

THE CULTURAL CONTEXT OF LEARNING AND THINKING



An Exploration in
Experimental Anthropology

by Michael Cole
John Gay
Joseph A. Glick
Donald W. Sharp

IN ASSOCIATION WITH
THOMAS CIBOROWSKI, FREDERICK FRANKEL,
JOHN KELLEMU, AND DAVID F. LANCY

Methuen & Co Ltd

LONDON

Foreword

GEORGE A. MILLER

The Institute for Advanced Study

Every culture has its myths. One of our most persistent is that nonliterate people in less developed countries possess something we like to call a "primitive mentality" that is both different from and inferior to our own. This myth has it that the "primitive mind" is highly concrete, whereas the "Western mind" is highly abstract; the "primitive mind" connects its concrete ideas by rote association, whereas the "Western mind" connects its abstract ideas by general relations; the "primitive mind" is illogical and insensitive to contradictions, whereas the "Western mind" is logical and strives to attain consistency; the "primitive mind" is childish and emotional, whereas the "Western mind" is mature and rational; and so on and on. In its most frightening form, this myth includes the claim that these differences are genetically based and derives from this fact that other people are just not as intelligent as Caucasians.

The dangers inherent in this hodgepodge of half-truths do not derive solely from the blunders they inspire in our relations with the Third World. The same stereotype is likely to be applied to ethnic minorities living in the West. Foreign and domestic policies based on such beliefs are paternalistic at best, and at worst can degenerate into frank repression and exploitation. It is of practical importance, therefore, to establish the true facts of the matter.

It is also of theoretical importance. If such opinions were true, the theory and practice of psychology and anthropology would be very different from what they would be if such opinions were false. Because the issue is so important, many anthropologists and some psychologists have attempted to test the myth. The present volume is a valuable contribution to this tradition of research.

No one would care to deny that differences exist. Any denial would be tantamount to saying that differences in experience that result from living in widely different cultures and technologies have no important psychological consequences. Rather, the argument concerns the nature of those differences, and their sources. Must the differences be attributed to innate differences in ability? Or can they be attributed largely to cultural differences in training and experience? In the course of this book the reader will grow increasingly skeptical of the need for genetic

explanations. Evolution has not created two different human minds—one for Westerners, another for everybody else. It is culture that develops certain potentials of the human mind here and others there.

But how should the difference be characterized? Are we really abstract, and they concrete? It is difficult to believe that anyone capable of mastering a human language with all of its codified abstractions and conceptual relations could be totally incompetent to cope with abstract concepts. The difference must be more subtle than that. Yet many psychologists, working from a conception of intelligence developed in their study of children growing up in the industrialized countries, have resorted to such terms in their efforts to characterize the performances they have found in more static societies.

All too often psychologists have taken some test of measurement developed in a Western context and applied it directly to children and adults in a very different cultural context. The “primitive people” usually score rather poorly, so poorly that it is difficult not to conclude that they are hopelessly inferior to their Western counterparts. Moreover, since it is widely believed that intelligence is genetically determined, the differences in test scores have too frequently been interpreted as demonstrating genetic inferiorities. In this way psychological research has often strengthened popular belief in our ethnocentric myth of Western superiority.

But such tests were designed to produce an overall score, or figure of merit. They were not designed to explore the cognitive processes by which the score is achieved. One cannot conclude from low test scores that a person “has” or “doesn’t have” certain psychological abilities or potentialities. All one can conclude is that, whatever the person “has,” he probably wasn’t using the same cognitive strategies that a Westerner automatically adopts. The following pages provide convincing examples of this difference.

What learning experiences influence a person’s acquisition of a particular cognitive strategy, or his decision that it is appropriate in a particular situation? This reformulated question is crucial for the psychologist’s understanding of thought and cognition, and it cannot be answered adequately without careful consideration of the culture in which a person lives and the environment in which his previous learning experiences occurred.

One advantage of reformulating the question this way is that it opens up for the psychologist lines of communication with social anthropologists who have also been interested in the cognitive processes of the

people they study. Psychometric evidence that has suggested the inferiority of native thinking, and that has often been interpreted as indicating the absence of certain cognitive abilities in the genetic endowment of such people, has stood as a barrier between psychologists and anthropologists and has frustrated the kind of valuable collaboration that this book represents.

Unfortunately, most psychologists are poorly prepared by education or acculturation to understand the mental processes of people living in relatively static, traditional cultures or to grasp the full implications of the fact such people’s experiences have not required them to develop and use many of the cognitive strategies that our Western experience has instilled in us. But suppose we test such people on things for which their experience *has* prepared them. Suppose we send them to school and give them an opportunity to learn our Western way of thinking. Suppose we probe behind their apparent failure in order to discover how they have interpreted an unfamiliar task. Would we then be so confident that they are inferior and not merely different?

These are the difficult but enormously important questions with which this book grapples. And it is greatly to their credit that the authors have asked the right questions, have struggled vigorously and often successfully to bridge the cultural gap between themselves and their subjects, and have successfully demonstrated that psychological and ethnological methods can be integrated in a fruitful search for the answers.

Preface

Our interest in the relation between culture and thinking grew out of a specific practical problem: Liberian tribal children experience a great deal of difficulty with Western-style mathematics. The difficulties experienced by Kpelle children in north-central Liberia led us to ask the question: if we knew more about the kinds of mathematical knowledge that these children bring to school, might we not be in a better position to teach these children the kind of mathematics that we wanted to teach them?

In pursuing this line of inquiry, we began with a set of fairly straightforward, pragmatic questions. What kinds of things do tribal people count and measure? What kinds of geometrical knowledge is exhibited in such activities as building a house? How does mathematics enter into everyday activities like rice farming, going to market, dividing food among members of a family?

When we looked into these matters, we found that there were certain tasks that the Kpelle people performed considerably better than Americans whom we asked to perform similar tasks. For example, the tribal people were exceptionally good at estimating various amounts of rice. Other tasks that at first seemed to be closely related gave the Kpelle great difficulty. For example, when measuring lengths, the tribal people were both inaccurate and inconsistent. In looking for the source of the differences between the two kinds of estimating tasks, we discovered that rice farming is central to the tribal culture and involves a network of related activities. On the other hand, for the Kpelle, length measurement is a very specific activity that depends on the thing being measured, so that, for example, the metric for cloth is not the same as the metric for sticks.

These observations fit quite well with what our common sense and many anthropologists have suggested. People will be good at doing the things that are important to them and that they have occasion to do often. The generalization implicit in this theory of cognition is that primitive cultures tend to make different sorts of intellectual demands than technologically advanced cultures. It is often inferred as a consequence that primitive peoples will be less advanced intellectually except in special areas of experience. People who hold this view usually make

the additional assumption that when the cultural conditions change, so do the skills of the people.

This notion of culture-specific skills can be contrasted with what might be termed an ability theory, which is especially prevalent among psychologists. The general thrust of the ability theory is that for a variety of reasons different groups or individuals develop "better," "more," or "more powerful" generalized intellectual abilities than others. This view is most obvious in the work of psychologists who use IQ tests to assess intellectual performance. Their basic assumption is that different subtests call forth different kinds of abilities, and that a high score on a particular subtest means a high ability in that area.

There have been a great many arguments in recent years about "culture-free" IQ tests, racial differences in IQ, and the like. We do not propose to enter that argument directly, but raise it here because the basic underlying assumption is very widely shared. It reoccurs, for example, in a great many theories of cognitive development (Piaget, Werner, Bruner) where development is seen as the acquisition of more powerful, higher-order structures: more development means more powerful structures. Moreover, the structures are seen as hierarchically organized so that missing early points in the sequence precludes later development. In the view of J. S. Bruner and his colleagues (for example, Greenfield and Bruner, 1966), some cultures "push" cognitive development further than others. If you have not been pushed far, you lack the more powerful cognitive structures. A presently popular application of this principle is the current psychological approach to "culturally disadvantaged" children.

It is important to recognize these two orientations at the outset because they distinctly color the nature of research on culture and cognition. One important assumption of the aptitude approach is that a given task (whether it be a question on an IQ test or a Piagetian problem) evokes the same kind of behavior regardless of who performs the task. The logic of the task itself and the cognitive processes it taps are comparable, even though content may be subject to cultural variation. Clearly, if the same task evokes widely different behaviors in subjects from different cultural backgrounds, the aptitude approach is going to lead us astray. If we think we are assessing the amount of aptitude X when in fact a subject is engaged in behavior Y, our conclusions are likely to mean little.

We believe, on the other hand, that one *cannot* assume that psychological tasks, be they derived from theories of cognitive development or

the structure of intelligence, evoke the same kinds of behaviors in subjects from different cultures. When we present a task to a subject and he appears to respond randomly or stupidly, the first question we must ask is "what is the subject doing?" Behavior is *never* random, although it may seem random to an observer with a particular orientation. Only after it is determined that subjects from two groups are engaged in the same activity (applying the same processes), can one ask questions about their relative abilities.

We have found it strategically useful to pursue such research in a culture that varies drastically from the middle-class, urban culture in which most of the readers of this book live. The very fact of great cultural differences will make it harder for us to assume that our subjects see the problem as we do. By maximizing the chances that our subjects will do things differently, we may be able to determine the conditions that evoke different ways of learning and problem solving. We wish to identify the behavior evoked by different kinds of intellectual tasks and to seek in the cultural environment explanations of the fact that different groups manifest different intellectual behaviors.

This exposition will not follow the oftentimes confused course that our own research has taken over the last half dozen years. Rather, we shall present our findings according to our present understanding of the problems we have been studying. In certain places this presentation may appear to be incomplete, incoherent, or incorrect. We know that we have only begun to find ways to understand the relation between culture and cognition.

Much of our dissatisfaction with the work that has preceded ours derives from two sources. First, little empirical evidence is available concerning the relationship between culture and cognition. Second, where evidence exists, it is too often seriously accorded the status of "fact," before the many problems involved in cross-cultural inference and investigation have been explored.

Our narrative begins with an analysis of the terms *culture* and *cognition* in Chapter 1. A major stumbling block to analysis of the relation between culture and cognition is that these basic terms are used in various ways by different writers, each of whom presumes that he is writing about the same topic as his predecessors. This problem is particularly acute when we consider that philosophers, logicians, anthropologists, sociologists, and psychologists understand the term *thinking* in vastly different ways. In particular, we will ask how it could be that intelligent and scholarly individuals came to believe that Western man

is the intellectual superior of his non-Western brethren. This idea, moreover, has led some to think that so-called primitive adults think in the same way as children in Western society.

In Chapter 2 and 3, we will introduce the cultural setting in which most of our work was carried out. Concentrating on the Kpelle of Liberia (and assuming knowledge of our own culture), we have tried to gather evidence relevant to the cultural sources of learning and thinking. Some, but by no means all, data were gathered in a very orthodox fashion. Careful analysis of the Kpelle language and formal elicitation of the structure of various semantic domains will be presented side by side with excerpts from essays written by high-school students and other shreds of evidence collected by a variety of people connected with our project in recent years. This presentation will, of course, depend heavily on more orthodox data with which our anthropological colleagues, particularly James L. Gibbs and William E. Welmers, have provided us.

Using this ethnographic material as background, we will turn to experimental investigations of three major classes of learning phenomena. We will consider the role of classification in memory and learning, the process by which attributes are combined to form concepts, and the way in which various problems are solved.

Study of these questions using Kpelle subjects is of particular theoretical interest. In addition to significant differences in general cultural features, the Kpelle language is structurally quite different from English, permitting study of longstanding questions about the relation between language, culture, and thought. Second, education in the American style is new to Kpelleland. Its relative rarity and the fact that school attendance in the lower grades is more or less determined by the whimsy of outside agents, allows us, in theory, to separate the influence of experience and maturation on the development of cognitive skills. The fact that virtually all normal children in Western Europe and the United States between the ages of five and seven years begin to attend school where they learn to read and write, is a major theoretical problem for contemporary psychological theory: Are developmental changes in cognitive skills the result of aging or the special experiences of the classroom?

Chapter 4 on classification in learning concentrates on the way in which material is organized by the learner and the teachers. A wide variety of learning conditions and subject populations is included in our studies of this problem as we investigate such questions as the relation between literacy and memory, and the effect of introducing varying de-

grees of structure into the materials and the procedures for learning them.

Chapter 5 also is concerned with the influence of social factors on concept formation, but emphasis shifts to an analysis of stimulus-specific versus generalized learning.

The chapter on problem solving (Chapter 6) studies tasks that vary in their complexity and in the importance of verbal formulations for their solution. At one end of the scale are experiments using discrimination learning techniques and very simple physical stimuli. At the other end of the scale are a series of riddles, verbal logical problems, a traditional game, and a court case.

Throughout the book we have attempted to relate the experimental tasks to naturally occurring problems and modes of problem solution and to depend on Kpelle formulations of these problems. But in this regard our reach has far outstripped our grasp.

In Chapter 7 we return once again to the general questions that we raised in this preface. With the added perspective of our success and failures behind us, we attempt to evaluate what we have learned about the relations between culture and cognition and try to point out the implications of these findings both for future research and for immediate application, particularly the problems posed by the poor educational performance of America's minority groups.

In order to solve the problem of writing for interested laymen as well as specialists in different disciplines, we have tried to keep highly technical material out of the body of the text. Where we believe that more detail will be of special interest to a significant proportion of the readership, we have included appendices that may be found at the end of the book.

We have also avoided detailed discussion of the many methodological problems which attend the actual conduct of cross-cultural research, restricting our attention to problems of principle which we view as crucial to the cross-cultural, interdisciplinary enterprise that we have undertaken. However, much of our message resides in questions of method, so some discussion of such matters will be found scattered throughout the text.

If there is a general principle to be gleaned from the method upon which our work is based, it derives from our belief that the people we are working with always behave reasonably. When their behavior appears unreasonable, it is to ourselves, our procedures, and our experimental tasks that we turn for an explanation.

Acknowledgments

The research on which this book is based would not have been possible without the support of many institutions and individuals.

The basic financial support was provided by a grant from the National Science Foundation (GS-1221). Data analysis was greatly facilitated by a grant of free time by the computing facility at the University of California, Irvine, where Michael Cole was a faculty member during the years in which this work was done. Individual fellowships to Donald Sharp (from the National Defense Education Act) and Thomas Ciborowski (from the U.S. Public Health Service) have made their participation in this work possible. Additionally, a research grant to Joseph Glick from the National Institute of Child Health and Development (HD 03947) supported portions of the analyses of data and writing of this book.

We owe a great debt to the many people in Liberia who assisted us materially and intellectually. Dr. Christian Baker and his colleagues at Cuttington College provided us with an invaluable base of operations. The people of the town of Sinyee have continued to put up with our incursions and have shared with us their time and facilities. We are particularly in debt to Johnnie Kwiiɔɔ, Mrs. Rose Sambola, and Zephaniah Ukatu for their assistance in gaining access to subjects and informants. In addition, many school administrators and town chiefs provided facilities without which this work could not have been carried out.

We need also to acknowledge the assistance of many people who worked for us at various times in the capacity of informants or experimenters: Moses Buno, Joseph Campbell, Yakpalo Doŋ, Michael Dinobi, Franklin Dunbar, Francis Dunbar, Joseph Keller, Akki Kulah, Arthur Kulah, Richard MacFarland, Paul Mulbah, Paul Ricks, John Wealar, Charles Wellington, Albert Wungko, Sulɔŋtɛ Gbɛmɛlɛŋ, John Kellemu, Michael Mbaebie, and Albert Wolokolie.

In the United States, we owe our thanks to the teachers and administrators in the Laguna Beach and Newport-Mesa school districts in California who opened their classrooms to our research. We were assisted in this work by Barbara Hanson.

A great intellectual debt is owed to our colleagues in the School of

Acknowledgments

Social Sciences at the University of California, Irvine. The atmosphere of the school influenced a great deal of the research described in this book. We particularly want to acknowledge the help of Jean Lave and Duane Metzger whose careful and critical reading of early drafts of this work greatly improved its quality.

The work of William Welmers and James Gibbs, referred to at several points, has been supplemented frequently by their advice on many matters pertaining to the Kpelle and Liberia.

Finally, we wish to acknowledge the support of the Rockefeller University for providing a haven in which this book could be written and the aid of Kay and William Estes whose material and intellectual support have greatly influenced what we present here.

Contents

ONE	Culture and Thinking	3
TWO	An Unorthodox Ethnography	25
THREE	Classification	59
FOUR	Classification, Learning, and Memory	92
FIVE	Classification and Learning of Physical Attributes	143
SIX	Culture, Logic, and Thinking	176
SEVEN	Conclusions	213
APPENDIX A	A Description of the Major Subclasses of the <i>Seq</i> Chart	237
APPENDIX B	The Application of the Similarity-Distribution Technique	242
APPENDIX C	Free Association	249
APPENDIX D	Additional Data from Similarity-Mediation Study	252
APPENDIX E	Details of Free-Recall Experimental Procedures and Results of Standard Experiments	255
APPENDIX F	Technical Aspects of the Conduct of Cross-Cultural Memory Research	264
APPENDIX G	Recall of Items Presented in a Story Context	267
APPENDIX H	Stimulus Matching as a Measure of Classification	271

Contents

APPENDIX I	Rule Learning	274
APPENDIX J	Procedural Details and In- structions for Initial In- ference Experiment	282
APPENDIX K	Details of Final Inference Experiment	284
BIBLIOGRAPHY		289
INDEX		296

Illustrations following page 36.

THE CULTURAL CONTEXT OF LEARNING AND THINKING

ONE : Culture and Thinking



“What kind of a bird are you if you can’t fly”? chirped the bird. “What kind of a bird are you if you can’t swim”? replied the duck.

S. PROKOFIEV,
Peter and the Wolf

The Problem of Many Disciplines

This book is concerned with a recurrent problem in man’s inquiry into his own nature: how do people’s thought processes relate to the culture in which they are raised and in which they live?

From the large body of scholarship bearing on the general issue of culture and cognition, several very general approaches which are influential among some groups of social scientists can be identified. A major line of argument concerns the implications of differing belief and classification systems: one school of thought maintains that salient differences in beliefs and category systems represent no more than differing conventions with little impact on thought processes; the opposing school holds that *either* a difference in beliefs *or* a difference in classification systems is sufficient evidence for differing thought processes. A completely different line of argument maintains that all evidence from group phenomena such as beliefs and language categories is irrelevant to understanding processes that are properties of individuals; only a study of the individual as a member of his group can lead to reliable information about culture and cognition.

So tangled are these theoretical approaches and so different are the data that adherents of the various approaches bring to bear on the issues, that choice among viewpoints is all too often an accident of one’s own disciplinary training—the implicit acceptance of a disciplinary definition of what constitutes good evidence about thought processes.

In this introductory chapter we will review the development of the

presently rather confused state of theory concerning culture and cognition. It is our intent to make clear the source of present disagreements, especially as they derive from implicitly different ideas of what the major phenomena are that need explaining and the data relevant to such explanations. Without some understanding of the source of these disagreements, future theoretical progress is likely to be limited, and research such as that which we will present in later chapters will be doomed to exist in isolation from intellectual currents of which it should be a part.

Anthropology

Anthropology developed as the study of human diversity. However, during its early history the specific question of the relation between culture and cognitive processes arose only as a byproduct of other concerns. During the latter half of the nineteenth century, anthropologists asked broad questions: What gave rise to the diversity of human cultures? Were there multiple sources or a single source of the human race? How can one explain the presence of similar customs and inventions in widely separated parts of the world?

E. B. Tylor suggests in his classic work, *Primitive Culture* (1874, p. 1), that "the condition of culture among the various societies of mankind, in so far as it is capable of being investigated on general principles, is a subject apt for the study of laws of human thought and action." Thus, considered in one very broad sense, the study of culture is the study of human thought.

Following this approach, some anthropologists asserted a cause-and-effect relation between similarity of cognitive processes and similarity of cultural institutions. But it was a debatable point which was cause and which was effect. The argument that cultural differences "explain" cognitive differences was used by the founding fathers of anthropological theory, Herbert Spencer, E. B. Tylor, and L. H. Morgan. They believed that human society evolves in a continuum from primitive to civilized society. This argument, bolstered by the biological theories of Darwin and Huxley, assumed that the evolution of intellect can be inferred from the assumed evolution of culture.

Two further assumptions beyond the basic premise that cultural differences imply cognitive differences were widely shared in the nine-

teenth century. First was the universal belief that society is evolving and simultaneously progressing toward a literate, technological state like that of the West. Second was the biological notion that young organisms "recapitulate" the anatomical history of their species during embryological development, an idea that buttressed the evolutionary argument. This doctrine became popular in both psychology and anthropology, and is usually summed up in Ernst Haeckle's aphorism, "Ontogeny recapitulates phylogeny." To some anthropologists interested in evolutionary sequences, these two assumptions suggested that primitive adults represent an early form of the adults of advanced societies. The European child also represents an early form of the European adult. Hence, according to this argument, the primitive adult is equivalent to the civilized child.

To many at the present time this line of reasoning and the assumptions on which it rests appear farfetched. However, to post-Darwinian, nineteenth-century social scientists steeped in the theory of evolution, they seemed almost self-evident.

The publication of *The Mind of Primitive Man* by Franz Boas in 1911 is in several ways an important and highly influential landmark in anthropological thinking about thinking. Boas was critical of the logic of both racial and evolutionary theories as well as the data upon which both were based. He rejected the basic assumption that similarity in thought implies similarity in culture as well as the formally equivalent argument that differences in culture imply differences in thought.

After looking closely at the historical antecedents, racial composition, and distinctive cultural features of modern societies, Boas comes to the conclusion still accepted by the overwhelming majority of anthropologists: that we can prove neither the equation of race and culture nor the existence of cultural evolution. Further, he asserts that whereas "the existence of a mind absolutely independent of conditions of life is unthinkable" (p. 133), nonetheless, "the functions of the human mind are common to the whole of humanity" (p. 135).

Particularly important is Boas' attack on the proposition that observed differences in culture and belief are evidence of fundamental differences in thought processes. First, he challenges the reliability of many of the reports on which such theories are based. Second, he challenges the belief that one can draw inferences about thought processes from traditional beliefs and customs of a people. He suggests that it would prove equally misleading to use traditional American beliefs about nature and society as evidence about American logical processes.

Boas did not intend to deny the existence of intellectual differences among human groups. In fact, at certain points in his argument against racial determinism, he confirms his belief, mentioned above, that mind and experience are intimately related. However, he introduced a new issue into the discussion by his suggestion that these intellectual differences among groups are *not* fundamental. Although there is some ambiguity in his use of the term *intellectual*, the thrust of Boas's argument seems to be that previous observers failed to understand the people they were describing and then mistook their own lack of understanding as evidence of their informants' stupidity.

Primitive Mind

In spite of Boas's trenchant arguments, interest in the implications of belief systems for understanding individual thought processes has continued to appear from time to time in anthropological literature.

One of Boas's major targets was the French sociologist Lucien Levy-Bruhl. Relying exclusively on the published reports of missionaries, travelers, and early anthropological observers, Levy-Bruhl began, in 1910, to publish a series of monographs on the thought processes of primitive peoples. The first of these books (translated as *How Natives Think*) met with strong and continuing disapproval from American anthropologists, of whom Boas was a leading spokesman. In the tradition of French sociology at the turn of the century, Levy-Bruhl held that every culture is characterized by a set of general beliefs, which he called "collective representations." Whereas the collective representations of the average European are exclusively intellectual and distinct from the motor and emotional realms, in the primitive person these basic beliefs are fused with emotional components. In discussing primitive mentality, Levy-Bruhl coined the unfortunate term *prelogical*, to characterize the rules by which basic ideas are combined. In addition, Levy-Bruhl assumed, contrary to Boas, that primitivity of material and religious culture is sufficient evidence to prove the existence of primitive mental processes.

One can readily see why Levy-Bruhl's position upsets anthropologists. Not only do they question his sources and his tendency to speak of primitives in general without recognizing differences among various non-Western, nonliterate groups, but also they challenge his basic assumption that primitive culture implies primitive thought.

The major point made by most critics was that

the facts about many cultures demonstrate that all peoples *at times* think in terms of objectively probable causation, just as *at times*, they indulge in explanations that relate a fact to an *apparent* cause. What the comparative study of culture, based on first-hand contact with many peoples, has taught is that all peoples think in terms of certain premises that are taken for granted. Granted the premises, the logic is inescapable. [Herskovitz, 1962, p. 361]

A modern attempt to account for the phenomena described by Levy-Bruhl is presented in the brilliant discussion of traditional belief systems and their relation to the logic of Western scientific thought by Robin Horton (1967*a,b*). Horton contends that there is considerably more similarity between the thought patterns of African and Western peoples than Levy-Bruhl realized. Horton's basic premise is that all peoples try to understand their world by developing explanatory theories. He proposes compelling analogies between the theories that underlie traditional African belief systems on the one hand, and Western so-called scientific beliefs on the other. For example, basic to both African and Western theory is the quest for unity underlying apparent diversity. In this context the African cosmology can be viewed as a way to reduce the diversity of everyday experience to the workings of a limited number of opposing forces. Moreover, both theories place events in a causal context wider than that provided by common sense. For example, the African diviner relates disease to antisocial and malevolent feelings among people, a practice that may have real adaptive significance in the African context. Western thinkers likewise look beyond common sense to germs and genes. A third parallel is that in both kinds of societies, common sense and theory play complementary roles. For instance, common sense is used to cure minor ailments and only when common sense fails is more high-powered theory brought to bear on the problem.

Horton explores the differences between traditional and scientific thought in terms of the fundamental difference between "open" and "closed" belief systems. Characteristics of primitive belief systems emphasized by Levy-Bruhl, such as "mystical" thinking, the concrete nature of collective representations, and belief in divination coupled with a rejection of chance, are shown to be misinterpretations of assertions based on a closed belief system, in which there is little "awareness of alternatives to the established body of theoretical tenets." In the open situation of "scientifically oriented cultures, such an awareness is highly developed" (Horton, 1967*b*, p. 155). In fact, the logic of the closed system does not differ from that of its open counterpart. On the contrary,

different premises give rise to differences that then systematically mislead outsiders into basing their theories on the obviously alien and exotic phenomena they observe.

A quite different approach to the phenomena labeled "primitive mind" is taken by Claude Lévi-Strauss (1966), who emphasizes differences in the kinds of categorizations produced by different peoples. In so doing, Lévi-Strauss uses differences in beliefs to infer both differences and similarities in underlying thought processes. However, he maintains that the thought processes he identifies in primitive cultures are not at some lower stage in the development of the human mind. Rather, he suggests, they represent different strategies by which men make nature accessible to rational inquiry. Both Western and non-Western strategies seek objective knowledge of the universe; both proceed by ordering, classifying, and systematizing information; both create coherent systems. These and other similarities have led Lévi-Strauss to conclude that the two types of thought systems are based on "the same sort of mental observations."

What then are the differences among primitive and civilized thought processes, according to Lévi-Strauss? The basic difference seems to involve the kinds of attributes that are used in forming classes. Primitive classification systems are based on qualities that are readily seen and experienced, whereas modern science relies more on properties that are inferred from necessary relations in the structure of the objects classified. For example, fruits and vegetables are classified by the average shopper in ways quite different from those of the botanist. Primitive classification systems generalize from overt properties of the members of the system and are thus limited by the concrete experience of the community.

One might ask next how classification systems enter into such areas of thought as problem solving. Lévi-Strauss suggests an answer when he distinguishes between two types of scientific endeavor. He characterizes non-Western, primitive science as exemplified by the jack-of-all-trades, who has a bag of things that he uses to make other things. The tools are never specifically designed for the task at hand, but rather constitute a collection of things preserved "because they might come in handy"; thus their function depends upon the particular occasions in which they are used. The jack-of-all-trades is contrasted with the engineer, whose inventory of tools is not a fixed set, originally adapted to other purposes, but is variable, depending on the task at hand. In contrast, the engineer has a fixed and stable structure of making and using tools, whereas in

the primitive's system a particular object is likely to have a rather amorphous and shifting status because of the nature of his classification system. In this way, Lévi-Strauss asserts, there is an intimate relation between modes of classifying objects and ways of solving problems.

The New Ethnography

Lévi-Strauss' concern with the implication of differing kinds of category systems is shared in somewhat different form by a movement in modern anthropology variously called ethnoscience or linguistic anthropology.

The major thrusts of the movement are neatly encapsulated in a definition of culture offered by Frake (1963, in Manners and Kaplan, 1968, p. 513): ". . . culture: how people organize their experience conceptually so that it can be transmitted as knowledge from person to person." Two major assumptions are contained in this definition: (1) that the underlying organization of experience is reflected in communicative (linguistic) behavior, and (2) that category systems differ widely from culture to culture.

In keeping with these basic notions, the ethnoscientists have adopted, as their major methodological goal, the development of linguistically based formal techniques which

provide the ethnographer with public, nonintuitive procedures for ordering his presentation of observed and elicited events according to principles of classification of the people he is studying. To order ethnographic descriptions solely according to an investigator's preconceived categories obscures the real content of culture. [Frake, 1963, in Manners and Kaplan, 1968, p. 513]

To the extent that his description of category systems is accepted as a reflection of basic thought processes, the ethnoscientist sides with those who maintain that cultural differences in thought processes are reducible to differences in classification. However, the relationship between formally elicited category systems and the "contents of men's minds" has been a point of enduring controversy.

Some authors maintain that successful formal analysis reflects the cognitive processes of the informant and other members of his culture. An example of such an approach is the componential analysis introduced by W. Goodenough (1956), which seeks to determine the "dimensions of contrast" that allow the informant to group items into sets. A. F. C. Wal-

lace (1962, p. 351), among others, claims that such procedures form "a calculus which describes cognitive processes." To use another term employed by Wallace (Wallace and Atkins, 1960), the ethnographic description reflects "psychological reality."

Opponents of this viewpoint within anthropology (see Burling, 1964; Hammer, 1966) argue that it is useless to argue over the psychological reality of an elicited category system. Not only are such claims unverifiable, but there can be multiple descriptions of any finite set of terms as well. There is no way to determine, *within the method*, which is more real. While the basic theoretical position is still a very controversial subject within anthropology (see, in addition, Romney and D'Andrade, 1964; Tyler, 1969), the *methodological advances* of the ethnoscientist have won general acceptance.

Linguistics

Although exceptions can be found (Jespersen, 1921, Book 1), professional linguists have for the most part shared the anthropologists' belief in the "psychic unity of man," although this conclusion has been reached via quite different routes by different schools of linguists. The first such route asserts the doctrine of linguistic relativity and the closely related idea that language shapes thought.

Linguistic Relativity and Linguistic Determinism

Although their ideas are anticipated by Karl Wilhelm von Humboldt in the nineteenth century, the twentieth-century linguists Edward Sapir and Benjamin Whorf are the best-known proponents of a theory of linguistic relativity. The deterministic aspect of their position is well expressed by Whorf:

It was found that the background linguistic system (in other words, the grammar) of each language is not merely a reproducing instrument for voicing ideas but rather is itself the shaper of ideas, the program and guide for the individual's mental activity, for his analysis of impressions, for his synthesis of his mental stock and trade.

Formulation of ideas is not an independent process, strictly rational in the old sense, but is part of a particular grammar, and differs, from slightly to greatly, between different grammars. We dissect nature along lines laid down by our native languages. The categories and types that we isolate in

the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux by our minds—and this means largely by the linguistic system in our minds. We cut nature up, organize it into concepts, and describe significances as we do, largely because we are party to an agreement to organize it in this way—an agreement which holds in the pattern of our language. The agreement is, of course, an implicit and unstated one, *but its terms are absolutely obligatory*; we can not talk at all except by subscribing to the organization and classification of data which the agreement decrees. [Whorf, 1956, p. 212]

Thus it is concluded that the structure of language determines the structure of thought.

Whorf builds on this and other arguments to demonstrate the relativity of language. For example, in a posthumously published paper, "The Linguistic Consideration of Thinking in Primitive Communities" (in Whorf, 1956, pp. 65 ff.), Whorf makes a vigorous assertion of the overall functional equality of all languages. He includes as evidence statements that in certain domains American Indian languages are superior to standard European languages:

It takes but little real scientific study of preliterate languages, especially those of America, to show how much more precise and finely elaborated is the system of relationships in many such tongues than ours. By comparison with many American languages, the formal systematic organization of ideas in English, German, French, or Italian is poor and jejune. Why for instance, do we not, like the Hopi, use a different way of expressing the relation of channel of sensation (seeing) to result in consciousness, as between "I see that it is red" and "I see that it is new"? We fuse the two different types of relationships into a vague sort of connection expressed by "that" whereas the Hopi indicates that in the first case seeing presents unspecified evidence from which is drawn the inference of newness. . . . Does the Hopi language show here a higher plane of thinking, a more rational analysis of situations, than our vaunted English? Of course it does. In this field and in others, English compared to Hopi is like a bludgeon compared to a rapier. [Whorf, 1956, pp. 84–85]

The claim is often made that a certain language is poor in abstraction because of rich detail of terminology for some aspect of their environment without a corresponding general term. Examples which are often quoted are the variety of Eskimo words for snow or Arabic words for horse. Whorf would reverse the argument and say that, rather than implying a poverty of language, these examples indicate greater differentiation and much more subtle appreciation of the particular domain in question.

It is not our purpose here to review the literature concerning the lin-

guistic-relativity hypothesis (see Miller and McNeil, 1968, and Fishman, 1960 for summary discussions). Important for our purpose is the assertion, arrived at using different evidence from that offered by the social anthropologist, that thought processes of all peoples are functionally equivalent and that they can be inferred from linguistic behavior.

The Generative Tradition

A rather different strain of inquiry has developed following the tradition that Noam Chomsky (1966) calls "Cartesian Linguistics." The Cartesian school elevated language to a central role in differentiating human and animal behaviors, and saw in language a manifestation of the distinctive features of human cognition. According to this view, possession of language is sufficient evidence for a type of mental functioning, unexplainable solely by those mechanical principles sufficient to account for animal activity. At present this viewpoint is championed by the so-called transformational linguists.

The transformational analysis has emphasized that all human speakers must be highly structured. No theory of cognition that fails to take linguistic competence into account can be considered adequate. Differences in knowledge are readily accepted, but differences in capacity or the "deep structure" of language are denied.

These assertions combine to form a point of view which de-emphasizes cognitive differences between different linguistic (cultural) groups. This view is more fully developed by the modern transformational grammarians who have added new insights into the relationship between culture (here embodied in language) and cognition. They have sought to advance linguistics beyond purely descriptive analysis to a broader attempt to provide a generative theory of grammatical understanding. An important insight of this school is that any given language can generate an infinite set of sentences, only a few of which have been experienced by any speaker of the language. In order for a speaker to generate sentences he has never before heard, he must use a complex rule system to create the new, but rule-governed, sequences called sentences. It is clear that human speakers, competent in their own language, store and use productive rules in a complex and nonmechanical fashion.

Psychology

The Impact of Darwin

When Darwin's work first appeared, psychology was just beginning to establish itself as a discipline separate from philosophy. Under the impact of evolutionary theory, an early preoccupation with introspection and the laws of sensation and consciousness gave way to the comparative study of animals, children, and adults. The problem of psychology became the problem of how various organisms, particularly man, adapt to their environments. Two natural offshoots of this interest were a more intensive study of children and their development and a study of human adaptation to different cultural and natural environments.

Developmental Psychology in the Evolutionary Mode

Within psychology the idea that the development of the child recapitulates the history of the race enjoyed even more widespread popularity than in anthropology; it was embraced by one of the founders of American developmental psychology, G. Stanley Hall. Hall's student, A. F. Chamberlain, summarizes what he believed to be the relevant literature in *The Child: A Study in the Evolution of Man* (1901). Although more cautious than many of his fellows, Chamberlain draws what he considers to be significant parallels:

The mind of the child and the mind of the savage, when differences due to the presence of manhood and womanhood in the latter, diversity of environment, influence of higher culture, prolonged infancy, social environment, etc., have been taken into consideration, present many interesting parallels of a general sort. *Naivete* that touches upon genius, suggestibility of great extent and sometimes of a very high order, resemblances in mental association, modes of thought and of thought expression, dream-life, mind-content. It must be remembered, however, that it is now the savage, now the child, who in one of these things touches the highest genius or sinks into the deepest ignorance—the capacity for mental progress and development rarely finding equal expression in both everywhere and at all times. In comparison with the child, the savage, who so often anticipates higher culture, higher morals, higher arts, suffers because we seem inevitably to rate ourselves higher and him lower than each really is. [P. 456]

One of Chamberlain's points concerns the so-called phenomenon of arrested development, which was discussed repeatedly in the early an-

thropological literature. N. Miller (1928) gives a typical treatment of this topic, citing a variety of reports that children raised in various tribal groups are initially precocious but concluding that "the perspicacity of the primitive child comes to a dead halt, however, at puberty" (p. 125). This arrested development is attributed to such factors as sexual excess and alcoholism; a conclusion which obviously reflects Western folklore rather than non-Western reality.

Chamberlain offers an explanation of this "fact" that has a very modern ring. He hypothesized that the "arrest of mental development" was not found in civilized people because of ". . . the greater number of learnable things which the environment of civilized peoples provides, and the care and trouble which the community takes to make the acquisition of these things possible. Not the mind so much as the schools of the two stages of human evolution differ" (p. 456). He asserted, moreover, that this "arrest" is known and is clearly reversible among Western children after the age of puberty.

Chamberlain's argument, although couched in theoretical terms long out of fashion, is reminiscent of contemporary arguments that severe environmental differences dramatically affect individual development. However, psychologists of his time failed to follow up these early speculative efforts with experimentally verifiable theories of culture and cognitive development.

A Hiatus: 1910–1950

When the initial flush of enthusiasm for evolutionary schemes began to fade, psychologists' interest in cross-cultural research into mental development seemed to fade with it. Instead they turned to the study of culture and personality and to standardized intelligence testing.

Hypotheses growing out of Freudian psychoanalytic theory provided the original impetus for research into the relation between culture and personality by such anthropologists as Bronislaw Malinowski, Clyde Kluckhohn, and Margaret Mead. Some anthropologists tested the way in which such institutions as the family gave rise, for example, to the Oedipus complex (Malinowski, 1922). Others, reversing the causality, sought to determine how various personality characteristics might shape cultural institutions (Kardiner, 1939).

The use of standardized intelligence tests among differing cultural and racial groups has generated considerable controversy in recent years. The major points at issue have been: what can be inferred from

differences in test performance? Do they measure some underlying "capacity" of the individual, or are they simply useful devices for predicting school performance? This latter question is difficult enough to answer for the white middle-class American population on which the tests were standardized. It is virtually impossible to answer for groups differing simultaneously in culture and racial composition from the standard group (for reviews of the voluminous literature, see Klineberg, 1963; Vernon, 1969; Jensen, 1969; Deutsch, 1969).

Data from these tests are of extremely limited value for our purposes because there is so little agreement about what kinds of cognitive processes were being tested. To be sure, subsections of such tests may claim to measure abstraction or relational thinking, but, in fact, items in these sections (as in the entire tests) were chosen because they were effective in predicting school performance. For this reason, in many cultures, such tests predict successful performance in Western-style schools (see Vernon, 1969), but what such predictions say about elementary learning processes is unknown. (See the excellent discussion of these issues by LeVine, 1970.)

Contemporary Psychological Approaches to the Study of Culture and Cognition

In recent years psychologists have shown a renewed interest in the cultural context of human development. In this more recent work, moreover, they approach the problem with a richer store of theoretical and experimental tools than they possessed at the turn of the century. Between 1910 and 1950 only a very few psychologists used variations in culture as indicators of cognitive processes. A few of these efforts took place in the 1930s. F. C. Bartlett (1932) performed experiments on the relation between culture and memory which we will describe later. There were scattered attempts to use intelligence tests as a starting point, rather than a measuring stick, for an analysis of culturally influenced cognitive skills (Nissen, Kinder, and Machover, 1935). And, anticipating things to come, Margaret Mead set out for New Guinea to test the generality of the sequences of cognitive development posited by Jean Piaget (Mead, 1932). However, only in the postwar era did psychologists become broadly interested in the study of culture and thinking. At least two different concerns are represented in this resurgence, namely, the use of cultural variations to test the generality of theories developed

in a Western setting, and the study of the relation between thought and language.

An early effort to test Western theories with non-Western data was Heinz Werner's use of anthropological data to support his theory of cognitive development (Werner, 1948). Werner's general thesis was that development implies qualitative changes in both the structure and dynamic properties of behavior. Structurally, the developing organism shows greater differentiation through the elaboration of hierarchies. Dynamic behavior is said to become more flexible, stable, and articulated. For Werner, "primitive" states are earlier on the developmental continuum and appear frequently in children, tribal peoples, and mental patients. Not unexpectedly, Werner's views (see also Werner and Kaplan, 1956) aroused strong resistance from anthropologists who accused him of committing a nineteenth-century error by equating primitive adults and "civilized" children.

Werner's writing has not always been criticized on adequate grounds. His position was not intended to be a strong claim about either genetic endowment or possibilities for developmental change. His major goal was to provide a general structural parallel (not material identity) between child and primitive, which would allow one to seek and order information about other societies in terms that coordinate with an organization of knowledge about individuals within our own society. A deeper criticism of his work would center around the heuristic potentialities of using one category system to describe another system. The ethnoscientists would claim that this is in itself a direct violation of anthropological method.

A theoretical problem of particular interest was the relation between language and thought. During the 1950s this interest of American psychologists in language behavior led to an awareness of the implications of linguistic differences for differences in thinking. Psychologists and anthropologists met together to discuss problems of language and culture (Osgood and Sebeok, 1954; Hoijer, 1954) and helped to develop the new discipline of psycholinguistics. The writings of Whorf were published in 1956 with a long introduction by a psychologist, John Carroll, and at about the same time scholars began to make experimental studies of the linguistic relativity hypothesis (Brown and Lenneberg, 1954; Carrall and Casagrande, 1958).

During the 1960s the relations between, on the one hand, language, thought, and culture and, on the other, culture and cognitive development dominated cross-cultural psychological research. Moreover, re-

search on child development reflected a more integrated concern with the influence of language, culture, and cognitive skills. The single most widely used theoretical context for cross-cultural research in recent years has been Piaget's theory of cognitive growth. Frequently, however, as J. S. Bruner, R. Olver, and P. Greenfield (1966) pointed out, the study of Piaget's theory has been confined to quantitative specifications of the age lag of some specified "foreign" children behind European children as they move from one developmental stage to another.

The strategy followed in the work of Bruner and his colleagues, as well as that of J. J. Goodnow (1969) and D. Price-Williams, W. Gordon, and M. Ramirez (1969), has been to try to identify the way in which some cultures "push" cognitive development earlier, longer, and better than others. A universal finding of this research is that attendance at Western-style schools enormously speeds up the development of problem-solving skills.

According to Bruner, Olver, and Greenfield (1966), two factors dominate in producing this result. First, children in school must learn to solve problems involving objects and events not present at the time. Second, schoolchildren learn to read and write. Price-Williams and his colleagues (1969) have shown that analogous acceleration is obtained when children are already very familiar with a particular aspect of their environment. For example, potters' children are very adept at a Piagetian problem involving estimates of quantities and types of clay.

A corollary to this kind of theorizing is that just as some cultural conditions accelerate the rate of development, the lack of certain critical experiences may delay or preclude development. Bruner, Olver, and Greenfield cite, as analogous to the so-called early arrest of cognitive functioning, their finding that tribal Wolof adults do not seem to understand that when liquid is poured from one container to another, the amount is conserved.

Another popular line of developmental research seeks to document the relation between cultural-environmental factors and "psychological differentiation" (see Witkin, 1967; Dawson, 1967). Research based on H. A. Witkin's understanding of psychological differentiation moves beyond Werner's generalization to demonstrate on the basis of experiments in perception that certain sociocultural traits (such as strict, directive upbringing) will lead to "less differentiated" (less analyzed and articulated) cognitive functioning.

These studies have attempted to specify the cultural variables that account for particular aspects of cognition. Although the enterprise is still

in its infancy, it is potentially far more fruitful than searches for any population difference that gives rise to a difference in test scores, with no accompanying effort to specify the source of the diversity (for a recent review of cross-cultural psychological research, see Cole, 1972).

Toward an Experimental Anthropology

Considering the long traditions that have generated the anthropological, linguistic, and psychological approaches to the study of culture and cognition, it would be excessively foolhardy of us to pretend to a grand synthesis removing all the barriers to interdisciplinary understanding. Our more modest goal is to create a research strategy that is consistent with the major methodological requirements that each discipline brings to this problem. The remaining chapters of this book are a summary description of our efforts. But before describing the research itself, we want to explain the considerations that motivated our choices of strategy.

It should be emphasized that when we began this line of research several years ago (Gay and Cole, 1967), we had no coherent overview of our goals and the proper methods to achieve them; we were faced with what we considered a concrete problem in "applied anthropology" in trying to understand African difficulties in learning Western mathematics. By bits and pieces, as we tried to make sense of what we were doing and to plan rationally how next to proceed, we began to develop a set of principles for guiding our inquiry, which led to a more explicit theoretical awareness. We still lack a complete and consistent "meta-theory" of cross-cultural research, but we will attempt to make explicit our current understanding of the enterprise. To this end we can abstract from the preceding discussions a set of very basic concerns of anthropology, psychology, and linguistics in the study of culture and cognition.

Anthropologists emphasize that cognition cannot be studied as an activity isolated from its cultural context. To study cognition is to study cognitive behavior in a particular situation and the relation of this behavior to other aspects of the culture. A second primary concern is that the investigator not impose his views and categories of experience on the phenomenon being studied, but rather that he make his behavior patterns fit those of the people he studies. Since the anthropologist is likely to reject evidence from belief systems as irrelevant to understand-

ing individual thought processes, no general theory of thinking has arisen in anthropology, although a beginning has been made by the ethnoscientists.

The psychologist is primarily interested in the study of various cultures in order to test the generality of hypothetical cognitive processes. His primary concern is with the *process* of cognition, although he is willing to consider *content* where it can be shown to influence process. In his search for evidence about cognitive processes, the psychologist leans heavily on the experimental method, although this was not always the case. In the period around the turn of the century, many unverifiable statements about "what the subject is thinking" were to be met in the psychological literature, in which the data were often of an anecdotal or observational nature. This practice of using naturally occurring behavior sequences as direct indicators of underlying thought processes was severely criticized by C. Lloyd Morgan (1891, pp. 327 ff.), who pointed out the difficulty of identifying a correct prediction of a single event as an example of true reasoning. Morgan distinguished two kinds of inference, "perceptual" and "conceptual." A perceptual inference is one taken from direct experience, in which the connection might be remembered. For example, the expectation of rain when thunder clouds appear is a perceptual inference. A conceptual inference is also based upon experience, but is reached through the exercise of the reasoning faculties. It is based upon the process of isolation and analysis and predicts occurrences that have never before been experienced. The major ambiguity in the analysis of single, naturally occurring events is that it is difficult to know if the conclusion is reasoned or remembered.

Considerations like these, combined with the reliance on observable behaviors as the basic data of psychology, led psychologists to define thinking in terms of new combinations of past experiences. The new combinations are made to obtain a goal or solve a problem. For example,

Thinking . . . may be provisionally defined as what occurs in experience when an organism, human or animal, meets, recognizes and solves a problem. . . . The process of thinking involves an active combination of features which as part of the problem situation were originally discrete. [Humphrey, 1951, p. 311]

The term *cognition*, now common in psychology, once was roughly synonymous to *thinking*. However, it is now used to refer to the range

of phenomena that the nonpsychologist speaks of as "thought processes." For example, Bruner (1957), in a well-known article, says that cognition is present whenever the subject "goes beyond the information given." Examples of elementary cognitive capacities discussed by Bruner are the formation of equivalence classes, the learning of redundancy, the learning of coding systems, and theory building (which involves the combination of the three former capacities to account for new phenomena). Similarly, U. Neisser (1968, p. 10) says that cognition is involved in an activity that displays formation and construction. A consequence of the psychologists' emphasis on new behavior or transformations of old behavior has been the study of situations that involve learning new things, or at least reorganizing old things. The question then becomes: is it necessary to hypothesize something more than simple association or rote recall, to account for these activities?

The linguist has two concerns. First, he wishes to test the fundamental proposition that the cognitive capacities of the individual are reflected in his language. Followers of Chomsky and Whorf may draw different inferences from this linguistic principle, but both are concerned with the role of language factors in cognitive performance. Second, the linguist wishes to refine and make generally available techniques for pursuing the ethnographic interests of the anthropologist.

Although it is doubtful that linguists in general agree on a definition of cognition, Chomsky and his fellow transformational linguists take a view of cognition roughly consistent with that proposed by Bruner and Neisser. They assert that the cognitive processes of the speaker must in some sense be as complex as the language he speaks. The central message of contemporary linguistics is that simple associations cannot in principle explain a person's infinite capacity for producing new utterances. By reasonable extrapolation, theories that do not assume such generative powers in the thinker cannot be expected to explain thinking.

Our own "synthesis" of these concerns can be characterized in two ways. First, we wish to study the relation between a person's home culture and the kinds of cognitive skills he develops. Our data concerning culture as well as the individual activities within that culture require that cognition not be isolated from other activities of life. Quite the contrary—as we indicated in the preface to this volume, common, everyday activities provide the basic materials for the discovery of significant cultural variations that may be related to cognitive variations. If, as we hypothesize, cognitive skills are closely related to the activities that

engage those skills, we have to be able to specify the kinds of tasks that people in different cultures routinely encounter. We also want to be able to characterize the nature of the differences in activities that are implied by cultural changes such as those introduced by Western-style schooling or literacy. In addition, we believe that the study of cognitive processes cannot ignore content, particularly the basic categories of experience that are relevant to the processes under scrutiny. Finally, ethnographic analysis sets a kind of endpoint of any analysis of cognition; it provides a picture of the intelligent, adaptive behaviors that people engage in every day. Whenever our analysis suggests lack of competence, we must always look to our basic ethnographic observations to see if that same lack of competence is manifested in routine activities. If not, it is more likely that our analysis, rather than our subjects, is incompetent.

Second, we believe that the experimental method is an important tool for understanding cognition. Our work starts with certain Western notions of cognitive process as embodied in various experimental tests. Hopefully, we will reach at the end a bidirectional, comparative analysis both of our own culture and of other cultures.

Cross-cultural experimentation, even embedded in a culturally appropriate context and carefully qualified by sound anthropological, psychological, and linguistic canons, is not inherently a trouble-free tool. Much of our thought and energy has been devoted to developing methods for designing experiments that would neutralize two major objections to cross-cultural experimental research—one from the anthropologist, the other from the psychologist.

The anthropologist makes the fundamental criticism that *in principle*, the experimental method is not applicable in nonliterate cultures. No matter what measures a psychologist may take to make his experimental procedures clearly understood, his materials familiar, and his procedures straightforward, the very fact that he asks a member of a nonliterate community to answer a set of questions or to seek the solution to a hypothetical problem violates cultural norms. The anthropologist concludes that the behavior displayed in this way cannot be considered a reflection of normal cognitive functioning.

We can accept the proposition that there are real and important problems in using the experimental method in cross-cultural research. But we reject the conclusion that cross-cultural experimental research is useless. The problems involved are not unique to this particular domain

of inquiry, nor do they compel us to retire to the role of participant observers, simply because we recognize that our means of obtaining data influence the data we obtain.

The situation is not unlike that which obtains today in the study of animal behavior. For many years experimental psychologists have used the Norway rat and the Carneaux pigeon to study the laws relating the conditions of reinforcement to the frequency and patterning of simple behaviors (lever pressing, key pecking) in animals. In recent years a group of scientists interested in animal behavior, but calling themselves ethologists, have challenged the research strategy of the psychologist, pointing out that an animal's behavior is specific to his species and is related closely to specific aspects of his physical and social environment. The ethological strategy calls for the study of the organism in his natural environment as a means to understanding his capacities and the functional relations between his behavior and various environmental events. Extremists among both psychologists and ethologists claim that *nothing* useful can be learned from following the opposite strategy. But the general consensus is to seek functional laws where they can be found—the problem comes from overgeneralizing one's results to domains where they do not apply.

All controlled observations, including experiments, affect the data one obtains. Just as an experiment is never a normal part of a subject's everyday life, so an observer can never become a normal part of a social group's everyday experience. The strategy in both cases is to seek to *minimize and evaluate* the extent of the distortion that observation introduces into the natural situation. Exactly the same problem arises in making inferences from experiments with Western children and adults, and one often hears complaints that it is difficult to know how to extrapolate laboratory findings to "real life." Our intuition tells us that the problem of extrapolation may be even more difficult in nonliterate societies, but this is a cause for careful study, not despair. If our data support theories that have predictive power, the result, although not perfect for all purposes, can be considered useful. The proof of that pudding we defer to later chapters.

The second objection to cross-cultural experimentation comes from the psychologist who is concerned with the logic of experimental design and inference. This objection can be expressed best through an example from our previous work. We asked persons to view small dots on a card for time intervals between one-tenth and one-hundredth of a second and to tell how many objects are present (see Cole, Gay, and Glick, 1968,

pp. 184 ff. for details). American adults are consistently accurate at this task so long as six or fewer dots are presented, but with more dots become markedly less accurate. The hypothesis has been proposed from these and other data that humans have a limited but definite "information-processing capacity" (Miller, 1956). A natural question to ask is whether normal adults in a radically different culture show the same behavior. When we tried this experiment with a group of American college students and Liberian tribal people, we found the Liberian performance both different and significantly poorer than that of the college students.

The experiment as described above can be criticized by both psychologist and anthropologist since it is not clear how to interpret the results. We do not know what inferences about cultural differences, either general or specific, are warranted. We could explain these results in many ways, some cultural and some methodological. How do we narrow the range of acceptable inferences? Furthermore, how can we make inferences that have general import, rather than relevance to this problem only?

We suggest that there are two ways out of our difficulties which can be used separately or together in psychological-cultural research. First, as Donald Campbell suggests:

We who are interested in using such (cross-cultural) comparisons for delineating process rather than exhaustively describing single instances must accept this rule: *No comparison of a single pair of natural objects is interpretable. . . .* However, if there are multiple indicators which vary in their irrelevant attributes, and of these all agree as to the direction of the difference on the theoretically intended aspects, then the number of tenable rival explanations becomes greatly reduced and the confirmation of theory more nearly certain. [Campbell, 1961, pp. 344–345]

Second, as we have pointed out elsewhere, whenever possible, inferences about differences between cultures with respect to a given cognitive process should depend on the pattern of performances within the cultures being compared.

These two principles require us systematically to vary the content and context of the experiment, while maintaining the central principle. However, such a program of experimentation may be exceedingly costly and time-consuming. It is necessary, therefore, to determine what inferences we can draw even under limited conditions.

The strategy of focusing on cross-cultural comparison of patterns of performance makes possible certain permissible inferences, even for a

single experiment. In the case of the tachistoscopic dot-recognition experiment, we can draw permissible cross-cultural inferences from the following facts:

1. American subjects are more accurate in their reports of the number of dots; as already reported, American accuracy begins to fall only when more than six dots are presented, while the Liberian accuracy falls from the outset (three dots).

2. There is little or no difference in performance between the two cultural groups when three dots are presented.

3. If the dots are presented in a patterned, instead of a random array (. . . or . . ., for example), American performance is improved relatively more than Liberian performance. Moreover, the American subjects make "patterned" errors, (saying ten instead of eight when shown four pairs of dots), while the Liberians do not.

These and other findings in the complete experiment effectively reduce the number of hypotheses that can account for the pattern of performance of our two cultural groups. For example, such hypotheses as poor eyesight, fear of the experimenter, and the strangeness of the estimation task for the Liberian subjects are not consistent with the facts that there are essentially no cultural differences using three dots and that the patterning helps only the Americans.

In short, by designing our experiment to assess *patterns* of performance between groups and across cultures, we can greatly reduce the dangers of irrelevant explanations and time-consuming experimental variations. Moreover, in so doing we have narrowed the range of variables that need concern us.

In the chapters that follow, we will describe the results of several years of research during the course of which these ideas were developed. It will be apparent that the aspirations we describe in this section exceed our grasp. Wherever possible we have followed the strategy of multiple experiments emphasizing patterning of results. We have, in addition, tried to locate the experiments within cultural contexts that were themselves the objects of study. Finally, we have proceeded on the belief that we are always dealing with normal human beings whose behavior is organized and meaningful within its natural context. When we encounter behavior that appears inappropriate, disorganized, or meaningless, we have tried to make such observations a starting point for inquiry, rather than proof of inferiority. We hope that the resultant characterization of the relation between culture and cognitive activity will reflect the richness and variety of human thinking, whatever its cultural context.

TWO : An Unorthodox Ethnography



An anthropologist's description of a culture is like a myth in that it "is a narrative that organizes data for some purpose."

P. BOHANNON

Introduction

The rather abstract prescriptions for doing cross-cultural experimental research with which we concluded Chapter 1 tell us that in order to enrich our understanding of the relation between culture and cognition, we have to do something more than transport our experimental devices to an alien culture to "see how the natives do." We begin the task of specifying the nature of this "something more" by providing background data on the people who have been the focus of our study, the Kpelle of Liberia. Because our special concern is to understand the relation between features of Kpelle culture and the learning and problem-solving process of individuals, we need to consider issues not ordinarily a part of ethnographic descriptions as well as standard ethnographic data.

To begin with, we will introduce the major cultural variables that we think important for understanding variations in cognitive processes. Beginning with these guesses about significant variations among groups, we will turn to a rather general description of Kpelle life and the national context in which it exists. This general discussion leans heavily on the prior ethnographic work of scholars such as J. Gibbs (1965) and J. L. Sibley and D. H. Westermann (1928). We will discover that there is considerable heterogeneity in contemporary Kpelle culture. In tracing a little of the history and the social forces that have shaped Kpelle culture, we hope to provide some understanding of how the situation we describe arose. We also hope to give the general reader some feel for

global aspects of Kpelle life so that he can approach our experimental work with at least a small part of the intuitive familiarity he has when our subjects are schoolchildren from suburban southern California.

Although this traditional ethnographic material will be useful in obtaining a general introduction to the groups on whom the experimental work will focus, it gives us very little insight into the detailed nature of the activities that members of the various groups engage in or the way in which they learn and solve problems. Consequently, we will provide additional data which are not to be found in previous ethnographies and which, unfortunately, are of a rather fragmentary and unsystematic nature. From recordings of conversations, court cases, school essays, and a variety of miscellaneous sources, we will piece together what we know of the mundane activities of Kpelle people that engage them intellectually. We hope that this material will serve two purposes. First, it should provide clues about the sources of performance differences among groups when they are encountered with our experimental tasks. Second, it should provide us with a picture of everyday Kpelle intellectual activities against which to measure the impressions gained from experimentation.

We begin by describing the major variables of concern to us as we undertook this "unorthodox ethnography."

The Overall Design of the Research

We cannot claim to understand fully either Kpelle life or cognition. We claim only an interest in such important examples of cognition as learning, problem solving, classification, and memory, coupled with some hunches about the cultural variables that influence them. In later chapters we will develop these intuitions into particular hypotheses leading to experimental studies. For the present we will outline the major cultural and subcultural variables that might be generally related to cognitive variation and describe informally the resulting subject populations used in most of our studies.

The major contrast that we have employed in our studies is between the traditional Kpelle and the Kpelle who have attained some degree of Westernization. However, this comparison is by no means straightforward.

Schooling represents the single most powerful institution for producing nontraditional, acculturated people, not only in Liberia, but

throughout sub-Saharan Africa. L. Doob (1960) has, for instance, used formal education in Western schools as his index of acculturation for Africans. He asserts that it produces more significant differences than other variables he has worked with, and that it is positively related to such other indices of acculturation as occupation, knowledge of English, and place of residence.

Schooling in particular is related to literacy, another variable that many authors believe to be very important in determining the way in which people learn and think. Although the schoolchild becomes literate and Westernized at the same time, it is possible, at least in theory, to separate these two factors. One way, suggested by G. Jahoda (1961), is to develop an "index of acculturation" based on the kinds of artifacts—for example, thatched roofs or corrugated iron roofs—used by people in their ordinary lives. It makes good sense to believe that a car mechanic, even though illiterate, will function intellectually in ways that differ from a rice farmer. A second way to separate schooling and literacy is to take advantage of special situations in which literacy is attained without formal schooling. Two such situations suggest themselves in the Liberian setting, although we have made little use of them: the use of Arabic by Mandingos, and the use by the Vai of the syllabic form of writing invented by a member of their tribe in the 1820s (Dalby, 1967).

Schooling and literacy are both thought to be related to a whole series of cognitive changes, one general characteristic of which is greater flexibility. For example, in Horton's (1967*a, b*) discussion of the difference between open and closed belief systems, literacy is said to be of great importance. Traditionally oriented peoples are said to be less able to see alternative solutions to problems because of their belief in "the one correct way." Doob, writing as a psychologist, sums up these observations and ascribes to acculturated peoples less dogmatism, greater proficiency in novel situations, a facility for abstract thinking, and greater ease in the use of language to describe one's feelings and reactions to the environment (Doob, 1961, pp. 325 ff.). In this connection J. Goody and I. Watt (1962) go so far as to say that:

It is probably that it is only the analytic process that writing itself entails, the written formalization of sounds and syntax, which make possible the habitual separating out into formally distinct units of the various cultural elements whose indivisible wholeness is the essential basis of the "mystical participation" which Levy-Bruhl regards as characteristic of the thinking of non-literate peoples. [P. 345]

Bruner et al. (1966) also suggest that education affects intellectual development; they contend that formal education is required for the development of certain cognitive skills. Both European and American developmental research are limited by the fact that in these two areas of the world all normal children begin to attend school between the ages of five and seven years. This is the same age at which certain crucially important increases in children's intellectual capacities have been repeatedly noted (cf. Piaget, 1955; Bruner, Olver, and Greenfield, 1966; Kendler and Kendler, 1968; Luria, 1960). For this reason it is impossible to say whether these changes come by the mere fact that the maturing organism interacts with its environment, or come because of special environmental features, such as those provided by the school.

One of our primary aims will be to specify adequately by experimental analysis the domains in which acculturated and traditional people differ in their ways of thinking and to separate, where possible, the effects of literacy and acculturation.

Cross-cultural developmental research can also test the oft-repeated claims of anthropological and psychological observers that primitive peoples manifest precocity of mental development, followed by an early arrest (Miller, 1928; Werner, 1948). We can compare developmental trends in those who have and have not been Westernized at various ages through adulthood.

In addition to schooling and age we are concerned with language. Although knowledge of English is one of the measures of acculturation and is highly correlated with school attendance, we can separate these variables and investigate certain questions of the relation between language and learning of major importance to the question of cultural differences in thought processes.

Although other variables could have been investigated, our own interests and skills, combined with conditions in the area in which we worked, lead us to study the influence on cognition principally of age and education, and secondarily of language and degree of acculturation.

Both great opportunities and great difficulties arise from choosing the Liberian hinterland as a place to do cross-cultural research on cognitive processes. The opportunities arise from the great degree of cultural diversity within a single ethnic group, while major difficulties stem from the fact that several of the most important variables clearly covary. For instance, in studying the contrast between traditional and acculturated Kpelle people, we have to consider changes in vocation, number of languages spoken, literacy, school attendance, and travel, to mention but a

few of the most obvious factors. Some of these changes are closely linked (literacy and education), whereas others are only partially correlated (number of languages and travel).

A major virtue of Kpelleland for developmental research lies in the fact that whether or not a particular child attends school is more a matter of chance than is true in Western society. Schools were built along the roads, which reach only a small number of the towns. Moreover, only some of the children in even these road towns actually attend school. As we remarked earlier, a major difficulty with present important developmental theories is their reliance on studies of children who begin school at exactly the same period when many important changes are said to occur in the child's cognitive capacities. Although comparisons of educated and noneducated Americans would be possible, the noneducated Americans would differ greatly from the cultural norm, whereas in Liberia the schoolchildren, if anything, are the ones who differ from the cultural norm.

Age would seem to be a straightforward variable to measure, but, in fact, few Kpelle know their age in years. As a consequence, estimates were often based on information supplied by parents, older siblings, or town elders, who were familiar with Western measures of age. Because of the unreliability of such estimates, we resorted to the use of age-ranges rather than specific ages to define our groups. The particular age ranges we used were chosen to facilitate comparisons with experiments conducted by others in the United States and to permit evaluation of various theoretical statements about the relation between age and performance. Although we used younger (four to six years) or older (sixteen to eighteen years) children in certain special experiments, normally we used six to eight, ten to fourteen, and eighteen to fifty year olds as our basic age-defined groups.

Further complicating cross-cultural comparisons of the effects of age and education on cognition is the fact that Kpelle children start school at widely varying ages. Although there has been a strong effort by the government to restrict first-grade admission to six-year-old children in recent years, the average age of children in the second grade is probably near twelve years, while first graders' average age is probably closer to eight or nine. Often children remain in the first grade until their English is deemed adequate to move ahead, a process that may take several years. This situation makes simultaneous cross-cultural equation of age and education virtually impossible; it is also one of the many reasons that we have come to emphasize the relations among variables within a