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WHAT'S CULTURAL ABOUT CROSS-CULTURAL COGNITIVE PSYCHOLOGY?[1]

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Laboratory of Comparative Human Cognition

Center for Human Information Processing, University of California, San Diego, La Jolla, California 92093

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The first review of cross-cultural psychology was published in the *Annual Review of Psychology* 6 years ago (81) Already swamped by the volume of material at hand, the reviewers reported that they covered only one quarter of the relevant material Since that time a special journal devoted entirely to cross-cultural research has appeared, several summaries devoted to sub-areas of research have been published (19, 23, 34a, 46, 48, 54, 63, 77, 90), an "advances" series has been initiated (85), handbooks are in progress, and books of readings grouped around special topics abound (2, 9, 13, 62, 67)

[1]This article represents the joint labor of the following members of our laboratory Kenneth Traupmann, Warren Simmons, Sylvia Scribner, Judy Orasanu, Louis Moll, Ray McDermott, Deborah Malamud, Helga Katz, Jan Jewson, Lois Hood, Martha Hadley, William S Hall, Zoe Graves, Joseph A Glick, Lenora Fulani, A J Franklin, Michael Cole Preparation of this article was made possible by a grant from the Carnegie Corporation

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In mid-1978 it would be impossible to list all of the relevant articles concerning "psychology and culture" in the space allotted, let alone review them

This flood of fact and opinion has faced us with a difficult problem of selection which we have decided to handle in the following fashion First, we will concentrate our review in that subarea of cross-cultural research which deals with the relation between culture and intellectual processes for the combined reasons that it has received increasing attention as the decade of the 1970s has proceeded and because our firsthand knowledge of this area of research is greatest Second, we will concentrate on research problems which have received sustained attention from more than a single researcher Among the rare consensuses to emerge from a field where disputation and diversity abound is the idea that firm evidence in support of hypotheses requires sustained research in carefully chosen locations using series of studies that build in a logical fashion Despite this consensus by commentators in the field, the number of research programs which fit this specification is exceedingly small [Sechrest (76), for example, noted that of 239 authors contributing to the *Journal of Cross-Cultural Psychology* in a sample of four volumes, 209 contributed only a single study]

Within this more restricted domain we would like to examine seriously the topic suggested by the title of our article *in what sense(s) does culture enter into the formulation of problems, the identification of independent variables, the observational techniques and, hence, the dependent variables of cross-cultural, cognitive research?*

This might be considered a frivolous choice of foci After all, it seems difficult to find fault with Brislin, Lonner & Thorndike's definition of the field "Cross cultural psychology is the empirical study of members of various cultural groups who have had different experiences that lead to predictable and significant differences in behavior" (13, p 5)

Any feelings of acceptance that this definition may arouse have to be tempered by two grave and generally unresolved difficulties First, there is no agreed-upon definition of culture in *any* academic discipline that psychologists can draw on as a means of specifying what it is they mean when they speak of culture as an independent variable that can lead to predictions Insofar as there is agreement (for example, among anthropologists to whom the psychologist typically turns as the source for a definitional warrant) those who are concerned with the study of culture emphasize the *patterning* of ideas, institutions, and artifacts produced by the group in question

Recognition of the difficulty that such patterning poses for the psychologist is widespread in principle, but very difficult to apply in particular circumstances We take it as symptomatic of the difficulties which this

situation presents that the previous *Annual Review* chapter on Culture and Psychology pointed to lack of progress in description of our independent variables as a major gap in research activities up to that time B Whiting's (88) discussion of the need to "unpackage" culture as an independent variable several years later indicates clearly that the problem did not quietly disappear because it was recognized But we must proceed carefully One of the quandaries that mechanical unpackaging presents us with (if culture is, as anthropologists tell us, a human-produced, *patterned* set of experiences) is that we may, by unpackaging, destroy the network of relations which gave the variable its (packaged) meaning in the first place

In our view, matters are in no better shape concerning the status of our dependent variables, the "predictable and significant differences in behavior" to which Brislin et al (13) refer

It is our impression that cross-cultural psychologists have (implicitly at least) agreed with B Whiting's assertion that sufficient progress has been made on the problem of identifying and measuring dependent variables to permit greater concentration on disentangling the sociocultural and biological precursors of these measures of behavioral processes This appears to be the assumption underlying the recent work of Berry (8), Kagan and his associates (40), and many others Here we will demur, while we strongly agree on the need for the serious study of culture as an independent variable, we will attempt to show that important ambiguities in current cross-cultural cognitive research arise precisely out of an insufficient knowledge of the behavior(s) that constitute the substance of the dependent variable Moreover, we will want to examine for dependent variables—as we will for independent variables—the sense(s) in which the concept of culture enters into the process of identification and measurement This is a major point of disagreement among psychologists and between psychologists and anthropologists It arises because in order to specify cognitive *process* the psychologist must rely upon experimental manipulations (or, far more weakly, on tests and intertest correlations) But our ignorance of the multiple, systematic behaviors that give rise to the criterion behavior too often leaves us mute regarding an unambiguous interpretation of the outcome The point is a very old one that is not restricted to cross-cultural cognitive research, but is just more acute there

> Group tests reveal the *product* of thinking, not the *processes* responsible for the product Any notion of development expressed merely in terms of accuracy or speed in achievement seems inadequate The true measure of development is not the degree of accuracy, but the manner in which the pupil thinks (86, p 366)

For the anthropologist these ambiguities give rise to judgments like the following from the 1977 *Annual Review of Anthropology*

> there seems to be little awareness that the measures used may be full of our cultural biases and therefore highly inappropriate to the task of comparing across cultures Psychologists, I have argued, would do well to consider actively the hypothesis that their measures may be biased (25, p 51)

While "bias" is not well specified in this passage, the article of which it is a part makes it clear that the author is pointing to many specific features of tests and experiments that are *not* a part of the psychologist's theory of the task but which, nonetheless, exert an unevaluated influence on the outcome and the conclusions which flow from it

FOUR BASIC RESEARCH APPROACHES

At this point in our discussion we face a fundamental decision It would be possible, following the tradition of previous reviews, to organize the discussion around major categories of cognitive behavior as they have been applied by various investigators, or we could review major areas of dispute centering on issues of tactics and methodology However, in the discussion that led to the preparation of this manuscript, we repeatedly found ourselves caught up in arguments over method which hinged on the nature of the theoretical problem with which the investigator under scrutiny was trying to deal, in short, many issues of method are not "theory-free" Rather, they are attempts to narrow the range of plausible alternatives to the central hypothesis under investigation

As a consequence of this experience, we have decided to organize this review as follows We will first survey developments since 1972 with respect to four general classes of research on culture and cognition—universalistic hypotheses (such as those associated with the work of Piaget and Rosch), socialization theories (including the work of Berry/Witkin and the Soviet sociohistorical school), "mixed" approaches as exemplified in the work of Kagan/Klein, their colleagues, and Wagner, and finally functional approaches that gear their observations to specific relations between culturally organized activities and specific cognitive outcomes In each case we will examine how researchers represent culture in the populations studied, the methods of observation, the dependent variables that are tokens of "results," and finally the conclusions that they draw from their data

COGNITIVE UNIVERSALS

Logical Operations à la Piaget

Several of the general references given at the beginning of this review centered on Piagetian theory, or at least on the use of Piagetian tasks to compare different cultural groups

The classical formulation of Piaget's position concerning cultural variability in cognition is given in his 1966 article (60) and summarized by Dasen (24) Four sets of factors responsible for cognitive development are listed

1 Biological factors, which interact with the physical environment during parturition and growth
2 "Equilibration" factors, which arise as the young organism interacts with its immediate physical environment
3 Social factors of interpersonal coordination, which arise as child and adult exchange information and the child learns to coordinate his behavior with the activities of important others
4 Educational and cultural transmission factors, which are culturally distinct pressures to learn about specific features of the (cultural) environment (as reflected, for example, in different classification schemes)

The standard perspective on this categorization of causal factors in development has generally been that the first three lead to predictions of universality (22, p 4) with the burden of cultural variation falling into the fourth category It is important to realize that when "universal" is employed as an adjective in relation to stages or levels of development in applications of the Piagetian system, it is being used in two different senses that (*a*) the sequences of stages, including their structural properties and the kinds of explanations given by children at different stages, are invariant, and (*b*) the horizontal decalage (e g the order in which conservation of quality, weight, and volume are acquired) is invariant Dasen's recent work speaks of a third kind of universal, which occurs when the quantitative level of achievement at the same age in different cultures is equivalent In 1972 it appeared that the hypothesized universalities were rather strongly confirmed for stage sequencing, generally supported for within-stage decalages, and disconfirmed for levels of quantitative achievement Indeed, it appeared that quantitative achievement of older subjects in some cultures threatened the hypothesis of universality in the existence of the highest level, "formal operational," stage (61)

By 1978, the situation has become considerably more complex Whereas the empirical verifications of the sequencing of major stages seems to have remained a robust phenomenon up through the concrete operational stage (23), failures to find formal operational thinking have engendered suggestions that it is necessary first to establish the end state toward which developmental processes move in different cultures If this step is not taken, the absence of a concrete formal-operational phase becomes a theoretical nonsequitur, which presupposes the Western scientist as the epitome of developed thinking (36)

Evidence about inconsistency in the order in which various concepts are achieved and "lags" in development for various cultural groups have met with three kinds of responses First, there are what we shall term the "psychological method" critiques As summarized in a number of discussions, investigators have become increasingly aware of problems arising from unfamiliarity of materials, use of standardized questioning procedures rather than flexible, clinical interviews that adhere to local norms of conversation and interaction, and inhibitions produced by the presence of foreigners, to mention some of the more prominent problems studied (12, 26, 41, 59) In some cases, performance differences between educated and noneducated populations, or between some "exotic" populations and European norms, have been reduced or eliminated through procedures that are designed to make the testing conditions as similar as possible in local terms to those that exist in the European countries from which the research methods arose These criticisms are valid, important, and are increasingly coming to be accepted by those engaged in all cross-cultural work However, we have to agree with Dasen (24, p 13) that such explanations cannot account for all of the differences found in the substantial studies carried out to date, particularly in cases where performance differences between groups are uneven in ways that cannot be explained away by any simple "methodological" difficulties

A second approach to cultural variability in response to Piagetian problems has been to apply Flavell & Wohlwill's (28) version of a competence-performance distinction to the cross-cultural Piagetian arena

As formulated by Dasen, the extension works as follows Flavell and Wohlwill assert that the probability of successfully completing a given task is the product of the probability that the child has acquired the operational structure and that the relevant attributes will be applied to the operational structure Dasen adds a third factor, representing the probability that the operation called for by a given task "will in fact be called into play in a given cultural milieu" (22, p 333) This formulation gives us performance as a multiplicative outcome of competence, task-specific, and culture-specific knowledge The goal of cross-cultural Piagetian research then becomes to determine if cultural differences are to be attributed primarily to differences in basic competence or in either of the two "performance" parameters

Perhaps the most significant development in comparative cognitive research of all kinds, but of Piagetian work in particular, is that a broad spectrum of researchers have explicitly or implicitly accepted some version of Dasen's model Once performance is treated as problematic with respect to competence, this research then finds itself confronted with the task of learning more and more about local cultural conditions in order to carry

out its newly recognized inferential program This latter necessity represents the third major direction visible in recent cross-cultural Piagetian research (As we shall see, it is a direction characteristic of the entire range of research under review)

Paradoxically, the Piagetian researchers who seek to determine specific cultural factors that influence development have to confront an absence of guidance from the European research base that generated their theoretical framework As Greenfield cogently remarks, Piagetian researchers who would seek to specify the organism-culture interactions that enter into cognitive performance are faced with the central difficulty that " although the role of organism-environment interaction is central to his constructivist theory, Piaget has never specified the nature of these interactive processes nor has he himself made them the object of empirical study " (36, p 327) Nonetheless, faced with the necessity of specifying the kinds of culturally organized experience that foster the development of particular competences, ingenious new experiments have been conducted

A major line of research, initiated by Price-Williams, Gordon & Ramirez's (64) finding that Mexican potters' children were precocious in their conservation of clay substances, has now given rise to several replication studies which are beginning to specify the nature of the interactions necessary to stimulate construction of the conservation concept

Adjei (1) contrasted child and adult groups of rural farmers, potters, and tradespeople He had expected, like Price-Williams et al, to find experience-specific differences among the groups with respect to different kinds of conservation performance (potters' children excelling on weight and volume, sellers' children on numbers, etc) His expectations were only partially fulfilled, in part because performance was excellent in all groups for the number task where he had expected the sellers' children to excel Potters' children reliably outperformed the other two groups only on the conservation of weight task The potters themselves, however, reliably outperformed both the farmer and seller groups on all three conservation tasks where direct experience in potting is explicitly implicated

As part of her large study, Bovet (12) also observed group differences in performance on various conservation tasks which she attributed directly to differential experience with the materials and operations involved For example, women in her sample habitually compared the weights of two lumps of dough as a part of their baking activities and were reported to be extremely skilled in detecting differences in weight These women often refused to make judgments about weight in the conservation task unless allowed to experiment with the materials using their own (experimentally inappropriate) method Men never made such requests, and their responses

were more easily coded according to traditional criteria Superior performance of men in a lengthy conservation task was attributed to their greater mobility (which presumably indexed experience with such task demands)

The problems and promise of this line of research are highlighted by a recent failure to find an experience-specific effect on conservation of the kind expected from research by Price-Williams et al Steinberg & Dunn (80) carried out a study contrasting the performance of children from two neighboring villages on conservation of weight and quantity Women in one village were potters, those in another were not No differences among children from the two villages were found In seeking a reason for this failure to replicate, Steinberg and Dunn zeroed in directly on the different involvement of children in the two studies in the actual process of potting and differences in the requirements of the potting process itself In the Price-Williams et al study, the children participated at various points in a production process which is very similar to the classic operation of conservation and repeatedly observed relevant operations even when they did not actively participate In the Steinberg and Dunn village, the production process not only did not permit experience of invariance across transformations, but it actually provided experience of variance because the process of firing the pots transformed their size and weight Their conclusion is important, even if its applications to the studies in question is post hoc " familiarity with the materials *per se* does not significantly facilitate performance on conservation tasks The nature of the child's particular experience with the material may have some relevance" (80, p 23)

This conclusion is relevant to another strain of recent Piagetian cross-cultural research which uses the competence-performance distinction to encompass findings that are otherwise difficult to incorporate into a Piagetian framework We are referring here to that body of work made prominent by Heron (39) which has failed to find the "structure d'ensemble," or intercorrelations among tasks, supposedly calling on the same underlying operations Heron has strongly questioned the unity of the various stages based on the lack of correlations that he has observed A position which assumes that lack of correlation among tasks diagnostic of a particular stage arises because of differences in task and culture-specific knowledge associated with each task is one obvious strategy for retaining the notion of universal stages in the development of cognitive competence, while accounting for cultural variation at the level of performance

Before leaving this section, one additional line of cross-cultural Piagetian work requires mention because it demonstrates the way in which culture-specific knowledge can bolster claims for cognitive universals In each of these studies, children were tested for their comprehension of kin terms in languages where the kinship terminology and family structure vary consid-

erably from the Genevan norm (37, 65) In each case, the sequence of comprehension—from errors based on failure to take another's perspective (egocentricism) to understanding of reciprocal relations among two others, to the understanding of reciprocity applied to oneself (reversibility)—was confirmed Further, indigenous linguistic categories, for which rather complex componential analyses are available, failed to account for the ordering of children's responses, leaving the "universalistic stage" hypothesis without serious rival

A puzzle about his line of work which was raised by Piaget more than half a century ago now becomes more interesting than when it was first posed Piaget noted that only-children were no slower to acquire comprehension of kin terms than children from multichild families When we begin to notice that successively more difficult kin relations must be probed with questions that are syntactically more and more complex (Compare "What is the name of your sister?" with "As for your younger sister Mary, what is the name of her older brother?") we want to ask, how are kin terms used in the various societies in question? Granted that componential analysis of (say) Tzeltal kin terminology does not predict the order of understanding questions about kinship, what domains of activity *do* give rise to the differential adult terminology and child comprehension? The investigations of how other Piagetian tasks fit in with native, culturally organized "contexts of activity" which seemed so important to understanding orders of acquisition of different conservation concepts must have parallels in domains such as kinship as well

Categorization

When the previous *Annual Review* article on cross-cultural psychology appeared, only the initial rumblings of the earthquake that was to hit psychological theories of categorization and the Whorfian linguistic relativity hypothesis were discernible Common wisdom and some data (cf 19 Chap 3) had it that different languages code the world differently, and that ease of codability predicts ease of information processing (for example, highly codable colors will be most easily remembered)

In 1969 Berlin & Kay (7) provided evidence that the number of basic color terms is very limited, and that despite variations in the boundaries of color categories, the focal colors are universal In a lengthy series of studies, Rosch (69) has explored the psychological implications of the idea that for concrete objects as well as colors and other attributes (such as form) there are universal "focal instances" (in the case of attributes) or "basic level objects" (in the case of objects) which arise either from universal characteristics of the human sensory system (11) or from characteristics of objects in the real world

Rosch's key experiment, which sets the logical pattern for all the others, was carried out among the Dani of New Guinea who have a two-term color vocabulary Pretesting with eight focal colors (taken from Berlin and Kay's classification) showed that they were no more codable linguistically than "internominal" (nonfocal) colors When recognition memory for these equally codable focal and nonfocal colors was tested among the Dani, recognition of the focal colors was significantly superior to that of the nonfocal colors Exactly the same relationship held for American subjects for whom the focal colors were more easily coded By demonstrating an invariant relation between focalness and recognition on the one hand and random variation between codability and recognition on the other, Rosch cleanly separated the effects of focalness and codability on recognition and showed the cross-cultural universality of a very important cognitive activity Still to be dealt with are cases (79) where categorization occurs in the absence of any focal instances Here codability may remain a powerful influence

In addition to its inherent theoretical interest concerning the understanding of categorization, Rosch's work is one of the best illustrations in the cross-cultural psychological literature of a strategy that tests cross-cultural hypotheses in terms of the interactions between variables *within* cultures It is the *within-culture* invariance of the relation between recognition and focality replicated *across* cultures that makes her hypothesis so robust As Campbell and others have pointed out (14), this approach removes many of the threats to inferential validity with which "main effects" cross-cultural studies have to contend (It is worth noting in this context that the Piagetian kin-term work is based upon exactly this logic of between-culture invariance of the within-culture difficulty of problem solving)

In subsequent work, Rosch has extended her approach to research on basic level objects and events (69, 70) Unfortunately, this work has not yet been extended to the study of categorizing in different cultures If and when such research is done, a good deal of culture-specific knowledge will be needed by the investigator, since the particular objects and events that will be seen as basic will, according to the logic of Rosch's approach, vary Only the relationship among "basic" and "peripheral" instances should remain constant

SOCIALIZATION THEORIES

We labeled the work reviewed in the previous section "universalistic" because the investigators were primarily concerned with demonstrating behavioral invariance in the face of environmental (cultural) variation Their basic presupposition was that crucial environmental factors (social interac-

tions, experiences with physical properties of the world) are so widespread in human societies that relevant cultural variability would be minimal and located in a few, unevenly distributed institutions such as formal schooling In the case of Rosch, the specific presupposition was that the structure of *Homo sapiens* and the real world is such that certain characteristics of categorization will vary across cultures only in the particular objects that fulfill invariant relations

The opposite stance toward cultural variability has, explicitly or implicitly, underpinned a great deal of the remaining work in culture and cognition The general logic of what we are terming the socialization perspective goes something like the following The physical environment in which people live will determine the kinds of economic activities in which they engage Their basic economic activities will require different kinds of knowledge, simply as a result of direct ecological press, the Kalahari bushman (45) and the Kpelle rice farmer (30) will have to develop different strategies for survival of the individual and the group Even at a very rudimentary level, these activities will have to be coordinated among members of a culture in order to insure an adequate supply of food, shelter, and care of the young

The different means of coordinating basic economic demands entail different divisions of labor which produce specialized activities between individuals within groups (the most conspicuous being sexual divisions of labor) It seems reasonable to suppose that, depending upon the environmental circumstances in which the group lives and the coordinated activities that the group has evolved to meet the demands of maintaining and propagating itself, groups will differently organize children's lives so that they will fit in with adult requirements and insure that the children can fulfill those requirements when they reach maturity (8, 45, 82, 89b)

The basic problem of the socialization theorist is to trace the ecology→economic activity→social coordination→child-rearing paths invented and transmitted by various cultures Standard practice uses variations among groups to tease apart the independent contributions of these different aspects of human ecology to the development of psychological processes As Serpell points out in his thoughtful review (77), a good deal of current research within this tradition springs more or less directly from the culture and personality work that came to prominence in the 1940s and 1950s This parallel is particularly strong in the case of those theorists who treat cognition as a reflection of a global characteristic of individuals

Psychological Differentiation

Far and away the largest enterprise in the cross-cultural cognitive socialization tradition has been associated with the work of Berry (8), who has

extended Witkin's socialization model to include ecological, biological, and "acculturative" (cultural importation) factors as well

For several decades, Witkin and his associates have been engaged in a massive exploration of the causes of self-consistent individual differences in the way individuals adapt to their social and physical environments A key concept in this evolving theory has been the notion of psychological differentiation, which characterizes intraindividual specialization of psychological functions and the degree of segregation of the individual from his surround Differentiation has, in turn, been characterized in terms of underlying dimensions, particularly the dimension of field dependence–independence which shapes the way the individual responds to his environment The focus of this review does not permit us to treat extensively the evidence based on research in the United States, but the reader may find a concise presentation of this work in Witkin's recent summary (89a), which also contains references to more extensive discussions

The aspect of Witkin's theory which concerns us here is the way in which it derives causal hypotheses about the effect of socialization practices on cognitive development Using the intracultural evidence as a base, cross-cultural work has sought to confirm hypotheses about the effects of different socialization practices, extend the list of practices which exist as a part of the normal, human repertoire, and relate them to broader contexts for socialization

Berry's large study of "human ecology and cognitive style" included data from 18 cultural groups who varied in their exploitative patterns (animal husbandry-agriculture-gathering-fishing-hunting), settlement patterns, community sizes, political and social stratifications, family organizations, and patterns of child-rearing (in particular, the amount of constraint put on children with respect to social compliance and individual achievement) Finding generally high intercorrelations among these factors, Berry combined them into an ecocultural index He also constructed an acculturation index, composed of years of schooling, involvement in the wage economy, and urbanization These two clustered independent variables were then used to order performance on the following tasks, linked in varying degrees to Witkin's theory of psychological differentiation the embedded figures test, Koh's blocks, Raven's matrices, Morrisby shapes, and a discrimination task (discrimination of rapidly presented geometric figures with gaps in the perimeter which have to be drawn by the subject on a piece of paper) Berry found a strong relationship between the ecocultural index (e g toward hunting and away from sedentary agriculture, toward autonomous child-rearing practices and away from strict socialization that fosters dependency) and performance on these tests of psychological differentiation Less, though significantly, related to psychological differentiation was the acculturation index

To paraphrase Berry (8, p 200), there is a sense in which this style of work disguises a lot of internal complexities and also a sense in which it covers a lot of ground No other cross-cultural effort studying cognition has attempted to cast such a broad theoretical net, no other effort has systematically sampled world cultures in a manner designed to test theory and *then* gone out to make the psychological test observations (as Berry has done) There can be little quarrel with the general attempt to relate behavior to larger and larger spheres of the individual's cultural and (ultimately) physical environment There is also great plausibility in the idea that cultures which, as part of their basic adaptive strategy, vary in the activities they require of adults and children will also vary in the way their members respond to various psychological tests But it is a very different matter to conclude that the particular theory of culture and cognition represented by this work has been confirmed by the evidence Rather, we recommend a more cautious view Using terminology applied broadly to cross-cultural research by Malpass, we believe that the Berry/Witkin differentiation theory is "weakly consistent" with the data because we are "for the most part unable to reject not only alternatives to the hypothesis, but also alternative interpretations of the data based on what are thought of as methodological matters" (51, p 68)

Taking up Malpass's two impediments to theory confirmation in reverse order, we note, as does Berry himself, that the problems of method are many The following difficulties appear paramount to us

1 The tests of significance from which Berry's correlations take their significance require independence among samples, several of Berry's samples were clearly *not* independent, a difficulty known as Galton's problem (57) When the number of *independent* culture groups is taken to be 8 (in contrast to the number of different cultural groups sampled, which was 18), the degrees of freedom for tests of statistical significance drops to 6 Many of the reported relationships between Berry's independent variables are no longer significant if tests are restricted to the independent samples Exactly how Galton's problem applies to the problem of predicting culture-behavior relations is an unresolved problem Berry, recognizing the issue, feels that nonindependence of samples is only a problem when correlating cultural variables with each other In our opinion, the same logic applies to predicting behavioral outcomes

2 The theory implies that perceptual tests that do not require "disembedding" will be less sensitive to the cultural variations in question than tests that emphasize psychological differentiation The discrimination task included in Berry's test battery is assumed not to involve differentiation, hence, discrimination performance would not be expected to relate to the ecocultural and acculturational indexes as highly as measures of psychological differentiation Yet the relationship between discrimination perfor-

mance and measures of psychological differentiation was as strong as the relationship between the ecocultural index and differentiation This finding raises the possibility that variation in differentiation scores resulted from underlying differences in visual discrimination ability rather than psychological differentiation

3 The theory of psychological differentiation is a theory of *individual* differences However, Berry's tests have often been at the group level It is essential to demonstrate the independent variable-dependent variables relationship *within* cultures just as it is to demonstrate the relationship *between* cultures This is the principle referred to as "metric" equivalence by Berry & Dasen (10, pp 18–19) For example, while two groups of adults from different cultures may, on the average, vary in the degree of compliance they require of their children, individual children within each group can be expected to vary in the amount of compliance that is actually required of them. The burden of Berry's analysis rests upon correlations between the ecocultural index and test performance including individuals from all cultures This procedure remains very much a between-groups comparison, although the individual appears to be the unit of analysis

Cognizant of this problem, but limited in his ability to carry out within-culture analyses owing to limited variation in the ecocultural index within the cultures, Berry presents within-culture analyses for each group he studies relating complaint socialization self-ratings and education to cognitive performance (8, pp 155–57) While substantial correlations between cognitive performance and education are obtained, correlations with the socialization index are variable and quite low on the average, in sharp contrast to the general picture given by the between-culture analyses

Although these general points of method are important, they should not be viewed as special to Berry's research In a sense, they surface clearly because the scope of the research makes it possible for us to note them

Matters of method, narrowly defined, are not the only reason to question Berry and Witkin's conclusions Serpell, for example, prefers a less global hypothesis, which he terms the perceptual skills hypothesis (77), to the theory of psychological differentiation as an explanation for the intercultural differences in performance on the kinds of tasks reported in Berry's monograph In its essence, the perceptual skills approach treats as unproven the claim of organism-wide generality to performance, focusing instead on the relationship between task-specific skills required by each of the tests and particular aspects of the environment (ecocultural system would presumably be an acceptable term to Serpell) that could be expected to encourage activities that foster those skills

One line of evidence pursued by Serpell (77) arises from analysis of intercorrelations among tasks For example, he cites a study by Okonji in

which two psychological differentiation tasks, the embedded figures test and the rod-and-frame test, were uncorrelated with presumably predictive socialization factors, the rod-and-frame test did not correlate significantly with the embedded figures test, but the embedded figures test did correlate with Raven's matrices Serpell hypothesized that skill in dealing with pictorial stimuli may be the common skill producing the correlation between these latter two tasks

Cole & Scribner (21) pursued a similar logic in their discussion of the interdomain consistency implied by the psychological differentiation theory Their review of the literature led them to conclude that cross-cultural evidence for consistency of responding implied by the theory across the range of human activities, including perception, cognition, defense mechanism, etc is still lacking This point was acknowledged by Berry & Witkin (89b. pp 29–30), and we can expect future research to reflect the important challenge that this gap poses for the theory Until there is evidence to the contrary, we believe that a perceptual skills interpretation of this line of research is the most parsimonious available hypothesis the data can support Berry and Witkin would strongly disagree with this judgement, and the interested reader should consult their forthcoming publications for more positive characterizations of the relationship between their rapidly evolving theory and the data

The Soviet Cultural-Historical Approach

> It has become a basic principle of materialistic psychology that mental processes depend on active life forms in appropriate environments Such a psychology also assumes that human action changes the environment so that human mental life is a product of continually *new* activities manifest in social practice (50. p 29)

This quotation summarizes the basic position underlying two remarkable cross-cultural expeditions carried out in the early 1930s by Alexander Luria and his colleagues to determine if rapid changes in "appropriate environments" led to qualitative changes in the structure of human mental activity Basing their experimental work on the general psychological position developed in collaboration with Lev Vygotsky (83), Luria sought to demonstrate that the higher forms of mental activity promoted by different cultural milieus would differ according to the leading activities demanded by the culture and made possible by the cultural tools (forms of intellectual activity) that the culture has accumulated in the course of its history

The setting for Luria's work was the small villages and newly organized collective farms of Uzbekistan and Kirghizia in Soviet Central Asia His major contrast groups were village women, who were particularly isolated and restricted to their villages, village men and people who had begun to

take part in collectivized agriculture. This latter group also had been instructed in basic literacy skills

Luria hypothesized that the leading activities of the villagers would be based upon their concrete experience, organized according to what he termed graphic-functional principles He believed that with the advent of literacy and involvement in the modern economy, more abstract-theoretical mental structures come to dominate thinking In a combination of experimental and clinical interview tasks that is unique in the cross-cultural literature, Luria provided support for his basic proposition in the domains of color classification, classification of objects, logical reasoning, imagination, and self-analysis Luria did not use formal, statistical techniques to demonstrate his belief that the changes he was talking about were organism-wide However, his basic theory and the fact that he was working with a relatively small population of subjects, each of whom were administered most if not all of the tasks, suggested to him that the basic principles he was studying were characteristic of the whole person, not just their functioning on his specific tasks In this respect, Luria's work is very much in the same spirit as Berry and Witkin's, a similarity which may stem in part from their common admiration for Werner (87)

Questions have (17) and should be raised about the interpretations which flow from Luria's observations, especially as they related to the developmental implication that nonliterate people lack abstract thought Whatever their weaknesses, however, these studies are unique not only for their subject populations, but as an example of how the clinical method can be used creatively in cross-cultural research

Since the publication of Luria's work, additional studies have been undertaken by Soviet psychologists which have sought to extend his observations to other peoples of the USSR As yet, publications of this work are available only in Russian (53) A small set of earlier observations are available in English (38, 49)

"MIXED" APPROACHES. CULTURE AND MEMORY

In the discussion thus far we have reviewed two contrasting approaches to the relation between culture and cognition The first emphasizes cognitive universals, the second cultural variability Some investigators take an explicit middle ground between these two stances, a ground not unlike that currently occupied by Dasen's competence/performance version of Piagetian theory in certain formal respects Research we characterize here as "mixed" uses theoretical distinctions motivated by experimental-cognitive research in the United States to support differentiation between universal and culture-specific aspects of performance on a variety of cognitive tasks

Illustrative of this work are two independent lines of research that have attempted to establish the existence of universal processes of memory and to distinguish these from culture-specific processes Kagan and his associates formulated their enterprise as follows

> It is assumed that performance on tests of basic cognitive processes generally will show a linear increase with age in all cultural settings, although the rate of improvement and the age at which asymptotic functioning is reached will be a function of local cultural characteristics Performance on tests of culturally specific functions will differ markedly in both their growth functions and asymptotes across different societies (40, p 374)

A variety of memory tasks, differing in their specific demands, were administered to children from 6–12 years of age in two Mayan towns and Cambridge, Massachusetts For all groups there was a regular, average increase in performance with age But there were wide differences between the two Mayan towns and between the Guatemalan children and the Cambridge students Performance differences were particularly marked for those tasks that explicitly required the subject to transform information in memory before responding On these tasks the curves suggest not only that the Guatemalan children lag behind their Cambridge counterparts, but that they may be reaching a lower asymptote

Kagan et al interpret their results as support for the notion of a universal increase in basic cognitive competence, but variation in the growth of strategic organization and rehearsal functions Variations in strategy activation is in turn attributed to delays in the development of "executive" cognitive processes which they believe depend upon such factors as infant care practices, attitudes toward schooling, exposure to a varied environment, and other experiential factors, generally of a cultural nature

While the interpretation of these data by Kagan et al is plausible, their evidence for universal processes of memory and their separation of performance into universal and culture-specific components has to be considered little more than a hypothesis suggested by their data, rather than a conclusion that follows from the data The interpretive weaknesses come from three sources First, Kagan et al lack a process theory of performance for each of their tasks, rendering separation of universal and specific contributions to performance very problematic Second, they lack a theory relating presumed culture-specific experiences to performance (For example, how, theoretically, is one's attitude toward schooling supposed to influence performance on a test of memory for the physical orientation of a set of dolls?) Third, their hypotheses are not framed in a way that will allow them to make intracultural tests that can be compared cross-culturally (unless one accepts the age-related increase in mean performance as such a relation) As a consequence, a variety of competing hypotheses (differential nutrition,

experimenter differences, motivational differences, etc) could be trotted out to question the authors' conclusions with regard to the universality or culture-specificity of particular test performances

Wagner's work in Morocco (84) succeeds in dealing with some, but not all, of the difficulties of the Kagan et al Guatemalan work by drawing on Atkinson and Shiffrin's general model of memory circa 1968 Wagner used this model to distinguish between cultural universals, which he located in *structural* processes of memory (e g size of the short-term buffer and rate of transfer between short- and long-term memory) and cultural variability in the *control* processes of memory (e g rehearsal, elaborated encoding of stimuli) Wagner's basic contrast groups were children of different ages living in an urban or rural environment and attending school or not Important supplementary groups were Quaranic (Koranic) students and rug sellers, who, he hypothesized, should exhibit culture-specific control process characteristics

Wagner's first study, replicating his own previous research in Yucatan, demonstrated educational and urban/rural differences in short-term memory for the location of pictured objects Fine grain analysis showed that the average differences were located primarily in the primacy portion of the recall set On the basis of the model and a great deal of collateral research in the United States, Wagner plausibly attributed these differences to the control process of rehearsal, with invariance in the "structural," recency portion of the list Contrary to his speculation based upon observation of Quaranic education, Quaranic students behaved like their unschooled peers In Wagner's second study, continuous recognition of rug patterns was the task assigned to his basic groups Here the special experience of the rug sellers was of obvious interest In this study, Wagner associated control processes with the level of acquisition (number correct) and structural processes with the forgetting rate over a period of time

If matters had worked out neatly, Wagner would have observed group variation in overall number correct, but none in rate of forgetting Matters did not work out neatly Some of the expected invariance was obtained (e g no age effects were found), but that invariance applied to both the structural and control aspects of the task Relevant variation was also obtained, but it was not restricted to the "control" aspect of the task and its direction was opposite to that obtained in Experiment 1 in an important way Instead of the control processes of the urban children exceeding those of the rural children, the opposite was found Again, Quaranic scholars performed like unschooled children Interestingly, rug sellers forgot at a slower rate than the other Moroccan groups Since the task involved recognition of rugs, this result was anticipated, but it occurred in the theoretically wrong aspect of the performance, forgetting, which was hypothetically a structural universal

Despite interpretive difficulties, Wagner's study is interesting as an example of a theoretically motivated study in which tasks were chosen to permit specific tests of universal and culture-specific components of cognitive performance The success of the rug sellers and the failure of the Quaranic scholars may have been more or less congenial to Wagner's experimental hypotheses, but in each case his inclusion of local cultural institutions provided the basis for a theoretically motivated selection of tasks and groups

ETHNOGRAPHIC PSYCHOLOGY

At the 1935 meeting of the American Association for the Advancement of Science, Florence Goodenough addressed the anthropological section on "The measurement of mental functions in primitive groups " At one point in her address she remarked

> Now the fact can hardly be too strongly emphasized that neither intelligence tests nor the so-called tests of personality and character are measuring devices, properly speaking They are sampling devices

and

> we must also be sure that the test items from which the total trait is to be judged are representative and valid samples of the ability in question, as it is displayed within the particular culture with which we are concerned (34, p 5)

Thirty years later Goodnenough's wise words describe two major characteristics of a fourth approach to the study of culture and cognition which has come to be called ethnographic psychology (not to be confused with the *volkerpsychologie* that Wundt proposed almost a century ago) Motivation for this development stemmed from observations of gross discrepancies between performance by "exotic" groups on psychological tests and anthropological accounts of their everyday behavior For example, Cole & Scribner (19, Chap 8) reported that in an experimental communication task originally designed to assess children's ability to consider another person's information requirements, unschooled Liberian *adults* performed much like young American children On the basis of their performance on this task alone, these adults could be labeled "egocentric " However, these same people engaged in sophisticated arguments in local courtrooms and other settings that indicated no general lack of communicative skill or insensitivity to their listeners' needs (4, 13, 16) Similarly, Gladwin (32) and Lewis (47) have described complex navigational skills of uneducated Micronesian islanders who had difficulty in solving Piagetian problems that American teenagers generally master quite easily The magnitude of such discrepancies was sufficient to generate suspicion that the methods currently in use to investigate the cognitive skills of non-Western people are

not appropriate to the inferences about culture and cognition which motivated the research in the first place

The ethnographic approach represents a deviation from both the current goals and methods of the previously described approaches. Its primary goal is neither to locate universals in cognitive structures nor to discover generalized mental abilities which develop as a function of socialization practices that are measurable by universally applicable techniques Rather, it seeks to explicate the relation between culturally organized activities and the development of systems of cognitive skills cognitive universals may be demonstrated, and socialization practices certainly control the organization of activities, but a firm understanding of what people are doing, what their activities are, is the starting point of analysis (18, 20, 29, 73)

These investigators' acceptance of the proposition that psychological tests are not measuring devices has required the development of techniques that permit valid statements about the (mental) activities which subjects engage in when confronted with particular cognitive tasks Specification of these activities has made the experiment, rather than the test, the basic tool of psychological analysis (16, 18, 71, 72, 74) The distinction between test and experiment is important here, because a great deal of cross-cultural work is based on process inferences from tests, a procedure that has helped to generate almost endless debate about item equivalence, validity, and other problems generally spoken of as methodological Consistent with current thinking and technology in domestic versions of experimental cognitive psychology (66), researchers within the ethnographic-cognitive psychology group have relied heavily on the series of experiments to warrant inferences about psychological process Performance in any given experimental condition is viewed as the product of complexly interacting basic processes, organized into functional systems (50, 83), the principles of which require extended experimental analysis if they are to be explicated Variations within the series of experiments is motivated by hypotheses concerning what is required for performance on a particular task and the relation of that task to others posed in the group's experience

There has also been a growing realization that Goodenough's comments on sampling have very broad implications for the cross-cultural enterprise The major methodological lesson is that ethnographic analysis of cultural activities that require and promote particular cognitive skills must be carried out in close proximity with (and preferably prior to) experimental analysis of the skills in test-like situations. Otherwise, we remain critically ignorant of how the behaviors sampled in the test relate to those routinely demanded by the culture

It should be clear from this bare description that the requirements that the ethnographic psychological enterprise lays before the practitioner are

stringent indeed, she must be adept at both cognitive-psychological task analysis and cultural task analysis, she must be knowledgeable about relevant theory in both domains Nor is such knowledge a sure foundation on which to build The technology for the former kind of analysis is still rudimentary (31, 52, 66, 78), the latter, embryonic (3, 5, 15, 29, 35, 42, 56).

The early work in this tradition must be considered inadequate on both experimental/psychological and ethnographic grounds Cole et al's cursory ethnography of Kpelle intellectual activities, while suggestive of interesting areas of inquiry, would have benefited from a far deeper understanding of Kpelle modes of discourse as contained, for example, in Bellman (4) Lancy's (43) studies of memory among the Kpelle suffer from a far-too-cursory ethnographic description of Kpelle remembering activities, in addition to the weakness of his tasks as measures of the presumed activities [contrast Murphy (55)] The only way to avoid the elements of superficiality which this research has struggled with, but largely failed to overcome, is to combine experimentation and fieldwork in a multiyear, multidisciplinary effort where ethnography and psychology can interact over time to allow crucial modification of each However, the early efforts did demonstrate important and heretofore explored connections between the activities that people ordinarily engage in and the skills they develop as reflected in psychological tasks They also slowed, if not halted, the all-too-frequent cultural deficit interpretations of group differences in mental ability which were to be found in the comparative psychological literature

The ethnographic-psychological approach connects up with several issues that have been widely debated in the cross-cultural psychological literature First, the analysis of within-group variation as it relates to between-group variation is a natural result of the basic tenets of this approach (19, p 198 ff) Group differences are not viewed as end points of analysis, particularly end points defined in terms of "amount of" or "level of" cognitive ability achieved by the cultural groups They become instead the starting points for an investigation of within-group organizations of experience that could produce the between-group variation Such differences are a source of hypotheses concerning both the task requirements and cultural "practice" in relation to the tasks

Second, while experiments retain their privileged status as environments for making clear the activities that generate analyzable cognitive activities, they are not privileged as samples of culturally appropriate behavior Quite the opposite They are viewed as extremely problematic in the matter of their representativeness, which must be explored carefully in every instance of application The problem of representativeness is in turn closely related to the problem of insuring that the task as conceived by the experimenter is the task as perceived by the subject All process-oriented cognitive psy-

chology rests on the assumption that the task-as-given and the task-as-received are equivalent Experiments are particularly susceptible to error from this source when done comparatively, but the problem does not change in principle from that facing those who study paired-associate learning in college sophomores (20, 52)

Two independent lines of research will be described which have adopted the ethnographic psychology approach Scribner & Cole (75) analyzed the cognitive consequences for tribal Vai adults of becoming literate in Vai or Arabic, neither of which is accomplished in Western-type schools Vai is learned informally from a friend or relative who knows the script, while Arabic is acquired in special Koranic schools Ethnographic information was obtained on three aspects of each literacy 1 the acquisition process, 2 the process of reading, and 3 typical literate practices Arabic literacy is acquired by first learning to recite passages from the Koran by what appeared to be a specialized rote memory process (the students don't understand or speak Arabic) The authors hypothesized that such practice would lead to the development of specific memory skills that would appear only if the experimental task mimicked the learning environment To test this hypothesis, all subjects were given three different memory tasks incremental recall in which one item was added to a list on each trial, starting with one item and building up to 16, free recall of a word list in any order, and recall of a narrative story Arabic literates performed better than Vai literates only on the incremental memory task, which presented requirements most similar to those of the Koranic schools

An analysis of the process of reading Vai script indicated that special requirements are posed by the script It is a syllabary, which means that each character represents a syllable, tone (which is important in Vai) is not marked, and no word boundaries or punctuation are indicated The reader must group the syllables together to form words, then integrate these into meaningful linguistic units Grouping and integration skills were tested by requiring subjects to "read" and comprehend sequences of pictures and to repeat and comprehend strings of disjointed syllables or words Vai and Arabic literates did not differ in their ability to comprehend the word strings, but Vai literates were superior on the picture reading and syllable integration tasks which mapped onto their normal reading activities

The uses to which Vai and Arabic literacy are put vary considerably Arabic is used strictly for purposes of reading the Koran, while Vai literacy is used for record keeping and letter writing In letter writing, the information needs of the reader must be taken into account Thus, it was hypothesized that those individuals with letter writing practice should be more explicit in other forms of communication as well A board game was taught to participants in the experiment and they were required to teach it to

someone else The Vai literates not only provided more information than the Arabic literates, they also were more likely to introduce the game by a general characterization before describing specific rules, a strategy common to the form of Vai letters In each case, outcome reflected cultural practice

Lave (44) began with an ethnography of tailoring activities by Vai and Gola tailors in Monrovia, Liberia, followed by tests to assess transfer of tailoring and mathematical skills to problems involving familiar and unfamiliar materials The unfamiliar problems could be solved using common tailoring algorithms Tests of arithmetic operations and number skills were also included Master and apprentice tailors who differed in both number of years at tailoring and formal schooling were compared

Both formal education and tailoring experience influenced nontailoring tasks, but only years of tailoring was related to performance on tailoring-type tasks Among the several virtues of Lave's research is the possibility of testing the theory that formal schooling leads to generalized, abstract problem-solving skills in contrast to the supposedly more restricted domain of applicability of skills learned in a nonformal situation Clearly, the general change theory was not supported by Lave's results On the other hand, it is interesting that proficiency in tailoring produced performance at novel tasks equivalent to that resulting from formal education Whether the similarity in performance resulted from similar cognitive processing was not addressed by Lave, a point made by Ginsberg (31a) However, this research and that of Scribner and Cole is useful insofar as it provides a test of generalizability of culturally organized practice

IN SUMMARY

This highly selective review has covered several lines of research that have become dominant in the study of culture and cognition during the latter half of the 1970s It is now possible to return to the question with which we began how is culture represented in the work we have been reviewing? In our opinion, a dispassionate answer to this question must be—superficially at best.

Cross-cultural Piagetian research began with a strong set of hypotheses regarding the order in which a variety of tasks would be mastered ontogenetically, a competence model linking these tasks to cognitive development, and a theory that posited cognitive universals because of an (unexamined) belief in universal organism-environment interactions that underpin development Much of the early work in this tradition represented a classic example of tests being used as measures (despite the example set by Piaget) Failures to find equal performance across groups motivated a

search for ways to include culture in the form of varied materials and procedures designed to equate (psychologically) relevant test factors (familiarity, for example). Only as the enterprise has encountered greater and greater difficulties have its adherents begun to look seriously at more complex features of the culture, searching for the presence or absence of culture-*specific* organism-environment interactions to explain the presence or absence of *specific* cognitive achievements This challenge to Piagetian theory may prove the spur to crucial analyses that can enrich both the theory and our understanding of culturally organized activities (e g 1, 12, 33, 37)

Matters have been little better in the socialization work On the independent variable side, ethnographic work has typically been minimal (with heavy emphasis on the Human Relations Area Files) or based on selected aspects of the culture taken out of context to permit later quantification One of the heartening changes in this area is the increased use of theoretically motivated, *within-group* observation as a means of specifying culturally patterned activities that can be used as "measures" by procedures which maximize representativeness (68) New work using ethnographic eliciting techniques to provide the basic categories for scaling independent variables are also important (27, 58, 77a) However, as Rogoff (68) points out, even careful spot observations can succeed only if there is a *theoretical* link between the observations of everyday behaviors (or indigenous activities) and the cognitive tasks that are the dependent measures

Recent work that combines intense ethnography with psychological research techniques in the socialization tradition makes it clear that the ethnographic-psychological approach is not incompatible with the other approaches reviewed here (6, 38a) Berland used the tools and language of cognitive differentiation theory in an extremely interesting account of the lives and socialization practices of Pakistani gypsies But his work also contains a fine-grained description of the activities that different socialization practices require of children For example, when we are told how young children are taught to care for, train, and act alongside of large carnival bears or to do sleight-of-hand tricks as part of a magic show, and when we are told how adults carry out this training, it becomes clear that it is these organized activities and the skills they generate, not the strictness or laxness of the socialization practices per se, that are crucial to producing increased cognitive performance

Culture is still distressingly absent on the dependent variable side of a great deal of cross-cultural work where psychological ability tests continue to be treated as measures instead of samples The absence of well-defined theories of the task-specific activities which give rise to the dependent variables is a central source of the ambiguity in almost all this work Advances in this area will almost certainly depend upon cross-cultural

psychologists keeping abreast of, and applying, the most advanced techniques for specifying process that the noncomparative study of cognitive processing will allow Cases in which there is a strong theory of the task and its relation to cultural practices point the way to incorporating culture into our dependent variables

As cultural practices become the focus of more and more cross-cultural cognitive work, greater emphasis will have to be put on developing cognitive ethnographies which go beyond cognitive anthropology's current products (42) A new concern for specifying culturally organized activities on a level which the psychologist can use is one of the major tasks confronting the study of culture and cognition in the coming decade

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