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What is This?

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The Final Requiem for the Omniscient Informant? An Interdisciplinary Approach to Everyday Cognition

A Psychologist and an Anthropologist Converse in the Field

(From minutes recorded from memory during the fieldwork of Pierre R. Dasen (PD, psychologist) and Jürg Wassmann (JW, anthropologist) in the Yupno Valley, Papua New Guinea, 1987: the discussion has been going on for some time and the tone of the conversation is slightly tense.)

PD: You are continuously trying to find an ideal-typical presentation of the system [of the Yupno culture]; what's missing is the occupation with actual everyday life. For instance, in West Africa there are real artisan villages. I could observe the people there while they were working and ask them direct questions.

JW: Here, there just don't happen to be any specialists, and what is produced, anyway? String bags, arrowheads, perhaps. And during the day the people are scattered all over the place. Some are gardening, others hunting in the bush. Good. In the evening they're all in their houses. But these are pitch dark. What am I supposed to be able to watch there?

PD: It's true that the Yupno are very individualistic. But, because of this, we

also have the chance of obtaining individual answers. The disadvantage is, of course, the general 'speechlessness'.

JW: One simply mustn't ask direct questions, but must limit the people to specific subjects.

PD: In addition, the answers are much too uncertain and we can't react to them quickly because your knowledge of the language is still too limited. Also, many questions (e.g. about 'multiplication' or 'subtraction') can't, apparently, be posed adequately because the respective words don't exist.

JW: We have noticed that the men all count a bit differently. Good. Nevertheless, I'd rather sit for hours with a single informant—he trusts me and he talks.

PD: No! You have to question a lot of people, collect samples, for example we still need 10 old women for counting.

JW: Impossible! How am I going to find 10 old women? They won't come, because they're afraid to give answers. They have the feeling that they're being 'tested'. Look, in the attempts to classify 'hot' and 'cold' objects they ran away. They found the whole thing absurd.

PD: It went quite well with the numbers.

JW: Yes, but they're not particularly important to the Yupno.

PD: I find it simpler if one first knows which cognitive problem one wants to examine and, accordingly, then looks for a 'suitable' culture: for conceptions of space, for example, I go to Australia; for problem-solvings regarding handicrafts, I go to West Africa—that makes sense.

JW: Not at all. I want to describe a culture; as far as I'm concerned, the individual variations in everyday life too. In any case, that with which the people are concerned, otherwise they just don't come [into our house] at all. The methods [of psychology, for example] are, therefore, only an aid. The Yupno tell me themselves what presents a problem.

(And so it went on for quite some time.)

The Theoretical Background: From Ethnoscience to the Cognitive Sciences

The *year of birth* of the 'cognitive turning point' (Holenstein, 1988) or the 'cognitive revolution' (H. Gardner, 1985), in which, apart from anthropology, various human sciences participated, to some extent, independently of each other, is considered to be 1956. At an MIT conference that year on information theory, Newell and Simon presented a paper on computer programs; Miller presented his famous treatise 'The Magical Number Seven'; and the 28-year-old Chomsky read excerpts from his thesis 'Three Models of Language'. In the same

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year, Bruner et al.'s book *A Study of Thinking* was published and two anthropologists, Goodenough and Lounsbury, published the first two programmatical articles on cognitive anthropology: 'Componential Analysis and the Study of Meaning' and 'A Semantic Analysis of the Pawnee Kinship Usage'.

With 'cognitive anthropology', or, more precisely, with the 'ethno-scientific' phase of cognitive anthropology, a new field of research came to the fore. Its goal was to describe other cultures in their own conceptualization, that is, in emic terms or 'from the inside' (Headland, Pike, & Harris, 1990). Different cultures categorize the 'world' differently and apply a different type of 'logic' in dealing with their environment. This difference—insofar as it is encoded in the language—should be recorded. The *underlying question* was an old one: What does the 'order out of chaos' look like? While, formerly, this 'order out of chaos' was frequently described with our own categories, that is, 'from the outside', ethnoscience persistently attempted to find these corresponding categories in the respective cultures themselves. No longer 'words for things', but 'things for words' (Frake, 1962, p. 72) were sought.

The way in which the environment is 'organized' can best be analysed (according to the assumptions of ethnoscience) by means of language. Therefore, the basic questions were, more precisely: How do other cultures label the 'things' in their environment, and how are these labels related to each other?

The labels are both an index of what is felt to be important in the environment and a means of discovering how the perceptions of the environment are organized. As a result of designations and classification, the extent of variation in the environment ('chaos') is reduced to a specific, surveyable 'order'. The type of classification is, at the same time, culture-specific and cannot be defined, a priori, by our anthropological metalanguage.

Consequently, classical cognitive anthropology had *two goals*:

1. to find out which environmental phenomena are considered to be important and how they are designated; and
2. to find out how these designated phenomena are classified one with another or which semantic properties 'make the difference', in order to construct a model, 'an idiography', by means of these classifications, and this with the objective of relevantly and validly describing those cognitive processes(!) of 'order out of chaos'.

One can argue that *three premises* formed the background to this ambitious programme:

Premise 1: Culture is common ('shared') knowledge.

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> A society's culture consists of whatever it is one has to *know* or believe in order to operate in a manner acceptable to its members, and to do so in any role that they accept for any one of themselves. ... It is the forms of things that people have *in mind*, their models for perceiving, relating, and otherwise interpreting them. ... Culture does not exist of things, people, behaviour, or emotions, but in the forms or organizations of the things in the minds of people. (Goodenough, 1957, pp. 167–168, emphasis added)

Seen in this way, culture is a mental phenomenon.

Premise 2: Knowledge has the form of a 'cultural grammar'. Anthropologists must, on the basis of the statements made by their informants, inductively discover this abstract and shared knowledge as a system. In principle, they can, in so doing, limit themselves to *one* person. In this case, the same applies as when learning a foreign language, where it (at first sight) suffices to have one speaker at one's disposal. The knowledge system of a culture is understood to be a 'conceptual model' which embraces the organizational principles of the culture and the behaviour of its members. The model is, so to speak, a 'cultural grammar' (Conklin, 1969, p. 93), a 'code for communicating' (Black, 1969, p. 166) or a 'set of rules' (Frake, 1964, p. 132).

Premise 3: Language is the best means of access to mental phenomena. With the 'reduction of chaos', certain phenomena and characteristics are selected from the environment as being significant, named and given a classificatory meaning. The main (but not the only) proof of the existence of a category is its label. In addition, the following applies: 'Culturally significant cognitive features must be communicable between persons in one of the standard symbolic systems of the culture' (Frake, 1962, p. 74), that is, principally by means of the language. This results in a restriction to classification expressed in language, as is reflected in the terminologies. This restriction is consciously accepted: 'The analysis of a culture's terminological systems will not ... exhaustively reveal the cognitive world of its members, but will certainly tap a central portion of it' (Frake, 1962, p. 74).

The equation of culture and knowledge proved to be very fruitful. In the 1960s, ethnoscience experienced its rapid success. Innumerable studies about—which was to be expected—terminologically densely structured individual fields were published, such as on 'kinship' (e.g. Goodenough, 1965; Lounsbury, 1956), 'colours' (e.g. Conklin, 1955), 'ethnozoology' (e.g. Bulmer, 1967), 'ethnobotany' (e.g. Conklin, 1954) or 'illness' (e.g. Frake, 1961).

One succumbed, as it were, to the great theoretical temptation to reduce complex and ostensibly heterogeneous things to a few rules

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(inclusion, exclusion and intersection) and to present them as elegant models which were looked upon as mental images (taxonomy, paradigm).

At the beginning of the 1970s, however, only a very few studies appeared, and in 1972, Keesing could begin a paper with the sentence: 'Whatever happened to ethnoscience?' (p. 299). A number of *problems* arose.

Problems with Premise 1: The many individual studies could not attain (to the degree expected) the ambitious goal of studying *the* collective knowledge (culture). They had to virtually limit themselves to smaller fields (such as 'kinship', 'colours', etc.) and, in so doing, due to a type of 'cognitive determinism', also failed to see individual deviations and different degrees of participation in the collective knowledge (cf., however, Wallace, 1961, 1968). They were just as little able to explain why different models could be constructed in a certain field with the same informants, contrary to expectations (as shown in the debate on so-called 'psychological validity', which led Burling [1964, p. 20] to the question: 'God's truth or hocus-pocus?').

Problems with Premise 2: The majority of studies saw knowledge as something static (simply: as 'grammar'), firmly organized into precisely defined fields ('semantic domains') in the form of lexemes which, reduced to their referential meaning, were organized according to taxonomic rules. They forgot to take into account the dynamic use of knowledge, and were helpless when confronted by those fields which were terminologically weakly structured ('fuzzy sets').

Problems with Premise 3: In general, the studies were exclusively focused on language material and overlooked the fact that knowledge is also expressed by means of actions or emotions.

Only subsequently did it become evident how highly dependent ethnoscience was on structural (pretransformational) linguistics. Its analytical model was only an 'extension to cultural phenomena of the paradigm of pretransformational linguistics' which emphasized the 'emic description of cultural uniqueness, discovery procedures, phonological models, and a finite corpus' (Keesing, 1972, p. 299). Here lies the irony: when, at the end of the 1950s, ethnoscience took over this model from linguistics and it became the focal point in the 1960s, it had already been swept aside in linguistics itself by Chomsky's new generative linguistics. The actual paradigmatic change in linguistics initially made ethnoscience methodologically homeless; it overtaxed it. Consequently, Burling (1970) wrote: 'Tell me, whatever happened to the good old phoneme?' (p. 681).

The result was *an opening and turning towards modern trends in*

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neighbouring disciplines. Computer science proved to have a particularly strong influence; when the first computer programs appeared which 'played' chess, the question arose: 'If computers could have programs, why couldn't people?' (D'Andrade, 1984, p. 88). In endeavouring to reproduce human cognitive processes in the model, cognitive anthropology employed the 'information-processing approach'. In so doing, the assumption (at that time) that cognitive processes follow the same pattern universally, whether in humans, in animals or in the machine, or in other words that the software is the same everywhere, irrespective of the hardware in which it is processed, was, from a philosophical point of view, highly explosive.

Cognitive anthropology understands itself more and more to be a part of the new 'cognitive sciences' and has participated in joint conferences since 1979. These meetings show the growing convergence of different disciplines towards a 'cognitive science'. In so doing, anthropologists want to 'convince other cognitive scientists of the heretofore largely neglected role of cultural presuppositions in human cognition. However, Holland and Quinn (1987) sceptically observe: 'Several of the formal discussants, deliberately recruited from fields of cognitive science outside of anthropology, made clear their scepticism about that discipline's contribution to cognitive studies' (pp. vii–viii).

The opening of cognitive anthropology leads to new terminology appearing in publications: 'category' and 'semantic attribute' have been superseded by 'schema', 'prototype' and 'proposition'. Simultaneously, cognitive anthropology splits up in different directions, each with it own thematic focal points. Finally, *the three premises of ethnoscience are reconsidered and extended*: What is new now is *where* 'knowledge' is sought and *how* it is represented—whereby the basic question, that is, that of the type of knowledge and its structuring (as 'order out of chaos'), remains the same.

Revised Premise 1: Turning towards the individual. Attention is now no longer focused on the whole collective knowledge system of a culture which, as it were, is supposed to be recorded as the ideal type, but on the knowledge applied by an individual in everyday life. This also means that, apart from interviewing the individual, preferred informants specialized in specific cultural fields (the experts and 'omniscient informants'), samples are collected which are intended to reveal widely scattered individual knowledge and, thus, individual variations (cf. Boster, 1985; Gardner, 1976; Romney, Waller & Batchelder, 1986). Differentiation is logically made between 'Culture' (as 'représentation collective' in the sense of Durkheim) and the distinctive 'culture' of each individual. The focus shifts, because it is now known

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that inferences cannot be directly drawn from Culture to individual cognitive processes or structures (Jahoda, 1982, p. 214). Consequently, the 'just plain folks', the 'jpfs' (Rogoff & Lave, 1984; Lave, 1988), become the centre of attention: the 'average' members of a culture who acquire, store (memorize) and reapply knowledge in their daily lives and in different contexts. (Although it is quite possible that 'jpfs' can be 'omniscient informants' or 'experts' in certain other fields.)

Revised Premise 2: Operationalization instead of categorization. As soon as 'knowledge' is no longer defined as an isolated system, but as something which is evident (be this verbally or non-verbally) in everyday use (by individuals), it becomes clear that many categories and semantic fields have no fixed boundaries, and cannot be defined in the classical sense ('fuzzy sets'). They are now also grouped according to what a person can *do* in daily life ('*task*onomy' instead of '*tax*onomy'), or else according to prototypes ('best example' from a category). It is 'everyday cognition' that a housewife needs when she shops, a milkman when he distributes dairy products to his customers according to a certain pattern, a Yakan in the Philippines when he wants to enter a house correctly. This everyday cognition is not the static knowledge of a 'sujet épistémique [sic]' (Dasen, 1992), but applied knowledge in function which, as a result, is also given a certain structure.

Revised Premise 3: Turning away from language as the only instrument which codes knowledge. Knowledge is also effective in non-verbal actions. 'Actions Speak Louder Than Words' is the title of an article by Gatewood (1985). Habitual actions in particular, can be very 'eloquent'. In 1977, the computer specialist Schank and the sociopsychologist Abelson introduced the influential term 'script' to describe stereotyped sequences of actions in certain situations. Tyler's book *The Said and the Unsaid*, which appeared in 1978—nine years after Tyler had published the first textbook on 'classical' cognitive anthropology (1969)—also refers to the same factor of 'tacit knowledge'. (With a certain logical consistency, the title of Tyler's latest book is *The Unspeakable* [1987].) Thus, although language remains one of the focal points, it is treated differently: no longer as a lexicon, but in everyday use as 'discourse' from which inferences must be drawn as to the intended 'message' (Hutchins, 1980; Lutz, 1987; Randall, 1985). Beyond this the (controversial) idea is that the structure of knowledge (as stored in the 'head') is not necessarily language-like: '[K]nowledge organized for efficiency in day-to-day practice is not only non-linguistic, but also not language-like in that it does not take a sentential logical form' (Bloch, 1991, pp. 189–190).

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If the individual acting in his or her daily life now arouses interest, this is a consequence of a paradigmatic change: cognitive anthropology now considers itself—as previously mentioned—a part of the cognitive sciences, which, inter alia, leads to the word 'cognition' being better understood (Berry, Poortinga, Segall, & Dasen, 1992; Segall, Dasen, Berry, & Poortinga, 1990). Cognition is no longer an expression of a culture as a whole and abstracted from linguistic material, but understood as *mental activity of individuals who actively apply knowledge in different contexts*, in that they think, generalize, draw inferences, perceive, recognize and categorize; analyse, combine, assess possibilities, solve problems and make decisions; classify, differentiate and choose; remember and master new situations. These activities are performed individually or between individuals (Hutchins, 1988) but, nevertheless, take place somehow within the broad framework of the 'Culture'. This brings us to the actual subject of this paper.

An Interdisciplinary Approach Is Proposed

Cognitive behaviour can be investigated everywhere, be it the American housewife who, with her hair in curlers, compares prices in the shopping centre, or be it a woman in Papua New Guinea who counts the grass skirts when the bride price is being handed over. Here, the second option was chosen, and with good reason. For although cognitive anthropology now finds itself in a, theoretically, very promising position, a certain amount of disillusionment remains if one reviews what has actually been published in the last 10 years.

Thus, for example, Werner (1985) poses the question as to how 'a cup, a mug and a bowl' would differ. On the basis of definitions from dictionaries(!) he lists the characteristics common to all the vessels and those in which they differ. In his treatise 'Two Theories of Home Heat Control', Kempton (1986) describes the conceptions which informants from Michigan have of a thermostat. Quinn (1982) examined, in 90 interviews carried out with Americans, the meaning of the word 'commitment' in their own life-history and with reference to their own marriages. Each of these arbitrarily chosen examples admittedly contributed to the theoretical discussion within cognitive anthropology: to the definition and designation of objects; to the use of different mental images of same objects; to words ('scenario words') which simultaneously also imply objectives for actions.

Nevertheless, are they not, compared with the possibilities of cognitive anthropology, also an expression of a certain despair?

Furthermore, it is noticeable that many (or even most?) of the studies

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are based on research carried out with American and European informants (housewives, sailors, students, etc.). In the three most influential new cognitive anthropology readers (Dougherty, 1985; Holland & Quinn, 1987; Rogoff & Lave, 1984), for instance, 'foreign' material is very seldom presented. Usually the context is known both to the researcher and the reader, and within this context an attempt is made to prove something on the basis of a given problem: that housewives in the shopping centre solve arithmetical problems without falling back on the knowledge they gained in school; that milkmen with little education are much more efficient in their job environment than, for example, students when they take over their job; that college students also have difficulties with syllogisms, etc. This seems legitimate for a young, still uncertain discipline, such as cognitive anthropology. The fact that anthropologists pay attention to their own culture and do not pose as 'professional dealers in exotica' (Keesing, 1985, p. 201), can also be said to be positive.

Nevertheless, is it not about time to apply the new cognitive approach to the traditional task of anthropology, that is, to record the type, structure, acquisition and use of knowledge, to other cultures also? This is certainly more demanding and attended by greater difficulties.

After all, the contention that interdisciplinarity is not only a (theoretical) strength of cognitive anthropology, but is also plainly and simply necessary is certainly correct. The questions are so comprehensive that different disciplines (from the cognitive sciences) must participate in this endeavour, not least because traditional anthropology can contribute little in terms of methodology. As early as 1978, Cole demanded an 'ethnographic psychology of cognition', for:

> There is precious little in the anthropological literature to guide anyone convinced that real life situations as well as experiments [i.e. not only descriptions of systems] must be included in a science of culture and cognition. (p. 630)

For this, the cooperation of neighbouring disciplines is imperative. Thus, characteristically, the three readers mentioned combine the works of anthropologists, psychologists and linguists (which partly explains why US material is so predominant).

Nevertheless, has interdisciplinarity not been limited in the past only to a mutual 'recognition'? This is a pleasing initial step, which must now be followed by others, for instance practical cooperation in the field.

Against this background, the project 'Ethno-Cognitive Research of

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the Yupno in North-Eastern Papua New Guinea' evolved in 1986. The aims were to record the cultural knowledge of the Yupno as comprehensively as possible, at the same time to produce the first ethnographic data on this previously unknown culture and, finally, interdisciplinary cooperation in the field itself. Consequently, the three anthropologists participating worked together with botanists, two physicians, a psychologist and a musicologist. In the following, the mode of procedure and results of the cooperation between the author and the cross-cultural psychologist Pierre R. Dasen, will be briefly discussed (for further results cf., e.g., Keck, 1992, 1993; Kocher Schmid, 1991; Niles, 1992; Wassmann, 1993, 1994).

The objective was to record the cultural knowledge which individual Yupnos have at their disposal in specific areas which are of importance to them, to describe its *nature*, to identify how it is *distributed* between the individuals, to determine whether, in the course of this, *variants* emerge, and to describe *how it is applied* by the Yupno 'jpfs' in everyday life. An endeavour was made to come 'closer' to the mental knowledge model of the individuals—this, with the aid of self-conceived experiments which are, nevertheless, in the tradition of Piaget and Bruner.

This casts doubt on the assumption, derived largely from Durkheim, that underlies much of traditional fieldwork practice, namely that anthropologists are not concerned with individuals as such, but merely with their functioning qua carriers of a common culture. With the above formulation of questions it becomes necessary to study individuals, or categories of people, in their own right rather than merely as some kind of cultural 'subunits'. For this reason also, the need was felt to go beyond the questioning and observation of everyday behaviour that forms the stock-in-trade of traditional anthropology, and it was felt that the special skills and techniques of psychology might usefully be employed as an integral part of the work.

The phrase 'an integral part' is crucial here. Historically, the first joint enterprise was the famous Cambridge expedition to the Torres Straits (1898–9), where anthropologists and psychologists worked in parallel, each group pursuing its own separate objectives. In subsequent cooperative ventures, there was closer contact, but, as a rule, still a rigid division of labour, with psychologists mainly administering tests of various kinds. By contrast, here, the anthropologist and the psychologist both planned and executed certain key aspects of the fieldwork together, jointly pursuing the same objective: mainly the ascertainment of the nature and distribution of cultural knowledge within the community.

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This does not mean that the world-views under consideration are regarded as mere collections of bits and pieces without any coherence. They may be said to constitute a system, but it is an open system subject to continuous change; and the extent to which it is apprehended by members of the culture occupying different positions within the community may vary considerably. (Thus, incidentally, a further traditional, Durkheimian assumption is challenged, namely that a culture is characterized by a set of 'collective representations' shared by its members.)

Consequently, an interdisciplinary approach was developed and tested on the actual ethnographic case. In addition, the proposed approach draws conclusions directly from what has already been said with regard to the development of cognitive anthropology. The approach comprises a three-stage mode of procedure which links interview, observation and experiment with each other:

(A) Interviews with a few key informants *and* 'jpfs' (as a consequence of revised Premise 1);
(B) Behavioural observations in everyday settings, to study the application of knowledge in daily life (as a consequence of revised Premise 2);
(C) Experiments (which are basically non-verbal, although the subsequent verbal reasons for actions taken are important) to induce behaviour that is not observable in everyday situations (as a consequence of revised Premise 3).

(A) Interviews

The ethnographer, for good reasons, often starts by interviewing a few key informants, usually 'opinion leaders', persons with high social status in the community, who can present a coherent, normative system. With these 'omniscient informants', who are experienced in answering the anthropologist's questions, it is possible to elaborate intensively on the verbal material, for example to dissect concepts into their semantic components, that is, to collect the qualitative data that are basic to the ethnographic method (Agar, 1986; Bernard et al., 1986; Werner & Schöepfle, 1987).

This first model is then confronted with alternatives derived from interviews with as many individuals as possible in order to collect variations and establish the distribution of knowledge in different segments of the population (according to age, sex, special experience, education, and so on).

(B) Observations

Interview data are not sufficient to describe the use of knowledge; the

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observation of how 'jpfs' apply the normative system in concrete situations, and how they talk about it among themselves, is a necessary complementary step. In practice, interviews and observations are alternated.

But observation brings with it its own problems. In everyday settings, routines determine the actions; rarely can one spontaneously observe how an individual is confronted with a new problem that is conceptualized as such and leads to the search for solutions. 'Problem formation and problem solving are very likely to be integral parts of a single process in many real world environments' (Murtaugh, 1985, p. 192). If a problem is solved, this occurs automatically, almost unobservably, and it is not easy to assess from the outside what the individual's thoughts have been. Another problem is that cultural knowledge is often 'transparent to those who use it', and once it is acquired, 'it becomes what one sees with, but seldom what one sees' (Hutchins, 1980, p. 12). Thus, cultural knowledge is often used unconsciously: it is implicit (Strauss, 1984), incorporated (Chamoux, 1981), non-reflexive. For these reasons, experiments are often unavoidable.

(C) Experiments

In order to observe problem-solving (as the most striking part of cognition, although cognition is more than that) more easily, subjects (Ss) are confronted with artificial situations, accompanied by instructions and questions; a problem is created that can be solved through the explicit and conscious application of cultural knowledge. These situations are called 'experiments' or 'quasi-experiments' here (Lave, [1988] speaks of 'simulation experiments') because the Ss are asked to do something unusual, which is new to them. (In psychology, the term 'controlled observation' would be appropriate.)

While experiments are the basic tools of psychologists, they are unusual in traditional anthropology; they were carried into the field by Price-Williams (1978) and especially Cole and co-workers (Cole, Gay, Glick & Sharp, 1971; Cole & Scribner, 1974; Scribner & Cole, 1981) under the name of 'experimental anthropology'. The advantages of such a procedure are obvious: how a particular knowledge is used in a new situation can be more easily observed and can tell us more about cognitive processes than the observation of daily routines. Another advantage is that experiments do not have to be verbal; non-verbal behaviour can be observed, although verbalization can help to render it more explicit. But there are disadvantages too, which is why anthropologists often reject experiments: if the situations are too artificial, and the Ss not used to being put in such strange situations, it

is not certain that they will be able to show their true cognitive competence. This is why it is important not to rely on single experiments, but to multiply the situations until the researcher can be reasonably assured that the performance reflects the competence (Brown & Sechrest, 1980; Lonner & Berry, 1986).

The three-stage mode of procedure described above was practically applied with the Yupno. Four different areas of knowledge of the Yupno culture were examined: the number system and counting, classification of the environment, classification of foodstuffs, as well as the conception of the own settlement area as 'space'. The results will now be described briefly.

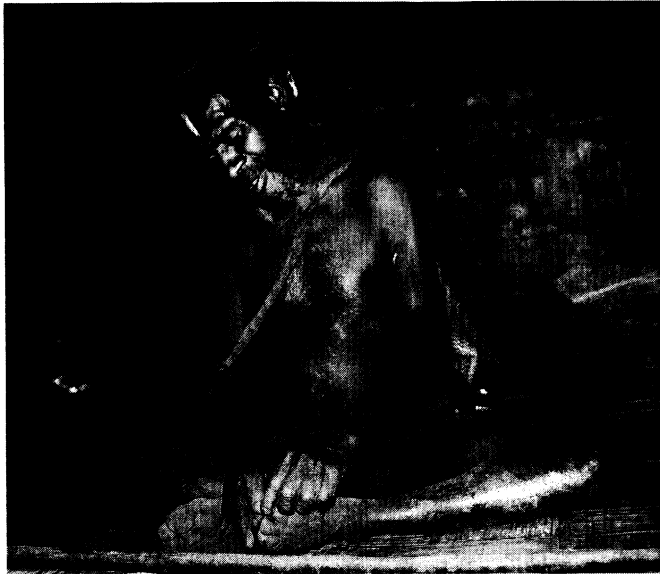## Number System and Counting

(A) This description will follow the information gained from the most prestigious, competent man in the community, Jowage, who was used to working with the anthropologist, and described the system, even when questioned several times, in a systematic and coherent fashion.

The system (see Figure 1) 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 finger of the right hand as Jowage counts. Distinct number words exist for 1, 2 and 3; number 4 is expressed as '2 and 2'; 5 is always 'the finger with which one peels bamboo shoots', that is, the thumb, and usually the sum is indicated by saying 'one hand', showing the closed fist. Numbers 6 to 9 are counted in the same way on the right hand, but adding for each finger 'hand on the other side of the body'. Ten is two hands, also called 'mother'.

Numbers 11 to 20 are counted on the feet; the index finger 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 by using the same numerals as with the hands (adding 'foot' and 'foot on the other side of the body').

For numbers 21 to 33, the number system continues with body parts. Two symmetrical body parts (left and right of the central body line) are used consecutively, that is, pointed to and named, 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, belly button, penis). Once the last body part has been reached, the sum is expressed as 'one dead man'. 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'.
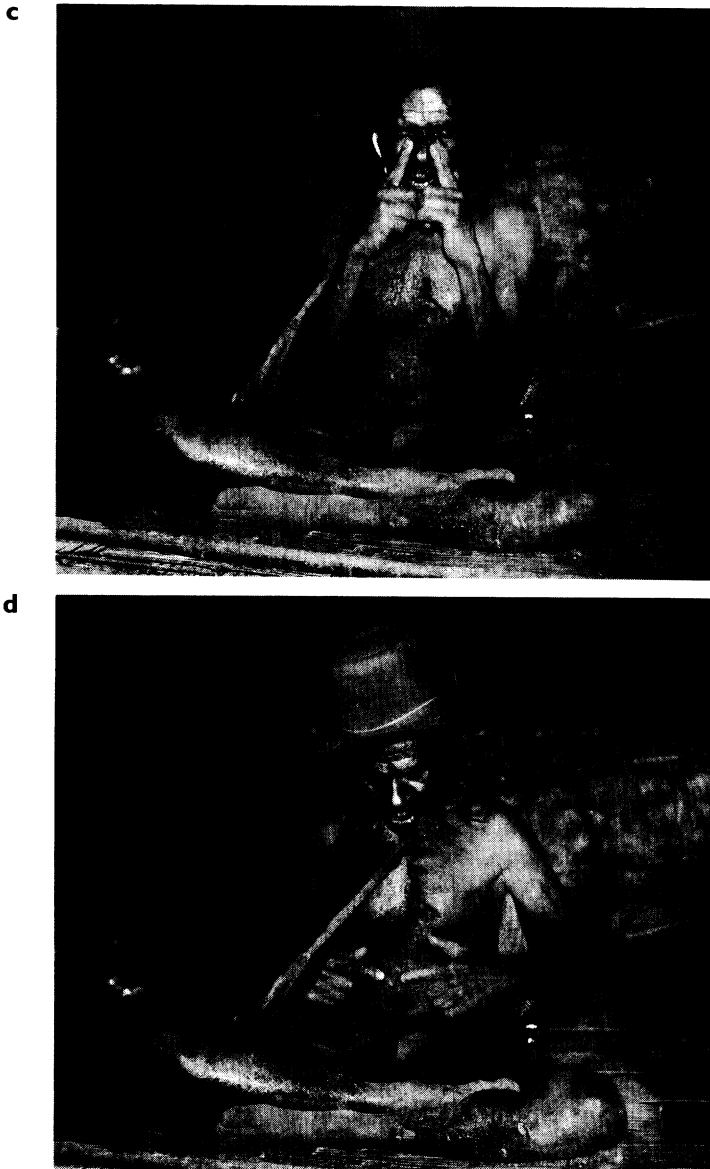
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a

b

Figure 1.

c

d

Figure 1 (a)–(d) Jowage, the 'omniscient informant', counts on his body: '15', '21–22', '23–24', '30'.

If one now asks 'jpfs', a different picture emerges. 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 basic 5 + 20 system (numbers 1 to 20). Schooled children 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 of the left hand; some variation occurs in the labelling 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 Ss start with the little toe, half with the big toe, and one informant first touched the big toe, but then moved to the little one.

The greatest individual variability occurs for numbers beyond 20: out of eight Ss using body parts, two started systematically with the left, five on the right, and one alternated right, left, left, right, right, left. Of the eight systems recorded, none is exactly the same, and the three informants who were asked to count two or three times used a slightly different version each time: starting either with ears or eyes, putting the nostrils before or after the nose, etc. One S reversed the order, starting with the penis, and saying one could start either up or down.

The most striking fact is that the number of body parts used varies: the most frequently encountered system ended at 33 (4 Ss), but one man used a system ending with 30, two used one ending with 32, and one used one ending with 37 (he added the chin, the mouth, neck and backside). Counting always ends on the penis, but it is the number of intermediate body parts that can vary. Since counting must always start with '1', it remains doubtful that the cardinal aspect of the numbers plays a role.

(B) The system is seldom used in everyday life. 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 (as at all markets in Papua New Guinea), 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 10 t coin in its place. Thus, no addition or giving back of 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 only for the exchange of the bride price: 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 and pigs and traditional stringmoney 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.

(C) What is surprising is that the Yupno have a sophisticated counting system, but seldom use this. Therefore, this induces the question as to the extent to which the number system can be applied to solve new problems (addition, subtraction, multiplication) that do not occur in traditional situations but which, in the course of time, can become important in everyday life due to the increasing significance of the monetary system. The informants ($N = 17$) were asked to solve some arithmetic problems which were first set orally in the abstract form (without objects), then laid out with sticks to illustrate the problems, and, finally, the Ss were allowed to manipulate the sticks.

To cite 'addition' as an example: 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 numbers (e.g. 19 + 16, 22 + 23) tend to be difficult.

The following example is how the problem 11 + 8 was (almost) solved by one old man (Paka) using sticks. The beginning of a (conventional) splitting-up of numbers is evident.

Paka had two groups of sticks in front of him (11 and 8). He first counted the sticks in the smaller group out loud: '2', '2', '1', simultaneously pointing to the left hand, then he referred to three with the left hand, put down three sticks again, and said '8'. With the second group, also, he said '2', '2', '1', '2', '2', '1', '1', and picked up the corresponding sticks. He said: 'One hand is finished, three are on the other side' (= 8); then: 'Two feet are finished, one toe is still there' (= 11). Paka counted everything again, the small group in the same way as above. With the 11 group, he said: 'Ear, one' (= 11). (It was this informant who usually counted the parts of the body after the hands.) Paka began again, looked at the individual stick (= 11) for a long time, but did not add. Then, suddenly: ' "8", that one [stick, from the 11 group] should come over here [to the 8 group], it makes "9" ' (the actual sum was not stated, but he had a row of 10 and a row of 9). (From a report dated 23 September 1987.)

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Addition, e.g. of 23 + 7, poses a special problem, since both the first number and the total are shown on parts of the body (e.g. left eye, ending with belly button). The four old men who attempted to solve this addition first all went too far, that is, they didn't know where to stop. One immediately recognized this and returned to the appropriate part of the body. One solved the problem on the second attempt by 'double enumeration' (establishing a one-to-one correspondence between the parts of the body and the first seven numbers on the fingers), and another one by using the basic 20 system without the parts of the body.

To sum up: as far as addition and subtraction are concerned, the new problems presented can be solved with the old counting system—even if in a different way. The old men, those who have not been to school and have little or no coastal experience, still know the old counting system—though to differing degrees and in an individual way. They can 'work' with it, and thus solve, in a more or less skilful manner, arithmetical problems which are, for them, unusual. The school-children also find correct solutions. They no longer know the old counting system and predominantly use the algorithms learned in school, even if all of the children, to a greater or lesser degree, still make use of their hands and feet. On the other hand, middle-aged men are overtaxed: they cannot solve any problem at all, because they have no instruments; they know neither the old counting system (because they are too young) nor the new system taught in the school (because they have had no schooling).

Classifying the Environment: 'Hot', 'Cold' and 'Cool'

(A) The following is a short description of the 'hot/cold/cool' system of classification, derived from interviews with key informants (specialists and others), as well as other Yupno adults.

All the things that the Yupno know about, the objects of the surrounding world, the village, the gardens, the bush, animals, people, are always in one of three states: *tepm* ('hot'), *yawut* ('lukewarm', 'fresh', 'cool') or *mbak* ('cold'). These words are used both to describe physical reality (temperature) and, metaphorically, to designate a qualitative state: 'hot' and 'cold' are extreme states and, thus, undesirable; a 'hot' state is dangerous because it cannot be controlled, and a 'cold' state produces immobility and speechlessness in humans. Only the middle or 'cool' state is normal and good, and most objects in the environment are usually in this state.

Tepm also has the meaning of quick, immediate, strong, biting (on

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the tongue), painful and sick; the word also relates to objects that are long, high, on top; it designates movement, and the right side of the body (because it is the right hand that bends the bow). Emotionally, *tepm* is associated with the meanings sorrowful, depressed, determined and enraged. If someone has a serious problem (e.g. infertility), this is usually attributed to some misbehaviour (of that person or someone in the family or clan) like adultery or a mistake in paying the bride price; the social harmony is disturbed, and that person is now *tepm*, 'on top' or outside the social group. In the same way, someone who is independent and determined is 'long', 'carries the head straight', is 'on top', that is, 'can no longer hear what others say'. That person has a problem and is, therefore, 'hot'. Someone who gets too hot may 'burn', namely die.

Mbak means cold in the metaphorical sense: broken, shameful (the state that renders one speechless), lethargic (but not dead). It also designates the left side of the body (because the left hand only holds the bow).

Yawut designates slow, careful, light, confident, weak, soft and little. The word is used for things that are below, short, and people who are socially well integrated. The person who is *yawut* is in the middle, is neither passive nor arrogant, is in the middle of people, at the same level, taking the ideal position: slightly bent. Just as a well-educated person enters a house slightly bent (if only to avoid breathing in the smoke), the *yawut* person avoids extremes, avoids taking sides, does not fight or talk back, is neither lazy nor overactive, but does the needed work amidst all the others, listening to them at the same level. Only such a person can become knowledgeable and influential. 'To listen' and 'to be a knowledgeable man' are expressed by the same word.

Now these are not static states, they are variable, can be influenced and manipulated, but while all Yupnos know about the three states, only a few experts know how to change them. These experts are called 'sorcerers', because they have special knowledge that relates to magic, which is, to a large extent, kept secret.

(B) Because the sorcerers' activities are secret, they are almost impossible to observe. The village of Gua, in which the research was carried out, has about seven sorcerers. One of them named Yam, with whom a particularly trustful relationship was established, agreed to reconstitute for the anthropologist some of the manipulations, and to describe them in detail. These details will not be presented here. The basic idea, however, is the following.

Manipulations are achieved through the principle of transmission

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through contact: if something has to be 'heated up', it is brought into contact with already 'hot' objects. The goal of manipulations is always to be useful or harmful. If that object was initially 'cold', the change will be useful making it 'cool', otherwise it is harmful. The transmission occurs by adding or taking away 'vital energy' to or from the 'body-soul', and this makes things (objects have a 'body-soul' too) and people 'different' (which also means beset by a taboo, holy, unapproachable). Someone who is different is outside the social norm, is no longer socially integrated, and is exposed to the escalation of the abnormal state and, possibly, destruction. On the other hand, the ideal state (of the bent person) is to have just enough vital energy, neither too little nor too much.

Some objects are predisposed to have a lot of (or very little) vital energy and are thus particularly useful for manipulations. Thus things that are red or black (dark), that are dry, stinging or burning, and are found on top are 'hot'. Things that are white (light), that are linked to water, and are to be found below are 'cold'.

Which objects a particular sorcerer chooses to use for manipulations is, nevertheless, a highly personal affair, inherited, derived from experience and trial and error or from knowledge acquired in dreams. In other words, given the 'general purpose model' (Quinn & Holland, 1987, p. 32), there are many individual 'instantiations'.

(C) Given the cultural model that all Yupno adults know about, and for which a few experts have the appropriate secret knowledge to put it into action, how would this knowledge influence their behaviour in a cognitive task? Would the experts use the highly abstract dimension (hot/cold) more readily than others?

To answer these questions, a sorting task was constructed. Nineteen objects were selected that could clearly be classified as either 'hot' or 'cold', but could also be classified according to other criteria: colour, form, function or taxonomy. Some pairs of objects were purposefully included that look alike to the layperson, but are distinct for the experts (two sorts of bamboo and two sorts of ginger roots). The objects were presented on a tray, in random order, and the Ss ($N = 30$) were first asked to name each object and then 'to put together those that belonged together, that had the same characteristics'.

The results show that, whether expressed as an abstract category or its associated function (to 'heat up', to 'cool down'), the 'hot/cold' distinction is used explicitly and spontaneously only by the expert sorcerers. The other older men tend to give a slightly different, functional explanation for their groupings: 'things that are used in rituals', in which the 'hot/cold' distinction is only implicitly present.

Indeed, all things connected with rituals always tend to be 'hot'. Women also give mainly functional reasons linked to their activities: feeding pigs, which is linked to 'cold', and dyeing string bags. The younger, more acculturated men and children, along with some individual answers, predominantly choose the criterion of colour. Form is never used, nor is 'substance' (Lucy, 1992), and generic names very seldom.

The following example shows how a sorcerer classifies (see Figure 2) and then gives the reasons for his classification as shown in Table 1. Other items he simply didn't choose. With ashes, the sorcerer was at a loss; the 'cold' ginger was ignored. In some cases, even during classification, he literally threw all other objects into a corner of the house: the white pebbles ('the Yupno River should take care of it'), the *tambun* leaf (*Claoxylon ledermanii Airy Shaw, Euphorbiaceae*: 'it's absolutely useless'; undoubtedly because it's used for dyeing, a woman's affair), the two canes of bamboo (*Bambusa Graminae*: 'they are neither nor').

When asked to form two (and only two) groups, the sorcerer made two perfect and complete 'hot/cold' groups explaining: 'These are cold, these are hot'.

The 'hot/cold/cool' model is an 'understanding system' for all Yupno which helps to order the world. Many anthropologists would say that this is *the* hallmark of Yupno culture. But what is the influence of this collective representation on individuals? How is this model available for action? How is the knowledge distributed in society? The answer to these questions is that those who manipulate the system (i.e. the sorcerers) have the model present in their minds, and use it explicitly as an 'acting system' (D'Andrade, 1984, p. 91). The highly abstract categories of 'hot' and 'cold' are really operative for this group of people, actually over-riding powerful perceptual features. For others, it is hidden, present only at some deep level; they use it implicitly (e.g. in sorting out according to function) in specific domains and situations, depending on their sex and age. For the more acculturated Yupno and schooled children, this cultural knowledge is no longer relevant; in fact, in the sorting task, schooling seems to induce the use of the concrete, perceptual cue of colour rather than the more abstract, traditional Yupno system.

Classification of Foodstuffs

(A) If one asks adult male and female informants about the individual foodstuffs, one first and foremost obtains a differentiation between the

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Figure 2 A sorcerer
begins to classify
according to the 'hot/
cold' model.

Table 1.

Classification	Criteria	Classification	Criteria
1. Black earth, red earth	'for certain work' (colours of religious things)	5. Banana (*Musa*)	'cold', 'in case of sickness', 'to cool down pigs'
2. Insect, red ginger, (*Zingiber officinale*)	'hot', 'for magic against people' (heat up)	6. Sugar cane (*Saccharum officinarium*)	'ends a problem' (cools down), 'cold'
3. White earth, *petpat* leaf (*Crinium asiatica*)	'cold', 'to cool down anger'	7. Butterfly	'If you want to marry a woman, I "bewitch" her food, pulverise this butterfly and mix it with that' (the food becomes 'cold', the woman is 'cold', i.e. defenceless; the butterfly is considered to be the symbol for women)
4. *Yaiyaal* fruit (*Elaeocarpus*), *tira kosum* flower (*Commelina paeata Hassk.*)	'to dye string bags'	8. *Njimil* leaf (*Cordyline*)	'used in divination'
		9. *Umban* leaf (*Cordyline*)	'hot'

Source: Report dated 1 October 1987.

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actual 'foodstuffs', the things which are edible, and everything that 'burns on the tongue', that is, the things which a human being does not eat. The 'edible things' are, in turn, subdivided into two groups within a taxonomy: the first embraces those foodstuffs which originate from the bush and grow wild; the second group, the foodstuffs which come from gardens cultivated by human beings. Within these two categories, which establish the *origin*, further classifications are made.

(B) If one observes everyday life and listens to conversations between the Yupno, be it in the garden or in the evening when they are all sitting around the fire and talking about the gardening, the foodstuffs are subdivided into four categories, whereby the taxonomic classification as 'bush foodstuff' or 'garden foodstuff' is missing. These are: 'sweet potatoes', 'bananas', 'tree fruit' and 'edible leaves'. This classification results from everyday *practical usage* of the foodstuffs.

On the other hand, in everyday life, in the evening when cooking, there is a further classification of foodstuff. Nobody speaks about it, it is implicit and is, at most, expressed verbally in the sentence that 'a proper meal always consists of sweet potatoes and leaves'. Underlying this is a classification of foodstuff into that which 'helps the blood' and that which 'strengthens the bones'. The determining factor is the *effect* on the human body. This classification provides the link to the conception of 'hot/cold/cool'. For all 'blood-helpers' (those foodstuffs which disintegrate when cooked, emit a lot of juice, which are raw, that is, edible leaves, fruits, sugar cane, etc.) help human beings in that they 'cool them down' a little; whereas, the 'bone-strengtheners' (sweet potatoes, potatoes, some types of banana) 'heat up' human beings on the whole, in that they provide them with 'vital energy', a 'heat', which they need to speak and move themselves. Thus, it becomes understandable why a 'good meal' simultaneously consists of sweet potatoes and edible leaves: in that they simultaneously 'heat' and 'cool', they contribute to the mean, the ideal, state.

(C) It is obvious that only two of the three classifications play a role in everyday life—each in its own context. It cannot be determined which of these two groupings is the more important or more 'available'. When requested to group selected foodstuffs presented in a sorting task (see Figure 3), the informants ($N = 30$) prefer both the fourfold grouping (if the foodstuffs are presented in an unsorted heap) and the 'blood-helper'/'bone-strengthener' classification (if the foodstuffs have already been presorted). In any case, apart from the criteria 'practical usage of' and 'effect' (i.e. 'hot/cold'), other possible dimensions only play a subordinate (preparation: raw/cooked, type: tradi-

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Figure 3 Classifying foodstuff.

tional/ newly introduced) or absolutely no role (origin: bush/ garden). The classification requested, that is, taxonomic grouping, is meaningless (at least in everyday life). This is because people in their everyday contexts classify for a purpose (e.g. the preparation of food), oriented to ways of acting that are not always guided by language (cf. Aebli, 1981; Boesch, 1991).

The Conception of the Own Settlement Area as 'Space'

(A) The Yupno are of the opinion that the 'world' consists of three oval levels arranged one above the other, the upper of which, heaven, is concave and rests on the other two. The middle level, the centre of which is occupied by the Yupno Valley, is inhabited by today's Yupno. The Valley is surrounded on three sides by mountains ('fences') which

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form the line of demarcation to the outside, the fourth side, on the other hand is open. There, the Yupno River flows through a gorge out of the Valley into the sea. Inside the Yupno world, the individually fenced-in oval dwelling forms the smallest unit; the dwellings of a kin group lie close together and were formerly surrounded by a fence. After the Second World War, under pressure from the mission and with the tacit permission of the (Australian) administration, the hamlets were pooled to form large villages. The region was 'opened up'. The fences were pulled down, schools installed and young men who wanted to leave the Valley for the first time were encouraged to seek work at the coast.

(B) Nevertheless, the majority of the Yupno (particularly the older ones) still move about extremely carefully and in a controlled manner, and if at all possible do not leave their own clan area.

As soon as one leaves one's own protective enclosure to reach one's own garden or area of bush, one is conscious of the danger in which one is—even if this takes place more at an 'intellectual' level. The paths are bad, but one must never 'stray from the path' (only children do this). Men always carry bows and arrows with them. However, one chiefly protects oneself by means of the so-called *kongap* melody, the 'ghost voice'. Every male and female Yupno has his or her own melody, which belongs to the person in the same way as his or her name. The *kongap* melody is 'found' or also 'dreamt' by the person him- or herself. It consists of a short series of tones lasting for two or three seconds. If Yupnos cross 'foreign' areas of garden or bush, they must, if they suspect the owner is there, sing the owner's melody. They must, so to speak, continuously give their position. In this way, they identify themselves as insiders, as friends, for only enemies are silent.

Around 50 day-to-day descriptions and observations, in which it has been precisely recorded where the informants went and with whom they spoke for a longer period, consistently illustrate how small the radius is in which they move. The number of persons (usually close relatives) with whom one has contact is also very small. One keeps to oneself. Nevertheless (as is to be expected), two tendencies make themselves apparent: men (old and young) are more prone than women to make visits and younger persons (men and women) have more contact with 'outsiders', that is, members of other clans, than old persons do.

(C) The question arose as to how the present inhabitants conceive the area of their settlement as 'space', as a 'cognitive map'. To what extent do the (formerly) closed settlement structure, that is, that which the old Yupnos have experienced, and the present external disintegration of this structure, together with the experience of an 'outside
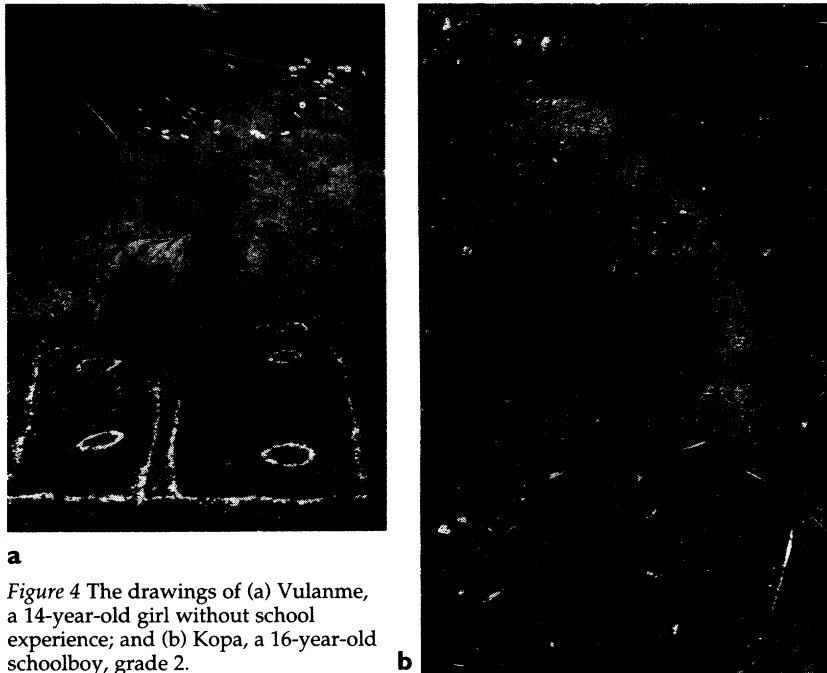
a

Figure 4 The drawings of (a) Vulanme, a 14-year-old girl without school experience; and (b) Kopa, a 16-year-old schoolboy, grade 2.

b

world' which some of the younger ones have had, influence the 'image' of the own area? The informants ($N = 28$) were asked to draw the area of their settlement on the ground (see Figure 4). The results (insofar as externalization of the inner cognitive maps can be depicted in drawings in the dust) were extremely varied. At the same time, they can be grouped, and these patterns can be correlated to the different background experience of the individual Yupno. The Yupno without experience of the 'outside world', that is, the old and the young without schooling, have a simple, closed and comprehensive picture ('configuration') of their own region which, at the same time, is the 'world'. The world is depicted as a closed oval or square; the main axis, the Yupno River, is in the centre, to the left and right are the small ovals of different villages. Symbolic meanings are simultaneously connected with this space.

As soon as the 'outside world' has been experienced, the inner picture of the own region changes. Experience of another world means, for instance, the visit to a town (with completely different types of houses, with streets arranged in squares, an 'angular' world); the understanding that one's own Valley is only a small part of Papua

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New Guinea; but 'another world' is also that which one sees or reads about in textbooks (drawings, pictures). The middle-aged men who had been to the coast reacted in two ways: some depict their region as an extremely abstract, angular grid, a type of schematized 'world', while others are obsessed with detail and endeavour to produce as 'photographically' precise as possible a picture, in which mountain crests, tributaries and paths are also not forgotten, but in which the surrounding 'fence', that is, the 'world boundary', is omitted. School-children, on the other hand, reduce their view to figuratively depicted details, such as houses of modern construction, trees, mountains, rivers, to a list of things without inner order and without a reference system. Their drawings look quite 'childlike', also, perhaps, because they try to copy (European) textbooks.

Discussion

(1) The objective was to describe some key aspects of the Yupno culture in the tense relations between collective and individual knowledge, between the phenomenon of 'culture' and daily private life. If one assesses the four areas of knowledge, it becomes evident that a specific aspect of the main theme is prominent in each area.

In the case of the 'counting system', it is, astonishingly, the *individual variations* (same/different) which catch the eye (astonishingly, because a counting system is—at least for us—really a normative thing). The variants both between individuals and for the same informants over time are so great that it is no longer possible to speak of an actual collective model (partly, of course, because all the Yupno are no longer conversant with the old counting system); since counting is usually done in public, however, this does not play a great role.

Contrary to this, the 'hot/cold/cool' system is known to all the Yupno (it is a true collective model), but is *differently at their disposal* (more/less): only those who actually work with it (and not only know of it) use it spontaneously.

In classifying 'foodstuff', *three different models are simultaneously (depending on the context) available*, one which is probably only significant in interaction with an anthropologist, and two further models which are important in everyday life: when discussing foodstuffs and when preparing the food.

There also appear to be different models in the conception of one's own settlement area as space: *one's own 'world' is conceived differently by those with 'outside world' experience* than by those who have not had this. At the same time, personal conceptions (as in the case of numbers),

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daily usage (as in the case of 'hot/cold' classification) or the context (as with the foodstuffs) do not play a role: the course of one's own life is decisive.

(2) Thanks to the interdisciplinary method of approach, it actually appears to have been possible to draw a differentiated picture of parts of the Yupno culture, a picture which is not limited to the static representation of the system, but incorporates the male and female, old and young, educated and uneducated Yupno in their individuality, and thus, to a certain extent, records not a static but a dynamic system in motion.

Nevertheless, the innumerable *individual actions and answers*, which were particularly clearly apparent in the experiments, show a wide systematic variation, depending on age, sex, context, personal experience, etc. Consequently, to a certain degree, a careful systematization or collection of the behaviour of 'jpfs' and 'omniscient informants' into subgroups is possible 'from below'. One can even go a step further. Thus, to begin with, it becomes apparent that the counting system which appears to be so cumbersome, with its longitudinal division of the human body by an imaginary vertical line and with its polar evaluation of the two sides of the body (left side = 'cold'; right side = 'hot'), corresponds in a striking way to the cognitive maps as basic spatial orientation. This means, in a wider sense, that the basic cognitive structures in the fields of counting and space conceptions also fit in well in the 'hot/cold' system which covers so much, and it could thus prove to be the basic cognitive conception of the Yupno as a whole: the conception of a slightly stooping person who is looking downstream could be the *common abstract model* of all Yupno. But precisely in that case, the innumerable individual, partly incomplete, partly deviating, partly idiosyncratic models would be particularly marked when compared to this assumed general model.

(3) If one now compares the objective of the approach with the actual procedures in the field, specific problems or restrictions become only too obvious.

Certain behaviours cannot be observed in daily life (or in the experiment) because there are *cultural restrictions*. This applies particularly in the case of women, who, although they are in command of a certain kind of knowledge, are not, depending on the circumstances, allowed to demonstrate this publicly in everyday life. Thus, women are quite conversant with the 'hot/cold' system, but only use it implicitly and in those areas for which they are culturally responsible ('feeding pigs', 'preparing food'). It appears that the competence to do something (e.g. to group according to 'hot/cold') indeed exists but, for

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cultural reasons, may not be overtly utilized, that is, because the corresponding performance is missing: 'on sais mais on ne fait pas' (Chamoux, 1981, p. 71). This certainly applies to counting too. Yupno women can count. Nevertheless many old women, in particular, broke off the corresponding experiments: they would have had to behave in a culturally undesirable way. It is, therefore, a fallacy to believe that the lack of 'faire' is, at the same time, a lack of 'savoir faire'. The same applies in reverse with respect to the men: a particularly large number of men provided no information about foodstuffs because this was not 'their subject'.

The demand to devote attention to everyday life as the 'natural context' and to see how the 'jpfs' apply their cultural knowledge in this sphere, that is, to see the individual in his or her own cultural context as the appropriate unit of analysis (Shweder, 1990; Super & Harkness, 1986; Valsiner, 1989) was certainly justified. But due to the fact that it is so difficult to record 'cognition' in this daily life characterized by routine, experiments were set up precisely for the purpose of being better able to observe how informants explicitly apply their knowledge. This is, unfortunately, in itself again an *artificial and not a 'real life' situation*. To this must be added that, in this case, individual answers were sought. Therefore, the interviews and experiments were carried out not in the indigenous houses, in the informants' habitual surroundings, with all the interfering neighbours and friends present, but in the house of the anthropologist, that is, again in a slightly artificial situation. Another contradiction develops from this: individual answers are what matter, but the Yupno usually discuss many (if not all) matters in the group in order to reach a consensus. Finally, for practical reasons, the term 'cognition' itself also had to be limited here to a partial (even if central) aspect: to a conscious, individual *problem-solving*. But as already mentioned, 'cognition' embraces much more. If ethnoscience believed it possible to draw direct inferences regarding cognition from cultural structures, and the more recent trends saw cognition as a mental process in the individual, there now appears to be an underlying idea that 'cognitive processes' cannot always be fully and exclusively located within the individual (Gumperz & Levinson, 1991, p. 614). There seems to be a middle ground in some cases, a type of 'externalized cognition' that lies, in some sense, between the inner life of the mind and the outer world of objects and behaviour (cf., e.g., Hutchins, 1988).

(4) An anthropological–psychological cooperation (not always free of minor problems due to the different traditions of the two disciplines, as the opening debate demonstrated) has been presented with a view to showing how the distribution of knowledge in a culture can

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be described. It is a *methodological proposal*, that is, one can do it, but does not have to do it. For there are certainly many reasons to proceed methodologically in another way, for instance the more intensified use of discursive language material or the use of game elements (cf. P. Brown, 1991; de Leon, 1991) in order to mitigate the artificiality of the test situation is conceivable. The actual research objective can also be different. Here an attempt was made to better understand parts of a single culture, that is, in its 'internal' multiplicity, at the level of the individuals—no more and no less.

The final requiem for the omniscient informant? The question as such makes no sense, but is helpful in order to challenge the still popular classical pattern of anthropological fieldwork for two reasons: On the one hand, in the case of the Yupno, it has become apparent how useful it is to acquire not only 'omniscient informants' but also, and particularly, 'jpfs' as informants (this in harmony with cognitive anthropology and with the aid of psychological methods). On the other hand, the preoccupation with Yupno 'omniscient informants' and experts shows precisely how ambivalent the term can be. Without a doubt, there are individual Yupno who know a great deal and, consequently, are particularly suited to be key informants for the anthropologists. The sorcerers are an example. They have a great deal of procedural knowledge, which allows them to change the environment as it is, that is, to 'heat up' or 'cool down'. Therefore, they are repeatedly commissioned, for payment, to manipulate this or that. They are influential and feared. But in spite of this, they are not considered (within the Yupno culture) to be particularly competent, for they find themselves in a dilemma. Although they have a great deal of (technical) knowledge at their disposal, at the same time they must apply it outside the social group, in secret and at night, within the radius of social conflicts, that is, 'hot' circumstances. The social 'cool' component is missing. But they need this in order to really be a 'knowledgeable' person, that is, a person who, in the centre of his group, assumes a slightly stooped pose, can listen particularly well and, therefore, can have (apart from a technical knowledge) a great deal of social-oriented knowledge. This, however, applies more to the 'jpfs' than to the (in our sense) 'omniscient informants'.

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