Cognitive Research among the Eskimo: A Survey

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RÉSUMÉ

L'auteur présente une définition de la capacité cognitive. Il fait une revue des approches anthropologiques et surtout psychologiques à l'étude de la cognition chez les Eskimo. Les problèmes méthodologiques des vérifications interculturelles chez les Eskimo sont soulignés et une autre stratégie de recherche est proposée. Finalement, la relation entre les stratégies de subsistance et la capacité cognitive est mise en lumière.

INTRODUCTION

The purpose of this paper will be to review anthropological and especially psychological approaches to the study of cognition within various Eskimo cultures, and to propose an alternative research methodology.[1] A universally acceptable definition of cognition is difficult to come by, but, for the purpose of this paper, cognitive skills are either skills of the perceptual apparatus or skills of the problem-solving, thought-processing apparatus.

ETHNOGRAPHIC DATA

Ethnographers have generally taken informants' naturally occurring and elicited statements as representing thought processes. Birket-Smith on this basis has claimed that Eskimo logic differs from that of Westerners. To support his contention he presents

[1] I wish to thank my advisers L.L. Langness, W.H. Oswalt, D.R. Price-Williams and R.B. Edgerton for their assistance and encouragement during the preparation of this manuscript. I also wish to thank the UCLA Neuropsychiatric Institute, Socio-Behavioral Group, Mental Retardation and Child Psychiatry Research Program for making this research possible. Finally, a thank-you is extended to the National Institute of Child Health and Development for the Traineeship, USPHS Grant No. HD-04612, which provided the necessary financial support.

a "Polar Eskimo's" statement explaining why the bear hunt was not successful.

> There are no bears, because there is no ice, and there is no ice, because there is too much wind, and there is too much wind, because we have offended the powers (1959:51).

Birket-Smith argues that "...the illogical element only turned up in his train of thought when his experience failed (1959:51)." Given, however, that the "powers" control the winds and that the "powers" are vengeful when offended, the argument is logical even though it may not be rational. Non-rational explanations are given by individuals from virtually all ethnic groups whenever the limits of personal experience are exceeded. An example of rational thinking within the limits of experience is Peter Freuchen's account of the amorous adventures of his Greeland Eskimo friend Lootevek.

> He saw Orfik pay the attending midwife eight kroner for her services, and his business sense once more took hold of him. His mind began to work.
>
> "Why," he figured, "should I ever marry a woman whose every child will cost me eight kroner? It is much better — is it not? — to marry a women who receives eight kroner any time a baby is born?"
>
> So Lootevek, without any wild talk and without any coffee party, quietly married the midwife (1961:303).

Ethnographers have frequently characterized Eskimo thought processes as concrete rather than abstract. Birket-Smith for example stated that the universal and more abstract words are lacking in Eskimo languages.

> It is another primitive trait that, despite the crowd of proper names, the universal and more abstract words are lacking. For instance, there is no term for snow in general in Eskimo; but only specific terms for the various forms of snow (Birket-Smith, 1959:60).

Carpenter (1955) has similarly stated that Aivilik Eskimos do not reckon distance by abstract units of measure.

> Thus Aivilik do not reckon distance between points by miles or other abstract, inflexible units of measure, but regard it as fluctuating, related always to climate, society, religion. A traveller will say a trip took so many 'sleeps', and thus describe space in terms of time. This involves more than just 'distance'; it includes such variables as weather, snow, topography and weight on the sled, as well as effort and skill (Carpenter, 1955:133).

In contrast, Briggs (1970) described Utku Eskimo concepts of emotion as highly generalized, even though they were not directly comparable with emotion concepts in English. Take for example the word *naklik,* which Briggs glossed as "to feel or to arouse concern for another's emotional welfare; to wish or to arouse the wish to be with another." When asked for a definition Briggs' informant stated that the word referred to the desire to feed someone who was hungry, to protect someone who was in danger of physical injury, and to warm someone who was cold. Nelson (1969) has stated that Alaskan Eskimos from Wainwright, Barrow, and Point Hope seem to have an unspoken concept of "percentage risk." Thus they do not risk traveling out on ice when they can foresee any chance of drifting away, breaking through the ice crust or being trapped for extensive periods of time by severe storms. Unsafe circumstances are recognized beforehand and probable consequences are foreseen. A probability model of the risks involved in alternate travel and hunting strategies requires the abstraction of general rules from the infinite combinations of concrete conditions which appear in the environment. A similar model must accompany the folk knowledge regarding the probable occurrence of game relative to season, the prey's food supply, geography, the range of weather conditions and the prey's daily habits.

Ethnographic data concerning perceptual abilities has consisted primarily of observational reports. Nelson (1969) concluded that the aforementioned Alaskan North Coast Eskimos were able to:

1) detect slight cracks in ice in order to keep from being stranded on an icepack which could break up and drift out upon the ocean.

2) observe the subtle patterns of light and dark made on clouds by light reflected from water, ice and land in order to predict weather conditions.

3) perceive and memorize minute geographical detail in order to navigate on seemingly featureless tundra.

Many ethnographers have reported that the Eskimos they encountered could read and/or draw maps accurately (King, 1848; Rasmussen, 1931; Carpenter 1955; Carpenter et al., 1959;

Briggs, 1970). Carpenter (1955) and Briggs (1970) reported that the groups they observed had the ability to comprehend rotated objects or rotated visual patterns.

Visual memory is another cognitive ability which has been frequently observed by ethnographers to be highly developed among various Eskimo groups. Efficient visual memory skills are suggested by the previously discussed ability to draw accurate maps, to predict ice flow movements, weather conditions and game appearance, and to navigate over seemingly featureless tundra (Marshall 1933; Carpenter, 1955; Ryan, 1965; Nelson, 1969; Briggs, 1970). About 70 per cent of responding Alaskan Eskimo teachers from village schools thought their students to possess the unusual ability to observe and remember visual detail (Kleinfeld, 1970).

Ethnographers have often reported that Eskimos create innovative solutions to complex mechanical problems (Foster, 1969; Nelson, 1969). Carpenter (1955) stated that Aivilik men were first-class mechanics and delighted in stripping down and reassembling engines, watches and all machinery. Working with the simplest tools they made replacement parts of metal and ivory to repair instruments which American mechanics had abandoned in despair (Carpenter, 1955:141). Oswalt (1963) reported the presence of mechanical aptitude and improvisation under the circumstances where an owner could not travel efficiently until a motor was repaired. However, watches, clocks and radios were not fixed and "mechanical geniuses" were not present in this community (Oswalt, 1963:105).

Ethnographers have compiled a wealth of information regarding the ecological and cultural bases of Eskimo cognitive skill, but they have not systematically dealt with cognition. Concepts such as rationale, logic, abstraction, concreteness, perception, foresight, genius and innovation have not been explicitly defined nor consistently applied. Psychologists have collected completely different kinds of data in their attempts to assess cognition. Psychological tests have been the major information gathering devices used. What follows, therefore, is a review and a critique of the results of applying among the Eskimo those psychological tests which have been constructed to analyze cognitive skills.

EARLY ATTEMPTS AT CROSS-CULTURAL TESTING

The earliest testing of isolated Eskimos reported very poor performance by Alaskan Eskimo children on both the Goodenough Draw-A-Man and the Stanford-Binet tests (Eells, 1933a & b; Anderson and Eells, 1935). Confident in their methodology the authors boldly stated that "Environment has little effect on the intelligence quotient; heredity as indicated by varying degrees of blood purity [as compared with the pure White Race] is a very significant factor (Eells, 1933a:437)." However, Marshall gave Stanford-Binet, Shimberg-Lowe, and Goodenough Draw-A-Man tests to a small group of Eskimo children living around Wiseman, Alaska, in proximity to Westerners, and found that young Eskimo children scored markedly above test norms and that older children scored at appropriate norms (1933:78-82).

DRAW-A-MAN TESTS

Levensky (1970) has confirmed Marshall's finding for the Goodenough Draw-A-Man test in that young Alaskan Eskimo children scored slightly above test norms and older children scored at appropriate norms. Vernon (1966, 1969) found that Canadian Eskimo boys, average age of 11 from Inuvik and Tuktoyaktuk, performed above test norms on Witkin's test with most of the boys drawing realistic seal-hunting scenes. Further, the same Eskimo boys scored close to but slightly below test norms on Goodenough's task. Harris (1963) in contrast found consistent superiority in Alaskan Eskimo children's scores on the Draw-A-Man test. However, these tests were sent to Harris by village teachers who may not have included poorer drawings. Preston, who administered Wechsler-Bellevue Performance subtests, Rorschach's, Thematic Apperception, and Eskimo figure drawing tests to Alaskan Eskimo subjects states "...the request to draw a picture of a person provoked the widest and richest variety of responses from these subjects (1964:379)." Dr. John Vogel evaluated Preston's Eskimo figure drawings by Goodenough's standards and found a very high degree of correlation between the resulting I.Q. scores and Wechsler I.Q. scores:

> The correspondence between these two measures of intellectual level among Eskimo subjects seems to me extremely interesting and encour-

> ages me to feel that in both their figure drawings and in their handling of three Wechsler Performance subtest [Block Design, Object Assembly and Digit-Symbol], we may have legitimate instruments for exploring further Eskimo intellectual potentialities (Preston, 1964:388).

If figure drawing tests are sensitive to skills which naturally occur in Eskimo culture, in what form do these skills appear and how are they learned? Preston's Eskimo sample lived from the Kuskokwim River to Point Barrow along the Alaskan coast. Within this region Oswalt reports the following practice:

> Play activities are numerous and vary both with the setting and with the age group involved. One type, however, that of telling a story and simultaneously illustrating it in the mud, dominates the activity of girls from the time they are toddlers until they are married and sometimes continues until they are fully adult women...
>
> The stories are told in Eskimo by one girl to one or two listeners, and the drawing is done with a stick, a table knife, or occasionally a wooden or ivory 'story-knife,' on any smooth, moist surface of the ground. The basic drawing is often an outline of a house, with lines marking off the beds and figures drawn in outline for the characters. When any change of action is related, this drawing is obliterated by rubbing and a new setting is drawn. If the only change is a speech, the storyteller makes numerous taps with her drawing implement on or near the head of the figure who is supposed to be speaking. Drawings may be made of houses, boats, sleds, hills, berry patches, or people; the storyteller may draw sketchily or methodically. A typical story is told in a few minutes, but occasionally one story may last an hour or more. Stories may be drawn outdoors in mud or snow or indoors on mud smoothed onto a board. Women begin teaching their daughters to draw when they are two or three and continue telling them stories for several years. A few boys younger than six draw, but older boys are not usually storytellers (Oswalt, 1963:34-35).

This drawing practice, more fully described in Oswalt (1964) and Ager (1971), may account for part of the measured figure-drawing ability of the Eskimos. According to Oswalt the male does not practice this skill as much as the female, thus, males should show a poorer performance at the draw-a-person task. In fact Preston reports a much lower performance on the part of the male with much less attention paid to form (1964:385). Preston also used this figure drawing task successfully as a projective test. That this task might tap for some Eskimo groups attributes of personality as well as naturally occurring cognitive skills suggests the consideration of this device.

VISUAL MEMORY TESTS

Canadian Eskimo children (9-15.5 years of age) from Inuvik and Tuktoyaktuk scored almost as well as "Whites" on standardized English spelling tests despite the Eskimo children's lack of proficiency in other English skills (MacArthur, 1968). This result may be due to highly developed visual memory skills in these Eskimo children.

Kleinfeld (1971) found that Alaska village Eskimo children scored significantly higher than the urban "White" children on a visual memory test (Sullivan, undated). MacKinnon (1972), in contrast, found Caucasions superior to Hudson Bay Eskimos on a modified version of the visual memory test. MacKinnon's subject selecting techniques and sample sizes have been questioned by Kleinfeld (1973a). It is disturbing that in the same review Kleinfeld does not attend to the ecological, cultural or cognitive differences within the set of groups labelled Eskimo. She treats all such communities as if they were interchangeable. In so doing she has ignored a broad spectrum of ecological and cultural diversity which must contribute to a broad spectrum of cognitive abilities. MacKinnon recognizes the danger in premature generalizations:

> He who dares to draw definitive conclusions from transcultural research is bold indeed... it is dangerous to generalize from any isolated community to the whole Eskimo culture from Alaska to Greenland... It may be extremely important to look at variables such as degree of acculturation, population homogeneity, psychosocial integration and economic viability of communities, and even nutritional intake, before we arrive at crosscultural inferences. To conclude that the Eskimo is inferior or superior per se on any given dimension, without considering the dynamic changes occurring within that culture would lead us into precisely the same trap which Jensen and his proponents have laid for themselves with regard to the intellectual status of black Americans (1972:304).

It is clear that in most cross-cultural studies of cognition the nature of one or more of the behavioral units involved is treated like a black box. Non-Western culture, Western culture, Western school and non-school are gloss terms with little more sophistication than Primitive or Civilized. Such classifications are used either because the user does not bother or does not know how to be more precise when classifying cultural phenomena. To de-

fine precisely a generalized term such as Eskimo one must systematically collect and classify a great body of detailed cultural information. Murdock (1961) has provided the cultural categories that would permit such a analysis yet we continue to seek a single educational and developmental plan that would work for all "Eskimos" from Siberia to Greenland. Cross-cultural psychologists must become more attentive to psychological effects of cultural and ecological differences.

VISUAL DISCRIMINATION AND MÜLLER-LYER SUSCEPTIBILITY

One research approach to Eskimo cognition which has treated cultural units more precisely is the ecological and developmental theory of John Berry. Berry (1966, 1969) tested Baffin Island Eskimos, the Temne of Sierra Leone and Scots on a number of different visual discrimination tasks which rate the ability of the subject to pay attention to and retain fine detail in visually presented figures. In all tasks the Eskimos tested were much more aware of slight variations in their visual environment than either the Temne or the Scots. Berry like Kleinfeld gives very little warning about possible variations within different Eskimo groups. Indeed, in some of Berry's articles the specific Eskimo group tested is rarely mentioned (1969, 1971a). However, unlike Kleinfeld, Berry tries to find the relationships between measured cognitive skills and the cultural and ecological environments in which they develop. In so doing Berry has gone beyond a black box view of culture to examine more precisely the ontogeny of cognitive processes within particular environments.

Berry (1968, 1971a) found that of 10 ethnic groups sampled only the Scots were more susceptible to the Müller-Lyer Illusion than the Baffin Island Eskimo. MacKinnon (1972) similarly found that Caucasian pupils in an urban area in Saskatchewan were more susceptible to this illusion than Eskimo pupils of Rankin Inlet on Hudson Bay. Degree of susceptibility has been hypothesized to be related both to environment and degree of pigmentation of the Fundus Oculi (Berry:1971a). The particular causes of Müller-Lyer susceptibility remain unclear, however, at least an attempt is being made to discover the contextual causes of the measured results.

EMBEDDED FIGURES TESTS

Baffin Island Eskimos scored significantly higher than the Temne and as well as the Scots on a subtest of Witkin's Embedded Figures Test with Westernized Eskimos producing higher scores (Berry, 1966). MacArthur (1968) found that Canadian Eskimo pupils at Inuvik and Tuktoyaktuk, about 1800 miles from Berry's sample, scored slightly lower than Western students on Vernon's Embedded Figures Test. Vernon (1969) produced the same result on another Eskimo sample from Inuvik and Tuktoyaktuk. MacKinnon (1972), however, found no significant differences between Rankin Inlet Eskimo students and Caucasian pupils in Saskatchewan using the abbreviated form of the Witkin's test.

These results would be much more useful if the researchers had used the same tests and testing procedure, and if they had conducted systematic ecological and cultural surveys on each of the groups sampled. Berry and MacKinnon attempt to introduce environmental variables into hypotheses describing cognitive systems. Their observations of relevant cultural processes are promising but not nearly extensive enough.

DESIGN REPRODUCTION AND OBJECT ASSEMBLY TASKS

Berry (1966) found that a traditional group of Baffin Island Eskimos scored significantly lower than the Scottish comparison group on Kohs Blocks while a transitional group, averaging three years of education, scored equally as well. In both the traditional and transitional comparisons the Eskimo surpassed the Temne. Preston (1964) reported that Alaskan Eskimos with less education than a Caucasian comparison group scored equally as well on the Block Design subtest of the Wechsler Adult Intelligence Scale (WAIS). Foster (1969) confirmed Preston's findings for Alaskan Eskimos. Vernon (1969) reports a slightly lower median performance by Inuvik and Tuktoyaktuk Eskimo boys on this test, however their schooling was often delayed or irregular. Finally, Forbes (1971) and Feldman (1971) found that Alaskan Eskimo children, who had attended village schools for the same length of time as Western agemates, scored significantly higher than test norms.

It is interesting to observe that the cognitive literature again classifies Eskimo communities into gross geographical, ecological and cultural units. Little attention has been paid to the effects of acculturative, ecological, subsistence, linguistic, social-system, and child-rearing diversity on cognitive functioning within the broad range of peoples labelled as Eskimo. In a rare exception Preston (1964) noted a systematic difference in test performance on the Block Design, Object Assembly and Digit-Symbol subtests of the WAIS between the Alaskan North Coast Eskimos and the Alaskan River Eskimos. On all three tests the River Eskimos performed significantly lower than the Coast Eskimos with by far the greatest difference occurring on the Digit-Symbol subtest.

> In conversations with teachers and nurses, I encountered the opinion that the North Coast Eskimos are thought to cope with life more 'intelligently' or to be less 'primitive' than the Eskimos living along the Yukon or Kuskokwim Rivers. This opinion seems to be based on the observation that the river Eskimos are inferior in cultural accomplishment, enterprise, and adapt more slowly to white man's values... It appears to be the low scores on the Digit-Symbol subtest that account for most of the discrepancy... Actually, all the Eskimo subjects did more poorly on this test than people of our culture. This test, however, requires facile use of a pencil, and speed is the essential ingredient in the ultimate score. From my observation, I had reason to believe that the river Eskimos were less comfortable in pencil manipulation than the coast Eskimos and were even more leisurely in their approach to this particular test (Preston, 1964:352).

The Eskimos in the Kuskokwim-Yukon delta have experienced far less contact with outside influences than the North Coast Alaskan Eskimos (Federal Field Committee, 1968; Oswalt, 1965). According to a 1960 census, Eskimos in the Yukon-Kuskokwim delta average over 3 years less schooling than the North Coast groups (Federal Field committee, 1968). Knowing that such variation occurs within a small part of Alaska, the current practice of directly comparing test results on all Eskimo groups is highly questionable.

The mean combined scores of Alaskan North Coast and River Eskimos on the Object Assembly subtest of the WAIS were above test norms with the very best scores being produced by the young (Preston, 1964). Likewise, Lantis (1968) reports that adolescent and young adult Eskimo males performed on a

similar Block Assembly test at the same level as Harvard undergraduates, whose nonverbal intelligence is presumably higher than that of the general population.

MAZE TESTS AND MORRISBY SHAPES TEST

Kunce, Rankin and Clement (1966) report that Alaskan Eskimo Adults performed slightly below test norms on Peter's Circular Mazes. However, the subgroup from this same sample having a high school education performed substantially higher. Vernon (1969) found that the median performance of Inuvik and Tuktoyaktuk Eskimo boys on Porteus Mazes was lower than an English comparison group, but, the Eskimo students frequently had delayed or irregular schooling. Finally Caucasian pupils in Saskatchewan were found to outperform Hudson Bay Eskimo students on the Porteus Mazes (MacKinnon, 1972). MacKinnon questions the significance of these results and suggests caution in drawing generalizations from cross-cultural research.

Berry (1966) found that both traditional and transitional Baffin Island Eskimo groups surpassed Scots and especially Temne performances on Morrisby Shapes. This result conforms with observations that some Eskimos have the ability to comprehend rotated visual configurations (Carpenter, 1955; Briggs, 1970).

CLASSIFICATION AND PIAGETIAN TASKS

Reich (1966) tested 20 Eskimo and 20 "White" pupils in Anchorage Alaska on a modification of Piaget's Equivalence task. In terms of structure, the developmental trends of Eskimo and "White" children were alike. That is, the proportion of "superordinate groupings" increases and that of "complexes" decreases with age. However, Reich found that Eskimo children formed fewer "superordinate groupings" than "White" children of corresponding age. This finding was attributed to the Eskimos' traditional emphasis on "the concrete individuality" of physical objects. Berry (1966) reinforced this conclusion by finding that, despite equivalent visual acuity, Baffin Island Eskimos were

significantly more aware of slight variations in the visual environment than the Temne or Scots.

Vernon (1969) tested 50 Eskimo boys living or boarding at Inuvik and Tuktoyaktuk on a related sorting task (Goldstein and Scheerer, 1941). These Eskimo boys of average age 11 attained a median score slightly above test norms. Vernon discounts these results by stating that "...This task depends little on linguistic capacity or on level of conceptual development (1969:205)."

On a battery of tasks derived from Piaget's writings, Vernon's Inuvik and Tuktoyaktuk sample was found to score well below test norms based on "White" norms (1969). True to form Vernon attributes this finding to the "...severe constriction of intellectual development by the unstimulating atmosphere..." of Eskimo homes and reservations (1969:205). Vernon's negative view of cultural environments other than those of "Whites" severely handicaps the usefulness of his research. Berry's research, which searches for cognitive, cultural and ecological differences, is less culturally biased in this regard.

MacArthur (1968) presents some of Vernon's data on the Piagetian tasks:

TABLE 3

MEAN *T*-SCORES ON PIAGET TASK, BASED ON WHITES AGE 9[1]

Tasks	EskY Subsample	Edmonton[2] Whites
Time Concepts	62	50
Number Concepts	62	50
Logical Inclusion	54	50
Equidistant Counters	55	50
Conserv. Length Rods	58	50
Conserv. Amt. Plasticine	57	50
Conserv. Area	59	50
Conserv. Vol. Liquid	51	50
Embedded Figures (Vernon)	53	50
Position & Size Shadow	45	50
Visualizing Insect	48	50
Water in Titled Bottle	45	50

[1] Edmonton White means are 50, *SD* 10, for each test.
[2] Within groups, a difference of 3 may be considered significant at the .05 level, very approximately.

The EskY subsample is Vernon's (1969) Inuvik and Tuktoyaktuk sample of 50 Eskimo boys of average age of 11. The Edmonton Whites are mixed male and female of average age 9, therefore, comparisons accross rows are not very meaningful. However, variation down columns shows that the Eskimo boys did best on the Time Concepts and Number Concepts tasks. These results along with high scores on perceptual tasks leads MacArthur to state:

> Characteristics of tests least badly meeting the criteria set up for measures of Intelligence A' appear to be: — (a) the items form something of an age-scale sampling stages in the development of cognition, starting with perception-dominated items, and proceeding through reversible concrete operations to propositional or formal operations; — (b) they use as stimuli symbols which, though dependent on learning are likely to be learned in a variety of cultures; — (c) arrangement of items in the test itself forms a crudely-programmed sample of learning-on-the-spot. These suggest three directions in which continued basic research may aid considerably with the practical problems of assessing the general intellectual potential of individual candidates from other cultures to adapt to more technological ways of living (1968:49).

Feldman et al. (1974) have tested 67 North Slope Alaskan Eskimos on a series of tasks, derived from Piaget, which seem to meet MacArthur's three attributes. Two very different sets of stimulus materials, colored blocks and pictures of wild animals, were used to create structurally identical versions of this new test.

> The Colored Blocks Test was administered to 67 North Slope Eskimos during the summer of 1971. This test was designed in order to investigate the congruence of the performance of Eskimo children and adolescents with some of Piaget's basic hypotheses: that cognitive development is hierarchical; that is, that it follows a logically invariant sequence of staged abilities. For this purpose five cognitive operations were defined: (a) completing a matrix by attending to one set of relations between attributes (Section 1 of the test); (b) completing a matrix by coordinating two sets of relations between attributes (Section 2); (c) identifying the operation performed on a set of relations between attributes (Section 3); (d) operating on a set of relations between attributes (Section 4); and (e) operating on operations (Section 5) (Feldman et al., 1974:73, manuscript copy).
>
> In addition to the Colored Blocks Test, there is a test which is a cultural analogue to Sections 1, 2, and 4 of the blocks test. The stimulus materials are drawing of arctic animals, approximately 2" x 2". The

> entire stimulus set consists of two values for each of two dimensions. The two dimensions are the true size of the animals and their natural habitats. The two values of size are large and small, and the two values of natural habitat are land and sea. The large sea animals were whales or walruses; the small sea animals were seals or fish; the large land animals were bears; and the small land animals were foxes (Feldman et al., 1974:69, manuscript copy).

The first hypothesis tested is that the appearance of cognitive abilities follows a logically invariant sequence. Out of 32 possible patterns of response, 63% of the subjects fell into one of the six predicted patterns. The second hypothesis predicts that cognitive abilities will appear in stages. Some evidence to support this hypothesis appeared, however, "...none of the age groups performed correctly on Section 5 above the average predicted by chance... (Feldman et al., 1974:82, manuscript copy)." The authors conclude:

> The universality of the staging and sequencing hypotheses is not established in the present study. Nonetheless, the sequence is shown to emerge... The predicted sequence does not describe all subjects; however, it is obtained far more often than any random model might predict. And it is obtained more often in an analogue form... [that is with the pictures of animals] (Feldman et al., 1974:115, manuscript copy).

Feldman et al. are caught in between two theoretical points of view. Initially, they tried to prove the occurrence of universal developmental stages and sequences. Where Eskimos failed to conform to predicted patterns the authors attribute the variance to cultural factors. For example, Feldman et al. suggest that the inability of Eskimos to perform section 5 of the test is due to their inability to linguistically represent complex and specific abstract ideas.

> Eskimo children in the generation tested here are described by their parents as unskillful speakers of Inupiat. They are described by their teachers, as well as by standard measures, as unskillful speakers of English as well. Their English is fluent in the sense that they readily express ordinary events and desires; however, it is simple and undifferentiated and it is difficult for Eskimo children to express complex ideas, or new ideas, or abstract ideas, with any degree of exactness. Structurally their language is a reduced version of standard English. In this respect it is not very different from the usual characterization of Pidgin languages, although Eskimo English is not usually considered to be a pidgin (Feldman et al., 1974:109, manuscript copy).

METHODOLOGICAL PROBLEMS WITH CROSS-CULTURAL TESTING

Throughout this paper numerous criticisms of cross-cultural testing among the Eskimo have been put forth. Those criticisms will now be reviewed and others which are relevant will be discussed.

1) Except for rare instances, all Eskimo groups have been assumed to be identical in terms of ecological context, acculturative status, subsistence base, social organization, psychological orientation and especially cognitive style. The attribute variations within "Caucasian", "White" or "Western" comparison groups have likewise been ignored.

2) Some researchers explained poor performances by Eskimos in terms of the "culturally deprived" or "culturally disadvantaged" nature of their cultural environment rather than in terms of the limitations of culturally biased tests. Researchers are bold indeed, who condemn all "Non-Western" cultures on the basis of the extremely minute cultural knowledge gained from cross-cultural test results. As Berry has said, concepts such as "...culturally deprived' or 'culturally disadvantaged'... have no valid place in a society guided by an ideology of cultural pluralism (1971c:145)."

3) Psychologists have assumed the cognitive abilities of all Eskimo peoples to be perceptual, figural, spatial, and visual because of good performances on non-verbal tests and because of poor performances on verbal tests conducted in English. However, not one psychologist has published the results of culturally sensitive verbal tests based on and conducted in native languages to see whether or not verbal abstraction occurs among skillful native speakers. The non-verbal, concrete style that psychologists have attributed to life in the north may be an artifact of tests conducted and dependent on competence in a recently introduced language.

> For children in a community where the parent generation, the expressers of complex ideas, usually speak a different language to them than the children speak among themselves... [the development of] a grammar and vocabulary sufficiently differentiated to permit encoding of complex and specific, abstract ideas... may fail to evolve (Feldman et al., 1974:108, manuscript copy).

4) Eskimos, especially young males, have become increasingly antagonistic to any sort of testing and research, which they view as another form of White exploitation (Kleinfeld, 1973a). Cooperation, if at all, may be perfunctory, resulting in extremely low test scores (Feldman and Bock, 1970). Kleinfeld (1973b) has found that nonverbally communicated personal warmth on the part of the ethnographer improves test performances. Finally, Eskimos may find it difficult to view a trivial, pointless task, whether verbal or non-verbal, as worthy of serious concentration and maximum effort (Kleinfeld, 1973a).

5) Performances by Eskimos on standardized tests may be lowered because of their unfamiliarity with test form, test conventions and stimulus materials. Eskimos, especially males, have been socialized into extreme caution before making a judgement (Kleinfeld, 1973a). The hunter is taught never to take risks, never to call out a hasty evaluation because the penalty can be swift death not only for himself but also for others who rely on his decision (Nelson, 1969). Error may result in social ridicule (Kleinfeld, 1973a). Especially more traditional Eskimos tend to have a slow, cautious response style which may depress their scores on speeded figural tests (Preston, 1964). Power rather than speed tests may be better indicators of Eskimos' figural abilities (Kleinfeld, 1973a).

6) Psychologists have ignored the effects of poor dietary conditions on measured cognitive skills. Miss Commons, the teacher in Newtok Alaska, explains a situation which may be typical.

> Some children come to school hungry; they hop out of bed and come right to school. And the juice and graham crackers, although served regularly, are not an adequate replacement for breakfast. The school lunch is not always sufficient to make up for the lack of breakfast either (Alaska, 1970:47).

7) Psychologists have ignored the effects of other negative health conditions on measured cognitive skills. Again, the Newtok teacher explains.

> Hunger also was combined with fatigue in this village. The children decided their own bedtime and often stayed up until 10:00 p.m., playing or attending movies (Alaska, 1970:48). Hearing problems were a primary cause of low educational achievement... ten to forty percent of

the school population has draining ears or other hearing problems. Often ear damage occurs before the child reaches school, and consistent medical care for ear infections is difficult. With hearing problems, it is doubly hard for a child to learn a second language (Alaska, 1970:52).

FUTURE RESEARCH STRATEGY

Thus far, information describing Eskimo cognitive abilities has been of two general types. Ethnographers have gathered elaborate cultural information but have not attempted to systematically deal with cognition. Psychologists have both defined cognition and developed devices for its measure, but, have displayed a superficial understanding of the cultural context in which cognition develops.

Fieldwork techniques which have the ability to assess the nature and context of cognitive development have been created, but have not been applied in any Eskimo community. Michael Cole and his colleagues, anthropologists and cross-cultural psychologists, have pioneered a theoretical and methodological approach to understanding cognitive development (Gay and Cole, 1967; Cole, Gay and Glick, 1968; Cole, Gay, Glick and Sharp, 1971; Cole and Gay, 1972; Cole and Scribner, 1974). Price-Williams, Edgerton and Gallimore have applied a closely related approach which they have labelled "ecology of competence (1972-74)." This program combines naturalistic observation and *ad hoc* experiments in the field with classroom intervention.

> More specifically, our program of research calls for (1) prolonged and detailed natural observation of children who are learning to cope with their cultural environments (this is necessary in order for us to infer how these children develop the cognitive and affective abilities to become competent members of their society), (2) field experimentation to clarify and confirm the nature and distribution of these abilities (such experimentation does *not* employ standardized western tests, but develops *ad hoc* experiments based upon relevant and meaningful behaviors in the natural environment), (3) intervention in the schools in order to discover ways in which the cognitive and affective skills of poor and ethnic children can be brought into closer fit with the skills required for success on a school setting (Price-Williams, Edgerton and Gallimore, 1972-74:1).

Eskimo children are learning to cope with a range of cultural environments which aboriginally and currently have adapted themselves to survival in harsh, arctic niches through the exploitation of fishing, hunting, trapping and gathering techniques and devices. It is logical therefore, to hypothesize that most naturally occurring cognitive abilities will be directly or indirectly correlated with these subsistence skills. Oswalt, for example, has reported the following condition among one group of Eskimos in the Yukon-Kuskokwim River Delta, Alaska:

> It is apparent that subsistence is a major interest for each adult in the community. Each man must support his family, and the sheer amount of time considered in subsistence activities makes these a focus of daily life. The stringencies of the environment and the virtual impossibility of storing significant quantities of food for more than a year force adults to think constantly about making a living. The education of children at home is largely in terms of developing the proficiency in livelihood techniques. Ceremonial recognition of subsistence achievements is conferred upon a girl when she picks her first berries and upon a boy when he kills his first animal of each species [excluding fish]. When adult status is attained, the greatest measure of prestige and success by village standards is in terms of subsistence proficiency (Oswalt, 1963:120).

The hypothesis that cognitive abilities are related to occupation tasks is relatively unresearched but not totally without precedent. Price-Williams (1969) found that Mexican children who were from pottery-making families performed better on tests for conservation of substance using clay than did children from families of similar socioeconomic status who engaged in other trades. Gladwin (1970) has documented the complex set of knowledge and logic that is concomitant with the elaborate navigation and boat building skills of a nonliterate sailing people on a South Pacific atoll. Dasen (1973) found that Aborigines of central Australia sometimes draw maps on the ground to indicate where water holes are located. Being hunters and gatherers in a dry land these people often travel great distances in their search for water.

The later three examples, along with the previously given ethnographic and psychological data, suggest a close relationship between subsistence and/or occupation tasks and cognition. Using the "ecology of competence" methodology the extent of this relationship within any given Eskimo group can be discovered.

CONCLUSIONS

Neither traditional ethnographic nor traditional psychological approaches to understanding cognitive development have satisfactorily described the ecological and cultural origins of cognitive abilities within the various Eskimo cultures. The "ecology of competence" methodology (Price-Williams, Edgerton, and Gallimore, 1972-74), pioneered by Cole and his colleagues, offers a refined alternative to prior strategies. Among Eskimo groups the relationship between subsistence tasks and cognitive competence is of particular practical and theoretical interest. Both Eskimo educational curriculums and our general understanding of human behavior promise to profit from this systematic, multidisciplinary, research approach.

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