy (1983) is correct when he writes, "People [in PNG] are indifferent to quantitative aspects of things beyond 'one', 'two', and 'many' (p. 109). The Yupno count neither days nor people, nor sweet potatoes nor betel nuts, because counting has no practical meaning; at the only market in the Yupno area, near the airstrip of Teptep (like at all markets in PNG), individual objects are always grouped into heaps of a standard value (10 *toea*), the size of which is then evaluated. The buyer, who usually disposes of the appropriate coins, takes a heap and puts a 10t coin in its place. Thus no addition or giving back change is needed.

In the stores, the storekeeper does the calculations (usually on a calculator) and announces the total to the trusting customer. The latter puts money on the counter for the storekeeper to count and is either asked for more or given change. Often, each product is bought separately, so no addition is needed.

Thus there are only a few contexts in which counting is meaningful. Traditionally, this is the case for the exchange of bride price, and since the introduction of a small cash economy, to a limited extent the trade store and

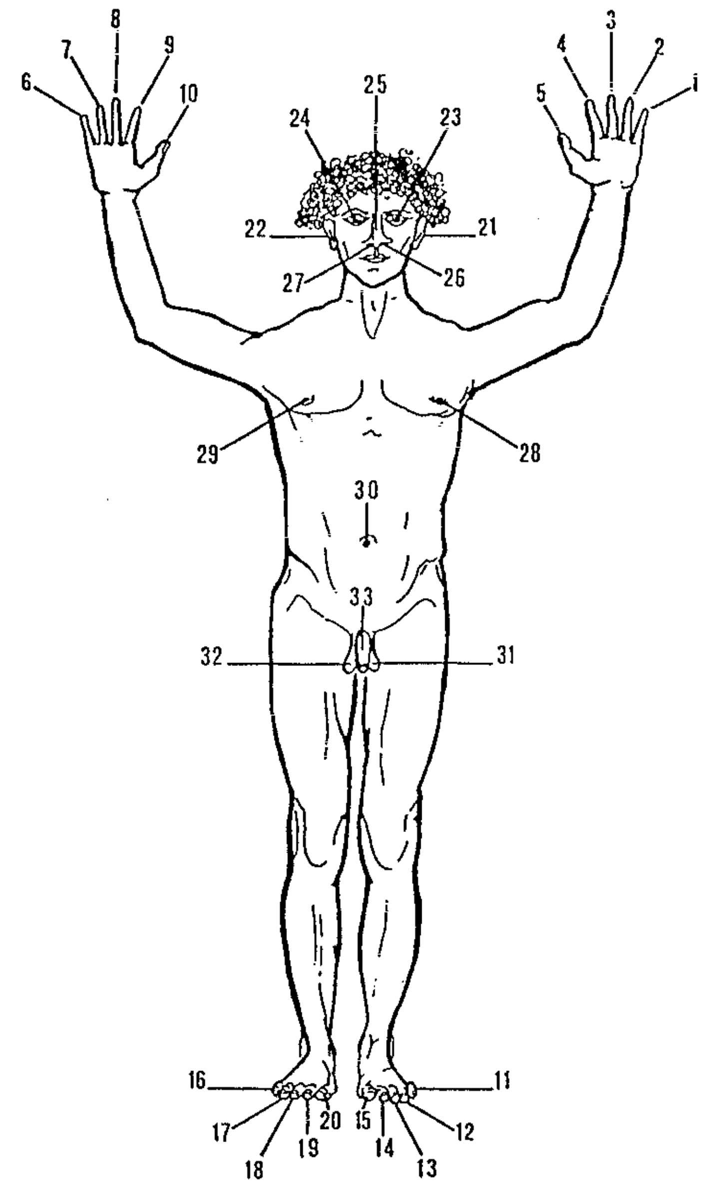

Figure 1: The Yupno Body Count System

the sale of agricultural produce, such as coffee and vegetables. In the first case, the older people count with the full 33 body-part system, the men aloud and the women silently for themselves. String bags and grass skirts are counted on the body, whereas pigs and traditional string money are tallied with sticks to keep a record because half of the value of the bride price will have to be returned in due course.

Since the introduction of cash (in the Yupno area about 1960), there have been three different monetary systems: first, the Australian pounds and shillings, then in 1966 Australian dollars and cents, and since independence in 1975, the kina and toea (1£ = 20Sh = 2K; 1K = 100t = about 1 U.S. dollar). Younger people and store owners use kina and toea, whereas older people still speak in pounds and shillings; a pound is "one complete man," meaning 20 shillings (or 2K).

In the village of Gua, the first store was opened in 1988. The storekeeper is a young man of 25, the only one in the village to have completed Grade 10 in a school on the coast. To explain a price to older customers, he uses a 5-20 system on hands (no feet, as this would not be handy behind the counter), calling out the meant value, as the same finger may have different meanings. Thus 1 finger = 1 Sh = 10t; or = 1£ = 2K (20Sh, 200t); or = 1 pig's head = 20K.

Depending on circumstances, one fist may be 5 shillings, 5 pounds (10K) or 5 pig's heads (100K). To indicate a price of 2K 50t, the storekeeper thus says "one man complete" and shows the little finger (20Sh = 1£ = 2K), and then says "5 shillings," showing the fist (5Sh = 50t).

If a customer buys a kilo of sugar (1K 50t) and a kilo of rice (1K 10t), the storekeeper would communicate in the following way: Showing two fists (10Sh = 1K) he would say "1 open hole" (the one-kina coin has a hole in the middle in analogy with the shells—kina = shell—on the traditional string of shell money); then, showing one fist (5Sh = 50t), "five round ones" (five 10t coins); then he again shows two fists, saying "1 open hole," and then "1 round one," showing the small finger of the left hand folded down; "together this makes one man dead" (20Sh = 2K), he folds down all fingers of both hands to show two fists twice (four fists = 20Sh = 2K), "and 6 round ones," folding down six fingers (6Sh = 60t).

USING THE NUMBER SYSTEM IN EXPERIMENTS

So far, we have described the Yupno number system on the basis of ethnographic observations and the account of a single informant; we now report how various other Yupno men and children described the system and how they were able to use it in solving arithmetic problems using addition and subtraction, problems that were totally new and unusual for them.

Counting

The complete number system with numbers from 1 to 33 is well known only by older men. The younger men also know about it but are less sure; the more acculturated young men use only the base 5 + 20 (Type 3) system (numbers 1 through 20). Schoolchildren usually know only the vernacular words for 1, 2, and 3; they usually count in Tok Pisin even when they use the vernacular.

Counting from 1 to 10 is fairly standard: The subjects usually start with the small finger on the left hand; some variation occurs in the labeling of the individual fingers, and sometimes fairly elaborate paraphrases are used.

With the exception of one old man (who inserted the body parts after 10), all other informants continued to count the toes. More variability occurs in the way this is done: Half the subjects start with the small toe, half with the big toe, and one informant first touched the big toe but then moved to the small one. Counting on the feet is done through using the same numerals as with the hands (but adding the word for "foot"), by calling out the name of the toes, using various paraphrases, or by grouping the toes 2, 2, and 1.

The greatest individual variability occurs for numbers beyond 20: Of 8 subjects using body parts, 2 started systematically with the left, 5 on the right, and 1 alternated right, left, left, right, right, left. Of the 8 systems recorded, none are exactly the same, and the 3 informants who were asked to count two or three times used a slightly different version each time: for example, starting either with ears or eyes or putting the nostrils before or after the nose. One subject reversed the order, starting with the penis, and saying one could start either up or down.

Often, two parts are named together (two eyes, two ears), or a group of three is announced before being counted (nose 3: left nostril, right nostril, and midline of nose).

The most striking fact is that the number of body parts used varies: The most frequently encountered system ended at 33 (4 subjects), but 1 subject used a system ending with 30, 2 with 32, and 1 with 37 (he added the chin, the mouth, neck, and backside). Counting always ends with the penis, but it is the number of intermediate body parts that can vary.

In sum, there is a fair deal of uncertainty about the "correct" way to use the system beyond 20; this may have always been the case, or it may be due to the fact that the old system is now used only very infrequently.

We took advantage of the individual ways of using the system to confront two older men (S and N) who were using the system differently: After the standard sequence for 1 to 10, both of them started counting with the right foot, but whereas one of them (S) started with the small toe, the second started with the big one. Furthermore, S counted the body parts from the ears down (two ears, two eyes, nose, two nostrils, two breasts, bellybutton, two testicles, and penis, leading to a total of 33), while N counted from the penis upward (penis, two testicles, two breasts, nose, two nostrils, two eyes, and two ears, leading to a total of 32.

We asked the two men the following question: "If you both count pigs. One of you (S) counts one man, two ears, and left eye (23); the other (N) counts one man, and from the penis to the left eye (30). Would you both have the same number of pigs?"

One of them (S, who often acted as informant and knew some Tok Pisin) was supposed to explain the problem to N. However, he was himself of the opinion that they should have the same number of pigs, and therefore found it very difficult to convey the problem, and then tried to influence the answer of his partner.

We repeated the same problem with counting money up to the left breast (2K 40t for N; 2K 80t for S). Again, they answered that they should come up with the same amount, and both showed surprise when the difference was demonstrated with real coins. The explanation was "on the body it's the same number, but here we counted money."

Next, we asked both of them to count 2K 40t. For S, this led to the right eye and for N to the left breast. At this stage, a lively discussion took place, summarized by S in the following way: "Yes, there is a problem because one starts at the bottom and the other one on top. If we both start on top, we come up with the same number."

We thought they had understood the problem linked to using the system idiosyncratically and so asked them if they would come to the same toe if they counted to 12. The informants said, "Yes, the value of each toe is fixed. This comes from our ancestors. It cannot change." Asked for a demonstration, S switched to counting 11 on the big toe like N, thus eliminating the problem.

It is quite clear that, at least at the beginning, both men failed to see the problem, attributing it to the usual hair-splitting on the part of the White fellows. For them, a same body part had to express the same value, and they were oblivious to the different way of using the body count. This militates against the flexible use reported by Saxe (when he presented his informants with the problem of starting with the left hand compared to starting with the right). However, our two informants were able to understand the problem after it was demonstrated to them with money. One could say they had the "competence" to understand it when helped but did not display the spontaneous "performance" (see Dasen & Heron, 1981, about this distinction). However the found solution was not easily transferred when we asked a similar problem about counting on toes (where the two men had started on different sides).

Counting to infinity. It is accepted by all that after counting "1 man" (20 or 33), it is possible to start again; usually this is done by designating a particular person in the attendance. A count of 44 sticks was expressed as follows by one informant: "One man is dead (33), another man from the family of the bride, his first hand, his other hand, and then there remains one toe." Occasions to go beyond two or three men would have been rare; traditionally, higher numbers were only used in the exchange of bride price, and even then it would have been unusual to count more than 33 pigs.

The general opinion is that it is not possible to go on counting beyond this limit. This opinion is shared by the younger, educated informants, who think that the English (Tok Pisin) number system is unlimited ("number is a long road without end"), but that this is not true of the Yupno system, if only because it would be cumbersome. When pushed, all 3 younger, educated men—who did not know the old system!—were able to translate from Tok Pisin the number 400 ("20 fellow men, or the hands and legs of one fellow man with all hands and legs"); one of them continued to 800 using a base 20, the other speaking in pounds (1 pound = 1 fellow man). None thought that it was possible to express the number 8,000 in the traditional system, but after this was demonstrated to them, one said, "It stops when thinking stops," meaning that it really becomes too cumbersome. Mimica (1984) may have been exaggerating in his philosophical analysis based on the answers of one single (educated) informant, the likelihood of these traditional counting systems to be imagined as capable of reaching infinity. We do not think that such a demonstration is necessary to consider the system as "truly abstract."

Arithmetic

for this part of the study, we asked the men to solve some arithmetic problems that were first set orally in the abstract (without objects), then with sticks laid out to illustrate the problems, and finally allowing the subjects to manipulate the sticks. We also tried to set the problems as meaningful stories, but this proved to be counterproductive because it would lead the subjects to talk about contextual details. For example, the following story was used for the subtraction problem 19 – 8: "You want to marry P's daughter. The bride price was set to 19 pigs. You have already paid 8 pigs. How many will you have to pay later?" The answer was, "Friend, I am not rich enough to buy a new wife. Where would I find 8 pigs? Besides, I am an old man and have no more strength." After this he could not be moved to tackle the problem again, it having been rejected as preposterous.

Addition. The Yupno system can be used by old men to compute simple additions (e.g., 11 + 8, 12 + 13, 23 + 7) if the total stays below 33; additions with larger number (e.g., 19 + 16, 22 + 23) did not seem possible. The following example is how the problem 12 + 13 was solved by one old man using sticks: He counts both sets (2, 2, 1) breaking them up in groups of five. He shows two hands and two toes (12), then he shows the three other toes of the same foot, and groups the units (3 + 2 = 5) saying, "One foot is finished." Looking again at the sticks that now form five groups of five, he says, "One man is dead. I start on another man, only one hand; all my hands and feet are finished. I am starting with Sivik (another informant present), from him only one hand." The subject, through decomposition and the base 20 part of the system, thus avoids using the upper body parts.

The younger, educated men were able to do these problems in the absence of objects, whereas all others needed the support of objects (even if these could not be physically moved). Several subjects broke the numbers down into groups of five to facilitate computation or counted only the units, leaving the tens aside.

The addition of 23 + 7 poses a special problem as both the first number and the total are shown on body parts (e.g., left eye, ending with bellybutton). The four old men who attempted to solve this addition first went too far (Saxe's, 1982a, "global" strategy). One immediately realized this and returned to the appropriate body part. One solved the problem on the second attempt through "double enumeration" (establishing a one-to-one correspondance between the body parts and the first seven numbers on the fingers), and another one by using the base 20 system without the body parts.

Subtraction. The older men solved the problem 19 – 8 through physically or mentally removing eight sticks, and then counting the remainder. One educated young man turned the problem into an addition, counting up, two by two, from the smaller to the larger number, and thus calling one body part by another (see Saxe, 1982b).

Multiplication and division. Multiplication (3 × 8, 8 × 3) was possible only if objects were available, which were counted, thus in fact avoiding the problem as such. Division was too difficult for all subjects.

School arithmetic. The same arithmetic problems were set to a few schoolchildren. Younger children (Grade 2, aged 13-14 years) openly used finger and toe counting (up to 20) along the lines of the traditional system but using English number words. Older children (Grade 4) used finger counting only in a hidden way (moving fingers only slightly or just looking at them). Observations at the local school showed that teachers allowed and even encouraged finger counting. The older children used decomposition (breaking down) of numbers combined with the algorithm of handling units and tens separately and then carrying. In written format, several children tried to apply school algorithms, but starting from the left instead of right. Multiplication tables (and the corresponding divisions) are taught even in the initial grades, obviously without conceptual understanding.

Quite obviously, if these children experience difficulties with arithmetic, this is not due to the interference of a traditional number system, of which they have no knowledge, but is either due to inappropriate teaching methods, and/or to the fact that arithmetic is not a part of their daily life outside school. Contrary to the Brazilian schoolchildren studied by Carraher, Carraher, and Schliemann (1985, 1987), who develop their own oral algorithms through practice when they sell produce in the market, for Yupno children the school is almost the only context in which arithmetic is used. It is therefore not surprising that they solved oral, written computation and word problems in much the same way and with the same rate of success.

DISCUSSION

NUMBER CONCEPT

Number has not been a very important part of Yupno daily life, either in the past or now. It is quite astonishing to find such an elaborate system considering it is so seldom used. Because the Yupno counting system is only known to older men, it is not possible to study its development in children as Saxe did for the Oksapmin. On the other hand, we have some observations on the flexibility with which the system is used by older men. The very fact that many variations occur points to flexibility: Whether the right or the left foot is used first does not matter. One informant even started the body-part system with the penis and moving upward, explicitly stating that it could be used both ways.

A further indication that the counting system is used "abstractly" is the possibility to solve unusual problems such as addition, and subtraction, and breaking numbers down into groups of five. The fact that this can be done usually only in the presence of objects, and that subtraction and

multiplication are handled through addition, represent, on the other hand, a limitation.

VARIABILITY

There is a surprisingly wide variability both in the counting itself and in the way the system is used to solve problems. It is difficult to decide whether the counting system is simply used in a very flexible way, or whether the participants were unsure about it (and insecure because of the testing situation) and just made "mistakes." At the end of this series of interviews, some informants were questioned about this variability: All agreed that the system used by the "big man" of the village (as described above) was the proper one. However, this may be telling only of the social influence of this man.

On the other hand, on the question of starting with the left or the right side of the body, there seem to be good reasons to think that the "correct" way is to start on the left. This is because, symbolically, the two sides of the body are not equally valued. When the Yupno speak of body orientation, they think of a man looking downstream (east); the left side of the body (pointing north) is the passive, cold, female side of man, the one that "helps" (*kwandim* = the helper). The right side of the body (oriented south) is the active, hot, male side (*amin tet*: *amin*= man, *tet* = to tighten the bow). This symbolism applies especially to the two hands: The right hand is the one that tightens the bow; the left one helps in holding it.

The counting procedure is congruent with this symbolism: The active right hand is used to point to the fingers on the passive left hand, folding each finger down in turn. By analogy, it would seem coherent to start with the small toe of the left foot to count 11, but here occurs a problem: Whereas the palms of the hands are pointing upward during counting, the contrary is true of the feet, and the small toe is on the left while the small finger was on the right. This asymmetry may account for the fact that so many informants start to count with the big toe.

SOCIOHISTORICAL CHANGE

Through acculturation, the "old" Yupno counting system is coming into disuse; the younger generation uses only the base 5-20 part of it and often prefers to use Tok Pisin instead of vernacular numerals. Similar to what Saxe describes, this part of the system is occasionally used in new contexts, such as the store, but only to communicate a total amount; calculations are done only by the storekeepers and this only in Tok Pisin (and usually with calculators).

Three distinct groups differing in the degree and kind of acculturation can be distinguished through our observations and experiments:

1. Old men who have had no schooling and have not been to the coast but still know the traditional counting system, even though to various degrees of expertise. They can work with it, and they can even solve problems that are entirely new to them. They are also familiar with the recently introduced monetary system and have incorporated it conceptually into their culture in a conservative way, as they still refer to the old system of pounds and shillings that is no longer in use.
2. On the other side of the dimension are the schoolchildren. They no longer know the traditional counting system and prefer to use Tok Pisin number terms, even when they speak in their vernacular language. To solve arithmetic problems, they usually apply algorithms learned in school with various degrees of success, even though all of them occasionally revert to counting on fingers and toes in the old base 20 system.
3. The victims of sociohistorical change are those young men who have not been to school and have not learned Tok Pisin; they know neither the old system, because they are too young, nor the new system taught in school. They cannot solve any arithmetic problem because they do not have the necessary tools, neither old nor new.

One fascinating question that remains unanswered is how such a double (base 5-20 and 33) number system came about. Has it always been the way it is now, or has it been adapted through external influences? There could have been a borrowing from a coastal base 5-20 system, or the Western influence of the old Australian monetary system with pounds and shillings (and even more recently the Western base 10 system taught in school), so that only the first part of the traditional system is used to handle the new cash economy. Because there are no data on the counting systems of surrounding populations and historical data are almost impossible to obtain, there are at present no scientific means to choose between these alternatives.

THE BLENDING OF ANTHROPOLOGICAL AND PSYCHOLOGICAL METHODS.

This study illustrates how a psychologist and an anthropologist can work together and complement each other. Introducing psychological methods (interviewing subjects of various ages and social categories; confronting them with new tasks to cope with) allowed several discoveries that may have gone unnoticed if standard ethnographic observations had been used alone. However, the results would have been uninterpretable without ethnographic embedding. For example, the variability found in the description and use of the number system is very important, to the extent where almost every subject uses it in a slightly different, idiosyncratic way. This variability is, at first sight, rather astounding in such a normative area as a number system; ethnographic knowledge about the daily use of the system (always in public and always going through the motion of the whole number sequence), explains why the idiosyncrasies are not necessarily dysfunctional.

Despite the obvious benefits of combining methods, it is too early for the anthropologist to speak of a "requiem for the omniscient informant" because the ideal model "fits" with the rest of the culture—for example, the symbolic separation between the left and right parts of the body. Just as universality and cultural relativity are not necessarily opposites, a cultural model and intracultural variability may be two complementary descriptions of the same reality.

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