

Visual Memory in Village Eskimo and Urban Caucasian Children

JUDITH KLEINFELD¹

ABSTRACT. The hypothesis that the ecological and cultural characteristics of Eskimo society lead to village Eskimo children having greater ability in visual memory than urban Caucasian children has been studied. A test of visual memory was given to 501 urban Caucasian and 125 village Eskimo children. Village Eskimo children demonstrated significantly higher levels of visual memory. Visual memory was also found to increase significantly with age. A follow-up questionnaire study indicated that about 65 per cent of teachers in Eskimo villages noted the unusually high ability of Eskimo students in recalling visual detail or mentioned their high performance in tasks depending partly upon this ability.

RÉSUMÉ. *La mémoire visuelle chez les enfants d'un village esquimau et chez des enfants caucasiens vivant à la ville.* L'auteur a étudié l'hypothèse selon laquelle les caractéristiques écologiques et culturelles de la société esquimaude donnent aux enfants d'un village esquimau une mémoire visuelle plus grande que celle d'enfants caucasiens vivant à la ville. Elle a administré un test de mémoire visuelle à 501 enfants caucasiens de milieu urbain et à 125 enfants d'un village esquimau. Les enfants esquimaux ont fait montre de niveaux significativement plus élevés de mémoire visuelle. On a aussi constaté que la mémoire visuelle augmentait de façon significative avec l'âge. Un questionnaire complémentaire a indiqué qu'environ 65 pour cent des instituteurs des villages esquimaux ont noté une habileté peu commune des élèves esquimaux à se rappeler des détails visuels ou ont mentionné leurs grands succès dans des tâches qui dépendent partiellement de cette habileté.

РЕЗЮМЕ. *Зрительная память деревенских эскимосских детей и городских детей европеоидной расы.* Проведенные исследования показали, что по сравнению с городскими детьми европеоидной расы, деревенские эскимосские дети обладают более развитой зрительной памятью, обусловленной особенностями экологии и быта эскимосского общества.

INTRODUCTION

The ecological and cultural characteristics of different societies may favour the development of different types of cognitive abilities. Berry (1966) suggests that the requirements of hunting in an arctic environment and the adaptive patterns of Eskimo culture lead to a high level of perceptual skills. This study tested the hypothesis that village Eskimo children have greater ability in visual memory than urban Caucasian children. Exploring this area might suggest teaching strategies which build on village Eskimo children's cognitive strengths and occupational areas where they may have unusual aptitude.

¹Assistant Professor of Educational Psychology at the University of Alaska, College, Alaska.

DEVELOPMENT OF VISUAL MEMORY

Requirements of Arctic and Urban Ecology

In contrast to the striking visual differences of the urban environment, the Arctic is a world of visual uniformity. The flat, monotonous tundra and piled sea ice provide few distinctive visual markers to guide the hunting on which survival in part depends (Laughlin 1970). In order to hunt and find their way back to the village, the Eskimo must attend to very small visual cues and their patterned relationships such as upturned rocks or the angle of the Big Dipper at different times of the day (Nelson 1969). Caucasians who have travelled with the Eskimo frequently remark upon their extraordinary ability to travel through what seems to be a featureless terrain by closely observing the smallest landmarks and memorizing their spatial locations (Carpenter 1955; Nelson 1969).

Socialization Practices

Adapted to the demands of hunting in the Arctic, Eskimo socialization practices are likely to increase children's sensitivity to visual information. Conversation often focuses on the concrete attributes of individual objects and the long, dark winters are enlivened by descriptions of past hunting trips in exhaustive detail (Chance 1966). Since the Eskimo who becomes lost in the Arctic may not survive, motivation to develop visual memory skills should be high. A powerful additional motivator with obvious adaptive value may be fear of ridicule. Nelson (1969) reports that young hunters who become lost are subjected to severe humiliation when they return.

Another Eskimo socialization practice which may contribute to the development of ability in visual memory is the autonomy generally allowed village Eskimo children. Both cross-cultural studies and studies within English and American groups suggest that child-rearing practices which permit early independence and the freedom to explore and manipulate the environment foster the development of perceptual skills (Vernon 1969).

Genetic Factors

The Eskimo's ability in visual memory may be in part the result of natural selection. This type of perceptual skill has been found to have a high degree of heritability (Osborne and Gregor 1966). The successful Eskimo hunter may be more likely to possess a high level of ability in visual memory, and he may be more likely to survive and to have many well-fed offspring. The natural selection process may be especially important among a group such as the Eskimo, who have lived in sexual isolation and in the same environment for a long period of time (Laughlin 1970).

Eskimo and the English Language

The Eskimo language may also increase the speakers' attentiveness to and memory for visual forms and patterns. Different languages code particular domains of experience with more precision than others. When a language represents an attribute in a single word rather than a lengthy paraphrase, the attribute may be more available as a classification category and may be more easily remembered (Brown 1958).

Adapted to the requirements of arctic ecology, the Eskimo language codes the domain of form and location with much greater economy than the English language (Gagne 1968). Eskimo contains a system of "localizers" which enables speakers to specify the form of objects and their spatial location as an integral part of the word for the object. For example, Gagne (1968) points out that the three-word Eskimo sentence "ililavruk manna ilunga" would be translated into the twenty-word English sentence "Please put this slender thing over there cross-wise on that end of that slender thing to which I am pointing" to convey the same amount of information about form and location.

Since the use of localizers is obligatory in Eskimo where it is not in English, the Eskimo speaker may be more attentive to form and space distinctions. Able to code a larger amount of information about form and location in fewer words, the Eskimo speaker may learn visual information more rapidly and be able to store larger amounts before overloading his memory capacity.

RELATED RESEARCH

Berry (1966) has made the most extensive comparisons of the Eskimos' perceptual abilities with those of other groups. He found that the Canadian Eskimo demonstrated far greater perceptual ability than the Temne of Sierra Leone. In contrast to the Eskimo, the Temne inhabit a complex visual environment, maintain their economy by agricultural pursuits, speak a language with fewer spatial terms, and employ strict child-rearing practices. A comparison of Eskimos with Scots, however, yielded mixed results. The Eskimos exceeded the Scots in a test of visual discrimination where subjects were required to notice small gaps in forms presented in a tachistoscope. Moreover, rural Eskimos surpassed town Eskimos on this task. On four other tests which were used to measure spatial ability (Raven Matrices, Morrisby Shapes, Witkin Embedded Figures, and Kohs Blocks) the Eskimos came close to Scottish performance but exceeded the Scots only on Morrisby Shapes. On these tests, the town Eskimos' performance was higher. Vernon (1969) and MacArthur (1968) have also found that the scores of Canadian Eskimos approach but do not exceed test norms on similar measures.

As the reversal in the rank of town and rural Eskimos on the different types of perceptual tests suggests, performance on the second group of tests may be in part dependent on familiarity with western institutions such as test-taking practices. In addition, such tests assess cognitive abilities other than perceptual skills and may also assess different types of perceptual skills. Eskimos may exceed Caucasians primarily in those perceptual tasks closely related to the demands of arctic living such as memory for visual patterns.

METHODOLOGY

Sample

The sample of urban Caucasian students consisted of 501 students (278 male, 223 female) from 9 to 16 years old who lived in Alaska's main urban centres, Anchorage and Fairbanks. The sample of village Eskimo students consisted of

125 students (62 male, 63 female) from 9 to 16 years who lived primarily in Barrow and Teller. Barrow, a migration centre for Eskimos from many northern villages, has a relatively high level of white contact whereas Teller has an intermediate level. No significant differences appeared in visual memory scores between students from Barrow and Teller. Since many Eskimo students leave the village for their high school education, these villages were depleted of students in the 14 to 16 years old range. For this reason, Eskimo students from a number of other villages who had recently arrived in Fairbanks to attend high school were added to the Eskimo student sample.

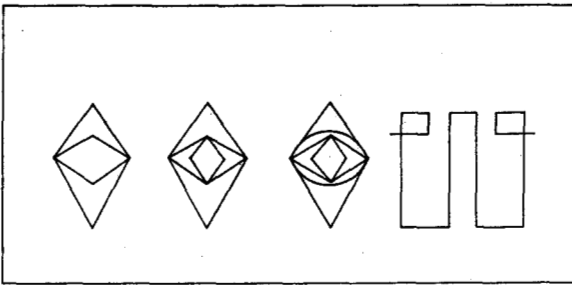


FIG. 1. Visual memory test items. Source: Sullivan "Squiggles" Test (undated).

Test

Testing methods attempted to minimize the effects of other cognitive abilities and of test-taking skills on visual memory test scores. The visual memory test (reproduced in Fig. 1) was adapted from the Sullivan Squiggle Test (undated), a measure recently developed to assess perceptual impairments in Eskimo children. Each design was drawn on a chalkboard before the classroom group and was immediately erased. The subject then drew it from memory on a blank sheet of paper. Drawings were scored as either right or wrong on the basis of whether the form relationships were correct. Drawing ability was not taken into account in scoring. A correct figure was given a value of 5 points so that partial scores could be assigned for additional analyses which may be found in Bland (1970). The first group of designs consisted of simple figures such as circles and squares which were not scored. They served to increase test-taking confidence and to eliminate subjects whose poor eyesight or unwillingness to cooperate invalidated test scores. One village Eskimo and 3 urban Caucasian students were eliminated on that basis. In order to minimize the effects of test-taking skills, the test was administered in a game-like atmosphere with oral instructions and no speed stress (Schwarz 1961). The visual memory tests were scored by a research assistant, Mrs. Laurel Bland. Inter-rater agreement, calculated from a sub-group of 100 tests scored by the author as well, reached 86.5 per cent.

Method of Analysis

A two-way analysis of variance was carried out to test the significance of differences in visual memory scores by ethnic group and also by age. While the hypothesis of this study concerned only ethnic differences, cognitive abilities generally increase over childhood to adolescence; since the urban Caucasian group

TABLE 1. Visual Memory Score Means of Village Eskimo and Urban Caucasian Children.

	Village Eskimo			Urban Caucasian		
	N	Mean	SD	N	Mean	SD
Age 9-10	41	16.70	4.76	87	11.95	6.35
Age 11-13	45	15.77	4.80	113	15.26	7.20
Age 14-16	39	17.69	3.40	301	15.79	5.00

was older than the village Eskimo group, age if disregarded might be a confounding factor.

Inspection of the standard deviations of visual memory scores in each ethnic group-age cell (see Table 1) raised the possibility that groups might be heterogeneous in variance which would make a straightforward analysis of variance inappropriate. Bartlett's test for homogeneity of variance as applied to groups with unequal numbers was calculated and did not indicate significant differences in variance between groups. For this reason, an analysis of variance for unequal and disproportionate subclass numbers was carried out.

Additional analyses, which may be found in Bland (1970), compared the visual memory test scores of the village Eskimo and urban Caucasian students with small groups of Athabascan Indian, and Negro students. Bland also discusses the uses of this test in identifying perceptual impairments to learning.

RESULTS AND DISCUSSION

As Table 2 indicates, village Eskimo students scored significantly higher than urban Caucasian students in visual memory. In addition, visual memory scores increased significantly with age. No interaction between age and ethnic group was found.

In order to determine if village Eskimo students' high ability in visual memory was apparent to their teachers and if these abilities led to better performance in certain types of academic tests, a follow-up questionnaire study was conducted.

The questionnaire, sent to each school in Alaskan villages, contained the items

TABLE 2. Analysis of Variance of Visual Memory Test Scores by Ethnic Group and Age.

Source	SS	df	MS	F
Ethnic Group	530.4	1	530.40	19.39**
Age	590.9	2	295.47	10.80**
Ethnic Group X Age	64.9	2	32.45	1.19
Within Cell	17,039.5	623	27.35	

SS = sum of squares; df = degree of freedom; MS = mean square; F = F ratio; ** p < .01.

"Have you noticed any special abilities which your students tend to possess or subject areas where they learn especially quickly?", and "Do your students show particular ability to observe and remember visual detail? If so, how do they show this ability?". Questionnaire response rate was 64 per cent. Of the 56 teachers in Eskimo villages who responded to this enquiry, about 65 per cent noted Eskimo students' unusual ability to recall visual detail or mentioned their high ability in tasks depending in part on such skills. Teachers frequently commented, for example, upon Eskimo children's ability to observe and recall small details of movies, even when the films had been shown a year or more before, and their ability quickly to learn the spelling of the unfamiliar words (perhaps by memorizing the word's visual form).

Village Eskimo children's unusual ability in visual memory may have significant educational implications. Instructional strategies might be developed that would increase academic performance in areas of weakness, such as verbal abstract skills, by building on Eskimo children's cognitive strengths. A verbal abstraction, for example, might be taught first through representing it in diverse realistic pictures which exemplify the range of the concept, and then by symbolizing it both in words and in progressively more abstract images. Increased use might be made of symbolic diagrams such as the process chart where the visual pattern emphasizes the subject's logical structure.

Another important area to explore is that of occupations where such perceptual skills might enable Eskimos to excel. Eskimos' artistic and mechanical abilities are often remarked upon. Such occupations as engineering, physics, and biology have also been found to have a higher proportion of individuals with what may be similar visualization skills (Barrett and Thornton 1967; Roe 1951). While verbal skills can be developed through education, such perceptual skills appear to be primarily the result of early socialization and genetic factors. When adequate education increases the Eskimos' language skills, their additional perceptual skills may enable them to make important contributions in such fields.

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