

CULTURAL DETERMINANTS OF PERCEPTION

by

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Chapter 1. Introduction

The study of the relationship between perception and culture is merely part of the larger problem of psychological differences between groups of people who are living under varying geographical, economic, social, and cultural conditions. Biesheuvel (1963) has noted that, "it is generally accepted that there are psychological differences between ethnic groups which are at different stages of development". However, different ethnic groups do not necessarily follow the same developmental paths since their particular goals and requirements may be different. With Biesheuvel (1959) it is considered that, "through the medium of educational practices and other social pressures, a culture produces the kind of personalities that are adapted to its requirements". In sum, then, people with different goals, ecological requirements, and social systems tend to develop different personality characteristics.

Gardner Murphy (1960) has colourfully expanded this idea:

The first human nature ... is a system of biologically given dispositions varying in their rigidity or flexibility and including many which are so flexible, so sensitive to changing requirements that the 'human nature' which they represent easily moves into a wide spectrum of different realizations. Despite common features, cultures move apart from one another not only in specific techniques of weaving or speaking or making war, but also in fundamental feeling tone, ways of facing or dreading or trying to control the universe. Each of these diverse cultures, however, develops its own gradually hardening mold, so that the soft bits of living stuff born into it become, before long, case-hardened, become representatives not of humanity as such, but of a formalized or standardized kind of humanity that sees, feels, and thinks as the mold determines.

This is a very strong version of cultural determinism; with Bateson (1944), "we do not suggest that culture fully 'determines' anything", but that 'culture', or 'cultural variation' is a useful beginning for a study of psychological differences between peoples of the world. Murphy's statement is also very broad; to attempt a study of how members of different cultural groups, "see, feel, and think", is beyond the scope of a single thesis, hence the present study is concerned solely with the first aspect of behaviour - visual perception.

That perception is not necessarily stimulus bound in contrived laboratory situations has been amply demonstrated by the 'New Look' studies. But whether need, value, and general experiential background can modify perception in the actual life settings of people is still largely an open question.

The purpose of this study, then, is to examine the possible relationship existing between selected aspects of culture and ecology on the one hand, and selected perceptual skills and characteristics on the other. The guiding hypotheses set out at the beginning of the study were that:

1. There are differences in visual perception in groups with differing cultural and ecological characteristics.
2. These perceptual differences are not random in kind or degree, but can be predicted from an analysis of the cultural and ecological characteristics of each group.
3. The nature of these perceptual differences tend to form a pattern of abilities and characteristics which contribute to the adjustment of the group to its environment.

These three general hypotheses are expanded into operational form in the preliminary discussion of each of the studies in chapters 5 and 6.

The overall plan of the study was to:

1. Select two societies with contrasting cultural and ecological characteristics.
2. Assemble and administer a battery of perceptual tests, standard for both societies.
3. Examine the resulting test differences in the light of the specific hypotheses concerning the different cultural and ecological characteristics.
4. Examine the resulting test differences for patterns or trends which are related to the cultural and ecological requirements of each society.

The variables considered in the study were:

1. Stimulus variables: the test battery, standard for both societies.
2. Response variables: the results of a questionnaire, and of the various tests.
3. Organismic variables:
 - a) Race (a term commonly used to refer to genetically related sub-groups of mankind).
 - b) Sensory apparatus: acuity and colour vision.
 - c) Health: disease and nutrition.
 - d) Cultural background.
 - e) Ecological background.

These variables are considered in detail in chapter 4, Method, and further in the studies themselves, chapters 5 and 6.

Before the experimental work is discussed, however, a short history of research on the problem of perception and culture is presented in chapter 2, and the societies examined in the study are introduced in chapter 3.

Chapter 2. Perception and Culture Studies: a Review.

1) Introduction

This chapter will present an outline of the studies, made since the beginning of the century, which have been concerned with differences in visual perceptual skills and characteristics between various racial and ethnic groups. Little critical comment will be made since many of the studies have been isolated and are therefore difficult to evaluate. Those studies which are concerned with similar material are examined together; otherwise, the organization is simply chronological.

2) Psychological Studies

Beginning in the early nineteenth century, many scientifically-minded travellers and explorers published accounts of their experiences and observations. Frequent among their tales were reports of the extraordinary visual abilities displayed by the natives of the various lands. These reports were so widespread that psychologists in Britain and America began studies in an attempt to verify them. These studies by Rivers (1901,1905) and Woodworth (1910) were the first scientific assault on the problem of a possible relationship between visual perception and race or culture.

Rivers (1901) travelled to Murray Island in 1899 with the Cambridge Anthropological Expedition to the Torres Straits. With the assistance of W. McDougall, Rivers examined men and boys on the island for such visual characteristics as acuity, colour defects and susceptibility to various illusions.

To assess acuity, they used a Snellen 'E' chart plus a hand 'E' which the subject could orient with the designated 'E' on the chart. No differences were found between the acuity of the Murray Islanders and Europeans, so to account

for the travellers reports, Rivers drew a distinction between acuity proper, and the, "power of observation depending on the habit of attending to and discriminating any minute indications which are given by the organ of sense", and concluded that:

By long-continued practice in attending to minute details in surroundings with which he becomes extremely familiar, the savage is able to see and recognise distant objects in a way that appears almost miraculous, but it is doubtful whether his visual powers exceeds those of the European who has trained his vision in any special field.

Rivers (1905) made a further field trip in 1901, this time to the region of the Todas in southern India. He administered a similar series of tests to men and boys of this tribe and concluded that, "there is little difference between the Todas and other races", with respect to visual acuity.

In America, Woodworth (1910) examined 300 people of different races at the 1904 St. Louis Fair.

The point of special interest here is as to whether the statements of many travellers ascribing to the savage extraordinary powers of vision, hearing and smell can be substantiated by exact tests.

Although Indians and Filipinos proved to be ten percent better than whites in visual acuity, he found it impossible, "to believe in a close correspondence between keen sight and a dark skin"! He concluded that:

Even if small differences do exist, it is fairly certain that the wonderful feats of distant vision ascribed to savages are due to practise in interpreting slight indications of familiar objects, and in general that:

...the keenness of the senses seems to be about on a par in the various races of mankind.

Spatial perception, as well as visual acuity, was the subject of early interest. Hallowell (1955) has noted that the observations on the Iroquois Indians by Père Lafitau in 1724 were in line with the current notion that, "the 'senses' of primitive man were more acute than those of civilized man, even though he might be intellectually inferior". Jaccard (1932) has maintained that distortions of these early reports gave rise to, "la legende de l'instinct d'orientation des sauvages", and concluded that:

... most primitive peoples are as embarrassed as we are when they find themselves in an area void of ... the familiar horizons of their native country... There is no appreciable difference in the sensory capacities and elementary mental functions among the various human races: this demonstrates the error of all the theories attributing to savages spatial abilities (facultés d'orientation) unknown to civilized peoples. (translation mine)

Thus at an early date the possibility of differences in acuity and spatial perception between different racial and ethnic groups was rejected. Laboratory studies soon followed, however, which attempted to relate perceptual differences found in experiments, to various cultural differences. In 1933, Thouless published the results of an experiment which had used Indian and British students as subjects. The task was to adjust a circle, inclined to the line of vision, to match an ellipse shown normal to the line of vision. Thouless found that the Indian students had a greater tendency to "phenomenal regression to the real object"(that is, size and shape constancy) than the British students, and suggested that this difference might be related to frequently observed differences between Western and Oriental art.

This study was repeated by Beveridge (1935) using West Africans as subjects. These people, he found, had, "a considerably higher index of phenomenal regression", than Europeans, and this difference, he considered, was related to "some peculiarities of African drawing".

In a later study, Beveridge (1939) investigated the relative use of visual and proprioceptive cues in the judging of the horizontal by West African and British subjects. The task was to adjust a rod to the horizontal while both the rod and the subject were enclosed in a box tilted twenty-five degrees to the horizontal. Results indicated that the Europeans were more affected by the visual cues in the tilted box (that is, were less accurate in adjusting the rod to the horizontal) than the Africans. Beveridge related this result to his experience that, when teaching Africans, they showed, "less interest in and efficiency with pictures and diagrams than most Europeans".

Hudson (1960, 1962), also working with African subjects, has reported marked inability to perceive a third dimension in two-dimensional pictures. Unaware of Western conventions of representing three dimensions on two-dimensional paper, these subjects were unable to see the third dimension. Hudson concluded that, "both cultural and genetic factors play their role", but Littlejohn (1963) has questioned the need to assume genetic factors at all, and Dawson's (1963) results derived from drawings modified from Hudson (1960), show a definite improvement in ability to perceive the third dimension as experience with Western pictorial material increases.

While on a chimpanzee expedition in Guinea, Nissen, Machover and Kinder (1935) also noted visual difficulties among the Africans. They administered spatial and performance tests to a group of children aged five to fourteen, and compared the results to those of Western subjects. They found that:

... the tests which have pictorially representative content, which involve symbolic material, and which require combinative activity based on the perception of part-whole relationships, produced the poorest results.

and suggested that test difficulty was related to the lack of, "particularized experience of a civilized environment".

Three more recent cross-cultural studies using spatial tests (Jahoda,1956; McFie,1961; and Dawson,1963) also found marked perceptual difficulty in African subjects; these studies will be discussed in detail in the section on spatial perception in chapter 5.

Since the war, psychologists have continued their studies of perception and culture using both projective and experimental methods. A good example of the cross-cultural use of a projective technique is Thompson's (1951) study with children. She administered Rorschach Blots to 1000 Indian children in southwestern United States to investigate, "the problem of delineating and comparing the structure and dynamics of group perception patterns". After analysing the reports from the various tribes, she concluded that each tribe had a distinctive perception pattern which was related to, "the implicit tribal world view".

Another study in the American Southwest was carried out by Michael (1953) using Navaho and white subjects. He attempted to discover whether the tendency to form closure is an innate principle of perceptual organization or learned in the cultural milieu. No significant differences were found between the two groups even though the Navaho were reported to have a "fear of closure", and he concluded that the phenomenon is either universally learned or innate.

Bagby (1957) has administered a binocular rivalry test to twelve selected Mexican and American subjects. Each subject was presented with ten pairs of photographs in a stereoscope, each pair consisting of a Mexican scene and an American scene, and subjects reported what they saw. Bagby's results show that Mexicans reported significantly more Mexican content, and Americans significantly more American content.

Pettigrew, Allport and Barnett (1958) have also used the binocular rivalry technique cross-culturally. They attempted to answer the question, "Do members of various ethnic groups identify each other differently?", and concluded that

the race of the perceiver was a factor in the racial identification of pictures presented to them stereoscopically.

Visual illusions have been studied cross-culturally more often than any other phenomenon. Two types of illusion, angular (eg. Müller-Lyer, and Sander Parallel-ogram), and rectangular (eg. horizontal-vertical) illusions have usually been included in most of the studies: Rivers(1901, 1905), Herskovits, Campbell and Segall (1956, 1963), Heuse (1957), Morgan (1959), Bonte (1962), Mundy-Castle and Nelson (1962), Dawson (1963), and Gregor and McPherson (1965). These will all be discussed fully in the section on illusions in chapter 6.

A unique study of visual illusion has been carried out by Allport and Pettigrew (1957) using the Ames Trapezoidal Window illusion. This illusion was presented to three groups of Africans of varying degrees of westernization and urbanization, and to Europeans in South Africa. They found a significant tendency for urban groups to report the illusion more often than rural groups, and concluded that, "experience with, and identification with Western culture makes it more likely that the illusion will be perceived under marginal (suboptimal) conditions".

3) Anthropological Evidence

In an early review of cultural and developmental factors in perception, Dennis (1951) warned that although anthropological evidence is great, "the experimental evidence for social influence in perception is slight". Some of this anthropological evidence is in the form of assertions by workers who have assumed various meanings for the terms 'perception' and 'seeing'.

Benedict (1935) has written that:

No man ever looks at the world with pristine eyes. He sees it edited by a definite set of customs and institutions and ways of thinking.

Levy-Bruhl (1926), as part of his early controversial theory of 'primitive mentality', held that:

... primitives perceive nothing in the same way as we do... primitive perception is fundamentally mystic.

Related to this view is Werner's (1948) contention that, "primitive perception is physiognomic rather than geometrical-technical". Primitive perception is, "based on the fact that the objects are predominantly understood through the motor and affective attitude of the subject". Werner has concluded that, "there is a good deal of evidence that physiognomic perception plays a greater role in the primitive world than in our own, in which the geometrical-technical type of perception is the rule".

Sherif (1935), in reviewing early anthropological reports, concluded that:
The individual acquires a certain set of norms from childhood on ...
these norms determine to a considerable extent the individual's...
perceptual tendencies.

and Frank (1949), in a group of essays on 'culture and personality', held that:

In every culture, the individual is of necessity 'cribbed, cabined and confined' within the limitations of what his culture tells him to see, to believe, to do, and to feel...

and Kluckhohn (1954) has agreed with the well-known statement that, "we see things not as they are but as we are". As we have already noted, Murphy (1960), too, believes that, "... humanity ... sees, feels and thinks as the mold determines"

Hallowell (1951), however, has been more cautious in his approach to the problem:

Perceiving ... may not be a simple function of an individual's organic make-up alone, but be related to his group membership and thus involve differential cultural factors.

Caution has also been urged by Gibson (1950):

It is perfectly true that perception can be fluid, subjective, creative and inexact ... (but) ... it can also be literal ...
The student of human nature and society needs to remember this when he is in danger of assuming that men are the passive victims of their stereotypes and perceptual customs.

4) Recent Reviews

Two recent reviews of the perception and culture problem have not only been cautious, but have also been somewhat sceptical.

French (1963) quite accurately pointed out that:

The relationship between cultural categories and cognitive categorization is not difficult to demonstrate. The relationship between culture and perception is another matter; many traditional approaches in psychology and anthropology fail to establish a convincing connection between these realms. The crucial question is: do people with differing cultures actually perceive differently?

Triandis (1964), after discussing culture and categorization, values and attitudes, concluded that:

It is now possible to explore how cultural factors affect each of the processes described by these concepts. Before doing so, however, it is important to examine whether cultural factors influence perception.

5) Conclusions

The history of the idea that our percepts are governed or altered by our past experiences as members of a social group, or as individuals with a particular visual environment, has been subject to the extremes of acceptance and rejection. Recent examinations of the problem, however, suggest that the problem is a real one, and that a new approach, as well as more experimental work, is necessary if we are to answer it.

Chapter 3. The People in the Study

1) Introduction

The first part of this chapter presents a short discussion of the culture of the societies selected for the study: the Temne of Sierra Leone, and the Eskimo of Baffin Island. The second part describes the test samples drawn from these two societies, and then introduces two Scottish samples as well as a small sample of Mende people living adjacent to the Temne.

2) Culture Description

a) The Temne

The Temne inhabit an area of about 10,000 square miles in central and coastal Sierra Leone, and number close to 500,000 individuals (McCulloch, 1950). Most live in small villages, but towns are growing, especially where wage employment is becoming available. Their land is comprised of tropical rain forests, grassland, and upland rice fields. The Temne house, reputed to be one of the best in Africa, is usually circular with a high, distinctive thatch dome, and is made either of mud bricks or of a lattice work of sticks plugged with mud and grass wads. The exterior of the house is frequently finished with a finer mud or cement (Littlejohn, 1960).

Most Temne are rice farmers, but they also cultivate groundnuts and hot peppers for cash. The farmland is used, at most, for two years (one crop of rice, followed by one of groundnuts or peppers) and is then left to grow up with bush. The fallow period varies, depending on land pressure, but is usually about five years. There is only one crop each year and harvesting begins about the first of October; the rice is dried, husked, and then stored for use during the year. Frequently too much rice is sold at market after harvest, and in the following September the rural areas experience their 'hungry season'.

Very few people hunt; the little meat available is usually caught in traps hidden in the fences surrounding the upland rice farms. In the larger towns, however, goats, cattle and chickens can be purchased. Fishing is carried on in the inland rivers with the use of nets and traps, while coastal fishermen are also active, supplying large quantities of smoked fish to the town markets.

A number of men have left the farms and sought wage employment in the iron and diamond mines. Towns in these areas are growing rapidly and are noticeably more westernized than the surrounding villages. Petty trading in these towns is carried on mostly by the women.

The Temne are polygynous. The wives do much of the routine farm work while carrying the youngest child on their backs, while the older children assist them in the fields. Both male and female children are welcomed and treated kindly up to the age of weaning (approximately two years). Thereafter, however, discipline is harsh, with frequent beatings. Men may acquire more wives by arrangement with the woman's father and by paying a 'bride price', which must be refunded if the match is not suitable. Women, as well as children, are strictly controlled, and the use of another man's wife (woman damage) is heavily punished.

Politically, the Temne are divided into a number of chiefdoms (Littlejohn, unpublished manuscript,nd). The chiefs are elected, but must be members of a 'chiefly' family to be nominated. The chiefly families are few in number within each chiefdom, but there can be as many as three or four where chiefdoms have been amalgamated. Traditionally, the Paramount Chiefs were virtually absolute rulers, with priestly as well as secular duties, but are now mainly agents of the central government (Dorjahn,1960).

Islam has had a wide acceptance among the Temne. Christian missionaries have made a few converts, but many revert to Islam after their schooling in the mission is completed. Traditional beliefs have been mixed with muslim tenets to produce a religion neither pagan nor orthodox muslim.

The secret societies have been the main source of formal education among the Temne: the Poro Society for the boys and the Bundu Society for the girls. Traditional skills and roles are learned during the months in the bush schools, where initiation also takes place. Many Temne youths also attend Arabic schools where they learn Koranic texts by rote and occasionally become fully literate in Arabic. The Christian mission schools teach in both Temne and English. For the first two or three years, there is very little difference between these mission schools and the Arabic ones. The main concern in both is learning religious texts and prayers, and becoming familiar with the rules of the classroom - sitting still, paying attention and responding to questions. In the urban areas, education is mainly in English and secondary school graduation may be attained.

b) The Eskimo

The Canadian Eskimo number only 12,000 persons and are spread across a 3,000 mile expanse of Arctic coast. Compared to those in Alaska, Labrador, and Greenland, the Canadian Eskimo are few, but they exert a strong influence on the popular image of these people because of their more traditional ways. Many still live in hunting camps dotted along the coast from trading and administrative settlements, but like the Temne, some have begun to settle in towns where wage employment is available. Their land is harsh, is well above the tree line, and is a virtual desert, annual precipitation being little more than in tropical deserts. Most live in shacks constructed of driftwood, packing crates, cardboard, and canvas, although some are now buying prefabricated plywood cottages from the Canadian Government. The snow house is now mainly used for storage or for temporary housing while hunting.

Most Eskimo men are hunters. Even many of those who take wage employment still hunt on the weekends using motorized toboggans to take them to fresh grounds. In the more traditional camps, seals are hunted from the ice in winter and from

boats in summer; narwhal and walrus are also taken. On the land, caribou are hunted and white fox are trapped for trading. Ptarmigan are snared and char (Arctic salmon-trout) are netted or speared to add variety to the diet. Traditionally, no vegetable product was eaten, but now the Eskimo buy flour, tea, and sugar from the trader. Because of illness, many have gone to hospitals in the south, and on their return are not strong enough to take up life on the land again. These people are encouraged in the traditional arts and crafts, products which have a ready market in North America and Europe.

The Eskimo are now monogamous, but have practised both polygyny and polyandry in the past. Some marriages are still contracted by traditional agreement, but most are now formalized by the missionaries. Children are welcomed and are treated with great kindness until adulthood. Punishment is rarely seen and great freedom is allowed their offspring. Very little control is exercised over their women as well as their children.

The Eskimo have never been highly organized as a political group. The leader was often the man with the greatest experience in social matters or the best provider. He was not formally elected, nor did he have to belong to a particular class or family; in fact, the concept of 'class' seems to have been absent from Eskimo society.

Shamanism is still practised, but has been hidden, if not erased, in most areas by the pervading influence of the Christian missionaries. Unlike Islam, Christianity allows no integrations with pagan beliefs, and so the Eskimo are superficially orthodox.

Traditionally, education has been given in the family. The boys learn on the hunt through close contact with their fathers from the age of nine or ten on; girls are instructed in the home skills and crafts by their mothers. Since the 1930's, a syllabic script for writing has been available and has been transmitted

to the children by their parents. This script plays much the same role in Eskimo society as does the Arabic script among the Temne.

Schools were originally run by the missionaries, but are all now operated by the government. Those schools in the isolated areas can provide little more than basic skills in reading, writing and arithmetic (up to, approximately, the grade 4 level). A child who shows promise may be sent to a larger centre where secondary schooling is available. Since those in the isolated areas rely on hunting for their livelihood, they cannot all come to live near the school. The government has therefore provided hostels, each run by an Eskimo family, to house those children from the camps who are voluntarily sent in by their parents. They are not compelled to stay, however, and frequently return to the camps for hunting, during which time traditional skills are maintained.

3) Sample Description

a) Introduction

Two samples from each society were selected; in the case of the Temne and the Eskimo, Traditional samples living in relatively isolated rural areas were considered to be the primary samples (N = 90). Transitional samples living in an urban, westernized environment were selected as secondary samples (N = 30). This sample split had two purposes:

1. to explore the perceptual effects of westernization within a culture.
2. to eliminate 'race' as a comprehensive explanation for any perceptual differences found between societies. If there are intra-cultural differences, both samples from the same gene-pool, then 'race' cannot be invoked to explain these differences. 'Race' cannot then be invoked to explain all inter-cultural differences.

Evidence for equivalent degrees of contact with Western people and institutions for the Temne and the Eskimo traditional and transitional samples will be presented in the sample descriptions, and in tables 3:1 and 3:2 on pages 20 to 22.

Two Scottish samples were also selected and administered the same tests as the Temne and the Eskimo; one sample was taken from a rural farming area, and the other from a large city. The Scots were included in the study as a comparison group so that the Temne and the Eskimo test results might be related, through the Scottish results, to the accumulated mass of Western psychological findings and norms. Without the inclusion of a Western sample some of the results might have proven difficult to interpret.

A small sample of Mende people were selected as well, but were administered only two tests and a short questionnaire.

In all samples, an attempt was made to test males and females in equal numbers, and to sample equally from five age groups: 10-15, 16-20, 21-30, 31-40, and over 40. This was done so that any age or sex differences in the results could be adequately examined. The distribution of subjects in all samples, by age and sex, is given in table 3:3 on page 24. The sequence of testing the various samples, with dates and maps showing their locations, is given in appendix 1.

b) Temne Samples

(i) Transitional: Pt. Loko, population, 4000.

The people of Pt. Loko have been in contact with Europeans since the early seventeenth century when the town was used as a trading centre by the Portuguese (Fyfe, 1962), and mission schools, run by Europeans, have existed since the latter part of the nineteenth century. Krio, an African language largely derived from English is widely spoken as well as the native Temne. Most people earn their living in employment other than that of the traditional farming, and almost all live in semi-western rectangular houses with metal (pan), rather than thatch roofing.

Contact was made, through Dr. J. Dawson, with Mr. Tejan Kamara, a bar owner and respected member of the community. He agreed to rent a room for testing and to

request volunteers from the 'compin' (a semi-traditional social and dancing society) of which he was president. Thirty-two subjects were selected for testing and each was paid three shillings, money equivalent to a half day's labouring wage.

(ii) Traditional: Mayola, population, 200.

European contact with the area around Mayola has been very limited. A bush road runs through the village from Marampa to Yonibana, but is used only for local trading. During the rainy season, ferries across rivers on either side of the village do not operate and access to Mayola is by foot only. No European has ever lived there and visits are very infrequent. Little Krio is spoken, and dress is almost entirely traditional. All but four of the twenty-two houses in the village are in the traditional style, and most occupations are the traditional ones. There are no Western schools, but the dawn and evening Arabic classes are well attended.

Contact with the village headman was made through Mr. J.K. Davis, a Marampa Mines supervisor who had been born in the area. The headman agreed to make a room available for testing, and to ask the villagers to cooperate. Many people came, volunteering "to play the games", and 90 were selected and tested. Each was paid three shillings.

c) Eskimo Samples

The Eskimo subjects were also drawn from two areas; one group was located in Frobisher Bay, a community in transition between Eskimo and Western life (comparable to Pt.Loko), and the other was taken from the hunting camps located along the coast from Pond Inlet (comparable to Mayola).

(i) Transitional: Frobisher Bay, population, 1,000.

The Hudson's Bay Company has had a trading post in the area since 1924, and since the war, the American Strategic Air Command and the Canadian Department of

Northern Affairs have brought many non-Eskimo people into the area. English is spoken by many Eskimo in addition to their own language, and there are adult reading classes as well as regular schools for the children. Almost all live on wage employment or welfare; few still hunt full-time, although many workers still hunt on the weekends and holidays. All housing is of the southern type, mostly rectangular plywood cottages of one or two rooms.

Contact with the community was made through Mr. Abe Okpik of the Rehabilitation Centre, where a testing room was established in a vacant office. Thirty-one subjects were selected and tested, and each was given a packet of cigarettes.

(ii) Traditional: Pond Inlet area, population, 300

The people in the camps along the coast from Pond Inlet are all hunters, using traditional methods, but aided by modern tools (eg. rifles, powerboats, etc.). Contact with non-Eskimo people is limited to trading trips to the settlement of Pond Inlet, when fox and seal skins are exchanged for ammunition and supplies. None can speak English, but many have allowed their children to come into the school hostels to learn English and basic school subjects. Schooling, however, does not interfere with the acquisition of traditional skills, for the children return home whenever the hunting is good.

The more populous camps were visited by dog team and all available people were tested. Word was left for those out hunting and those in other camps to visit the test centre in the settlement when they were next in to trade. Ninety-one people were selected and tested, and each was given a packet of cigarettes.

d) Temne and Eskimo Sample Comparison

It is considered that the Mayola and Pond Inlet samples are equally free from the effects of Western contact, and that the Pt.Loko and Frobisher Bay samples are at equivalent levels of westernization. The foregoing discussion of the history of contact, dress, housing, language, occupation, and the availability of schools has presented evidence for this view; the following tables present

further data on age and years of education.

Table 3:1 Years of Education of Temne and Eskimo Samples by Age and Sex:

Transitional Samples:

Pt. Loko

<u>Age</u>	<u>N</u>	<u>MALES</u>		<u>N</u>	<u>FEMALES</u>		<u>N</u>	<u>TOTAL</u>	
		<u>M. Age</u>	<u>M. Educ.</u>		<u>M. Age</u>	<u>M. Educ.</u>		<u>M. Age</u>	<u>M. Educ.</u>
10-15	3	12.7	4.3	3	12.3	0	6	12.5	2.2
16-20	3	18.0	7.3	4	17.0	4.0	7	17.4	5.4
21-30	8	23.1	3.1	3	24.3	2.6	11	23.5	3.0
31-40	4	31.5	4.0	1	32.	9.	5	31.6	5.0
40 +	2	43.0	0	1	45.	0	3	43.7	0
Total	20	24.5	3.8	12	21.3	2.8	32	23.3	3.4

Note: 'Mean Education' has combined Arabic and Western education. Separate means are as follows:

<u>Type</u>	<u>N</u>	<u>Sample M. Educ.</u>	<u>S.D.</u>
Arabic	5	0.4	1.2
Western	14	3.0	3.7
None	13	-	-

Frobisher Bay

<u>Age</u>	<u>N</u>	<u>MALES</u>		<u>N</u>	<u>FEMALES</u>		<u>N</u>	<u>TOTAL</u>	
		<u>M. Age</u>	<u>M. Educ.</u>		<u>M. Age</u>	<u>M. Educ.</u>		<u>M. Age</u>	<u>M. Educ.</u>
10-15	3	13.7	5.7	3	12.7	5.3	6	13.2	5.5
16-20	3	18.0	7.3	3	17.3	5.0	6	17.7	6.2
21-30	3	24.7	4.2	4	24.5	1.8	7	24.6	2.6
31-40	4	34.8	1.3	2	33.0	0	6	34.2	0.8
40 +	3	49.0	0	3	43.0	0	6	46.2	0
Total	16	28.4	3.5	15	25.6	2.5	31	27.1	3.0

Note:

<u>Type</u>	<u>N</u>	<u>Sample M. Educ.</u>	<u>S.D.</u>
Western	18	3.0	3.1
None	13	-	-

Table 3:1 cont. Traditional Samples:Mayola

<u>Age</u>	<u>MALES</u>			<u>FEMALES</u>			<u>TOTAL</u>		
	<u>N</u>	<u>M.Age</u>	<u>M.Educ.</u>	<u>N</u>	<u>M.Age</u>	<u>M.Educ.</u>	<u>N</u>	<u>M.Age</u>	<u>M.Educ.</u>
10-15	10	12.6	3.4	10	12.4	0	20	12.5	1.7
16-20	10	17.9	3.5	10	17.1	1.1	20	17.5	2.3
21-30	10	25.6	3.3	10	23.5	0.3	20	24.6	1.8
31-40	10	35.6	3.0	10	34.2	0	20	34.9	1.5
40 +	5	45.8	0	5	45.2	0.3	10	45.5	0.2
Total	45	25.4	2.9	45	24.4	0.4	90	24.9	1.7

<u>Note:</u>	<u>Type</u>	<u>N</u>	<u>Sample M.Educ.</u>	<u>S.D.</u>
	Arabic	42	1.7	2.5
	Western	0	-	-
	None	48	-	-

Pond Inlet

<u>Age</u>	<u>MALES</u>			<u>FEMALES</u>			<u>TOTAL</u>		
	<u>N</u>	<u>M.Age</u>	<u>M.Educ.</u>	<u>N</u>	<u>M.Age</u>	<u>M.Educ.</u>	<u>N</u>	<u>M.Age</u>	<u>M.Educ.</u>
10-15	11	12.4	1.3	8	11.5	0.5	19	12.0	0.9
16-20	9	17.0	0.8	8	17.4	1.4	17	17.2	1.1
21-30	9	25.6	0	11	25.5	0	20	25.5	0
31-40	9	34.4	0	11	34.0	0	20	34.2	0
40 +	8	53.1	0	7	52.3	0	15	52.7	0
Total	46	27.3	0.4	45	27.8	0.3	91	27.5	0.4

<u>Note:</u>	<u>Type</u>	<u>N</u>	<u>Sample M.Educ.</u>	<u>S.D.</u>
	Western	21	0.4	0.9
	None	70	-	-

Discussion of Table 3:1

Transitional samples: The number of years of education in Pt.Loko includes Arabic and Western education, while in Frobisher Bay, it represents Western education only. A note at the bottom of the table shows the mean number of years in the respective school systems. The Pt.Loko sample and the Frobisher Bay sample both have had an average 3.0 years of Western education, but the Pt.Loko sample has also had an average 0.4 years of Arabic education. These two samples are therefore considered equivalent in educational standing.

Traditional samples: The number of years of education in Mayola represents the number of years of Arabic education, while in Pond Inlet, it represents Western education. It has already been suggested that at least for the first few years, Western education for the Eskimo, and Arabic education for the Temne both manage to teach only the basic skills with pictorial material, and the necessity of sitting still and answering questions. It can be seen in the table that only the two youngest age groups in Pond Inlet have had any education at all, for the school has only recently been introduced. It is considered, then, that these two samples represent approximately equal levels of education, even though the Mayola mean is four times that of Pond Inlet.

Table 3:2 Occupations of the Temne and Eskimo Samples by Sex:

<u>Pt. Loko</u>				<u>Frobisher Bay</u>			
<u>Male</u>		<u>Female</u>		<u>Male</u>		<u>Female</u>	
none	3	none	3	none	1	none	0
student	5	student	1	student	3	student	5
tailor	2	housewife	4	clerk	4	housewife	9
labourer	2	trader	2	labourer	3	cook	1
dancer	1	washwoman	1	busdriver	2		<u>15</u>
blacksmith	1	welfare-		heavy equip-			
gardener	1	worker	1	ment operator	1		
messenger	1		<u>12</u>	baker	1		
lorry driver	1			mechanic	1		
yard boy	1				<u>16</u>		
laundry boy	1						
house builder	1						
	<u>20</u>						
<u>Mayola</u>				<u>Pond Inlet</u>			
<u>Male</u>		<u>Female</u>		<u>Male</u>		<u>Female</u>	
none	0	none	3	none	0	none	0
student-		student-		student-		student-	
farmboy	9	farmgirl	2	hunter	12	househelp	5
farmer	33	farmer	39	hunter	34	househelp	9
carpenter	2	housewife	1		<u>46</u>	housewife	31
tailor	1		<u>45</u>				<u>45</u>
	<u>45</u>						

Discussion of Table 3:2

Transitional samples: No subject in the transitional samples follows the traditional occupation of his people. All are on wage employment or are **self-**employed; those males listed as unemployed are all relatively well educated and were currently looking for clerical work which was difficult to obtain.

Traditional samples: The table shows an almost complete reliance on the traditional occupations; no subject in either sample is on wage employment.

Conclusions

It is apparent, then, that on the criteria of education and occupation, as well as on those of historical contact, language, housing and dress, that these traditional and transitional samples are matched for degree of westernization.

e) Scottish Samples

In selecting Scots to compare with the Temne and the Eskimo subjects, an attempt was made to use farming or working people. In this way it was hoped to reduce test and pictorial sophistication. In order to maintain the traditional/transitional nature of the study, two groups of Scots were chosen, one from a small farming village, and the other from the city.

(i) Inverkeilor

This village is located in Angus, midway between Arbroath and Montrose. Subjects were drawn both from the village and from the surrounding farms. Mr. D. Ramsay, the Headmaster of the school, contacted the first subjects, and others volunteered when later approached either privately or in groups. Sixty-two subjects were selected and tested in the school and in the Men's Club Hall which had been made available as a test centre; no reward was given. The mean education of the sample was 10.0 years, S.D.= 1.7.

(ii) Edinburgh

Most of the subjects in the Edinburgh sample volunteered after hearing a brief

talk at a ceillidh. Others were approached through these initial subjects. Testing was done at the Psychology Department, and at two schools, Hunter's Tryst Primary and Firrhill Secondary. Sixty subjects were selected and tested; no reward was given. The mean education of the sample was 10.4 years, S.D.= 2.6 .

f) Mende Sample

A control group of members of the Mende tribe was required for the Temne-English language study (see appendix 3). While there, it was decided to administer Kohs Blocks as well. The village of Kotia (population, 300) is situated about three miles along a bush path from a gravel road linking N'jala to Taiama. None but foot traffic can reach the village and there is no school or other Western institution. Clothing and housing are predominantly traditional, and all subjects were farmers. Fifteen males and fifteen females were tested, three in each of the five age categories. The village appeared to be comparable to Mayola and Pond Inlet in degree of westernization.

g) Summary of Data for Six Main Samples

Table 3:3 summarizes the number, age and sex of subjects in the six main samples. Unless otherwise indicated, the N's listed here are those used in all statistical operations in chapters 5 and 6.

Table 3:3 Summary: N, Age and Sex of Subjects in Six Main Samples:

Age	<u>SCOTS</u>				<u>TEMNE</u>				<u>ESKIMO</u>			
	<u>Inverkeilor</u>		<u>Edinburgh</u>		<u>Pt.Loko</u>		<u>Mayola</u>		<u>Frobisher Bay</u>		<u>Pond Inlet</u>	
	<u>M</u>	<u>F</u>	<u>M</u>	<u>F</u>	<u>M</u>	<u>F</u>	<u>M</u>	<u>F</u>	<u>M</u>	<u>F</u>	<u>M</u>	<u>F</u>
10-15	7	7	6	6	3	3	10	10	3	3	11	8
16-20	5	10	6	6	3	4	10	10	3	3	9	8
21-30	7	8	7	5	8	3	10	10	3	4	9	11
31-40	3	4	6	6	4	1	10	10	4	2	9	11
40 +	5	6	6	6	2	1	5	5	3	3	8	7
Total	27	35	31	29	20	12	45	45	16	15	46	45
Total	62		60		32		90		31		91	
Total	122				122				122			

4) Acuity and Colour Vision

Before being accepted as subjects, volunteers were screened for visual acuity and colour defects.

a) Acuity

Volunteers with less than 6/12 far acuity (best eye) were only accepted as subjects if they could see the tests with ease at the one to four foot administration distance. Those with less than A.9 near acuity (best eye) were not accepted at all.

Far acuity was assessed by the Landolt Rings administered at six metres, and near acuity by the smaller Rings at twenty-five centimetres. The subject was requested to place his arm (for far) or finger (for near) in the same quadrant as the gap in the Ring. Where corrective lenses were normally worn, acuity tests as well as the battery to follow were administered with the subject wearing them; one Temne subject and eleven Eskimo subjects wore glasses during testing. Table 3:4 summarizes the acuity of the Temne and Eskimo samples; similar data for the Scottish samples are not given, since all those who needed them were wearing corrective lenses.

Table 3:4 Temne and Eskimo Far and Near Acuity Distribution:

<u>Far Acuity</u>	<u>TEMNE</u>		<u>ESKIMO</u>	
	<u>Pt.Loko</u>	<u>Mayola</u>	<u>Frobisher Bay</u>	<u>Pond Inlet</u>
6/6	28	80	20	76
6/9	4	6	4	10
6/12	-	3	3	1
6/18	-	1	3	3
6/24	-	-	1	1
<u>Near Acuity</u>				
A.6	31	73	29	85
A.7	1	7	1	3
A.8	-	5	1	1
A.9	-	5	-	2

Table 3:4 cont. Summary: Percent of Samples:

	<u>Far Acuity</u>		<u>Near Acuity</u>	
	<u>6/6 or 6/9</u>	<u>6/12 or worse</u>	<u>A.6 or A.7</u>	<u>A.8 or worse</u>
Temne	96.7 %	3.3 %	91.8 %	8.2 %
Eskimo	90.2 %	9.8 %	96.7 %	3.3 %

In general, the Temne have slightly better far acuity than the Eskimo, while the Eskimo have slightly better near acuity than the Temne, but the samples are essentially equivalent. The differences are not significant; $X^2 = 7.07$ (df = 4) for far acuity, and $X^2 = 4.36$ (df = 3) for near acuity.

b) Colour Vision

Colour vision was examined using the thirty-eight plate edition (1962) of Ishihara. Illiterates were given a brush to trace the meandering line version of the test, but literates were allowed to read the number. Those subjects who had colour defects were allowed to proceed with the battery if they could name the colours on the Kohs Blocks and their patterns. Table 3:5 summarizes the colour defects in the six samples.

Table 3:5 Summary of Colour Defects in the Six Samples:

	Total N	<u>MALES</u>		<u>FEMALES</u>			
		N	% defect	N	% defect	% defect	
Inverkeilor	62	27	3	11.1 %	35	0	0 %
Edinburgh	60	31	1	3.2	29	0	0
Pt. Loko	32	20	0	0	12	0	0
Mayola	90	45	2	4.4	45	0	0
Frobisher Bay	31	16	1	6.3	15	0	0
Pond Inlet	91	46	0	0	45	0	0
Total	366	185	7	3.78 %	181	0	0 %

Colour defects were rare in both the Temne and Eskimo samples, with only two and one defects respectively; the Scottish samples had more defects, with four out of 122 unable to read the numbers.

Chapter 4. Method

1) Introduction

It is the usual concern in cross-cultural psychological research to construct 'culture-free', 'culture-fair', or 'culture-reduced' tests in order to reduce or eliminate cultural bias. Many workers have turned their attention to this problem of fair testing across cultures since Goodenough's (1926) early attempts to assess intelligence with drawings. Cattell's (1940) test has been followed by cross-cultural applications of the Raven Matrices by MacArthur (1960) and by MacArthur, Irvine and Brimble (1964), but none of these has successfully eliminated the bias inherent in his test material. However a recent attempt by Kidd and Rivoire (1965) to discover culture-free items for inclusion in a spatial test has met with moderate success. Vernon (1965a) has recently suggested that, "it is unprofitable to talk about or investigate racial or ethnic differences in intelligence ... it is much more meaningful to study the effects of controllable environmental factors on the development of various types of abilities, either within a particular culture or between contrasted cultures".

2) Design

In the case of the present study, no attempt has been made to eliminate or reduce the cultural bias of the tests; indeed, the opposite is the case. Cultural differences have been investigated, isolated, and utilized in selecting and constructing tests for presentation to the various cultural groups. By working with these differences, rather than attempting to eliminate them, it was considered that their effects on perception might be observed and gauged. In attempting to relate test differences to cultural and ecological differences, however, other variables must be held constant or otherwise controlled. These variables are as follows:

a) Stimulus Variables

The test battery is objectively standard for all subjects; questions, instructions and administration procedure were standard throughout, within the limitations of translation. Test centres were all well-lighted, and conditions of temperature and seating were all normal for the subjects concerned, although, of course, they varied considerably between the Temne and the Eskimo.

b) Organismic Variables(i) Race

The three groups have been drawn from three different races, but from each race, two sub-samples have been tested. If differences are found between the sub-samples, especially if these differences can be predicted from sub-cultural and ecological differences, then a purely racial explanation of the differences between the three races is not valid.

(ii) Sensory Apparatus

Visual acuity and colour defects have been measured. There were no significant differences between the groups.

(iii) Health

Disease: There is no doubt that with Western medical services, the Scottish samples were most free from disease. Malaria among the Temne, and tuberculosis among the Eskimo are very common, but the relative incidence and the possible psychological effects of these diseases have not been studied.

Nutrition: Many Temne suffer from a protein deficiency condition known as kwashiorkor, and many Eskimo suffer from other dietary deficiencies, especially when hunting is poor, but again relative incidence and the possible psychological effects have not been studied.

In the absence of contrary evidence, it is assumed that the Temne and the Eskimo samples suffer comparable degrees of disease and malnutrition, and that both are at an equal disadvantage with respect to the Scottish samples.

Those variables which have not been held constant are as follows:

c) Cultural Background, and

d) Ecological Background: These two factors show considerable variation as outlined in the previous chapter. Specific components of these two variables considered relevant to the test differences will be discussed in detail in the individual experimental studies, chapters 5 and 6.

e) Response Variables

As just mentioned, this variable will be discussed and related to the cultural and ecological variables in the reports of the experimental studies in chapters 5 and 6.

3) Battery

A test battery was assembled which was considered might gauge the effects of various cultural and ecological factors on visual perception. A description of the non-standard tests, as well as modifications to standard tests, is given in the appropriate experimental report.

The test session was introduced as follows:

I would like you to work with me for a few hours. First I want to ask you some questions, and then I would like you to look at some drawings and photographs. If you do not understand something, please ask about it. Most people who do this work enjoy themselves, and I think you will too.

It was generally known that payment in the form of money, tobacco or candy was always made, so this fact was not mentioned during the introduction.

The battery was preceded by a questionnaire lasting from fifteen to twenty minutes (see appendix 4), and served to put the subject at ease as well as to gather background information. Much of the data gathered in this way will not be used in this thesis.

The battery itself was composed of the following tests:

<u>TEST</u>	<u>Approximate Administration Time</u>
1. Acuity, far and near	5 minutes
2. Colour vision	5
3. Kohs Blocks	20-30
4. Acquiescence	5-10
5. Illusions	5-15
6. Witkin Embedded Figures Test (EFT)	20-30
7. Closure	5-10
8. Assimilation	5-10
9. Temne-English language study (not to Eskimo)	5-15
Eskimo-English language study (not to Temne)	5-10
10. Raven Matrices	20-30
11. Perceptual Units	5-10
12. Morrisby Shapes	10-20
13. Binocular Rivalry and eye dominance test	10-20
	140-240 minutes

A rest break of ten to fifteen minutes was given after item 9. For the younger and older subjects, the first part of the battery (to item 9) was administered in the morning, and the second half in the afternoon. All others (aged 16-40) had only the fifteen minute break, but were allowed rest any time they were tired. The overall time for each subject averaged a little over $2\frac{1}{2}$ hours for the Scottish and Eskimo samples, but closer to $3\frac{1}{2}$ hours for the Temne samples.

4) Cross-Cultural Testing

Two major problems plague the administration of psychological tests to members of diverse cultures: communication and motivation. No worker with experience of cross-cultural test administration can claim total elimination of these difficulties, but certain steps can be taken to reduce their effects.

a) Communication

Some of the tests included in the battery could be demonstrated and responded to with minimal use of language (eg. Landolt Rings, Ishihara, Kohs Blocks, Illusions, Closure, and Assimilation), while others required a good deal more verbal explanation (eg. Acquiescence, EFT, Matrices, and Shapes). But in no case was it necessary for the subject to respond with more than a few words, a drawing, or an indication of his choice using a brush as pointer. This minimal reliance on verbal communication was intended to ensure equivalence of instruction and response between all the samples.

Where language was used, it was always in the subject's own tongue, and spoken by a good interpreter. In all cases the interpreters were fluent in both English and their native languages, but English was their second language, learned either in school or at work. All three interpreters were respected and known by almost all subjects, and all had high prestige because of family background or government employment. Each interpreter had been administered the questionnaire and battery of tests, and had memorized the instructions prior to beginning work. In each case, the test instructions were pre-translated by highly competent professional translators, and copied out for use in the field. It is considered that these precautions have reduced errors due to communication to a minimal level.

b) Motivation

The desire to volunteer for testing and to perform them quickly is not equally strong among all peoples of the world. To over-come these two problems, the following steps were taken:

(i) In every case, subjects were volunteers who agreed to be tested after being approached either by myself or by my interpreter, either singly, or as a member of a group. No pressure was placed on anyone to volunteer, and the reward

was not emphasized. In this way it was hoped to attract subjects who were genuinely interested in being tested, rather than those merely wishing money or tobacco.

(ii) Tests were selected for inclusion in the battery which were varied and colourful. Delight and interest were frequently expressed during testing, especially by the Temne. Whenever boredom was apparent, a break was called, and the subject usually had a cigarette; with Rivers (1901), we have to admit that much of the testing was done while subjects were "under the influence of tobacco".

(iii) All the tests were untimed with the exception of Kohs Blocks, EFT, and Shapes. However the time limits on Kohs Blocks were increased, as specified in chapter 5, and on EFT most subjects who could not find a figure within the first minute or so could not be motivated to use the full three minute time limit. In the Shapes test, the majority of Temne and Eskimo subjects completed the sixty test items well within the ten minute time limit. The Matrices were not timed at all, nor were any of the other tests. It is considered, then, that the bias introduced by an emphasis on speed has been effectively reduced, if not eliminated.

Chapter 5. Study 1: Discrimination and Spatial Skills

1) Introduction

In the general introduction, three guiding hypotheses were set out. In this section, a number of specific hypotheses will be presented concerning perceptual differences between the Temne and the Eskimo. In each case, these hypotheses will be derived from the following discussion of the ecology and culture of the two societies.

a) Ecological Requirements

We have seen that the Temne and Eskimo visual environments differ greatly. The Temne land is covered with bush and other vegetation providing a wealth of varied visual stimulation. Colour is also abundant; trees and grasses vary from dark to light green, fields present an expanse of brown and beige, and flowers, fruits and berries provide splashes of the brighter colours. The Eskimo land is bleak at any time of the year; in winter the whiteness of the land merges with the frozen sea, and in the few short weeks of summer, moss and lichens cover the rocks and sand giving the land a uniform grey-green-brown tone. A few flowers and heathers bloom in the summer, but these are scarce and short-lived. It is apparent, even from these short descriptions, that the Eskimo, when compared to the Temne, inhabit a world of uniform, homogeneous visual stimulation. (See photographs, appendix 1).

We have also seen that the Temne and the Eskimo differ markedly in their economies; the Temne are farmers who work land near their villages, and rarely have to leave the numerous paths through the bush. The Eskimo, on the other hand, are hunters who must travel widely on the sea and land, and far along the coasts in search of game and trap animals.

It is evident that the Eskimo must develop certain perceptual skills, merely to survive in his situation, which the Temne are not called upon to do:

1. He must first of all, in order to hunt effectively, develop the ability to isolate slight variation in visual stimulation from a relatively featureless array; he must learn to be aware of minute detail.

2. Secondly, in order to navigate effectively in this environment, he must learn to organize these small details into a spatial awareness - an awareness of his present location in relation to objects around him.

The fact that the Eskimo hunt effectively and range far over unknown territory, suggests that he has been able to develop these two skills to some degree. But the fact that the land requires these skills is no guarantee that they will be developed automatically, solely in response to ecological requirements, (migration or extinction are both logical alternatives to the development of these skills). It was therefore considered that some other factor or factors have contributed to the emergence of these required skills. Three of these factors will now be examined to discover how they might contribute to or promote the development of these required perceptual skills.

b) Cultural Aids

(i) Language

It is reasonable to expect that the content of a person's language will reflect the type of experience he usually faces and the type of discrimination he finds it useful to make. To discover whether the Temne and the Eskimo possess systems of 'geometrical-spatial' terms consistent with the requirements of their respective lands, analyses were made of these terms in both languages.

One-hundred English 'geometrical-spatial' terms were arbitrarily chosen for translation, where possible, into Temne and Eskimo. The terms were translated in a single session by two literate native speakers of the language. The translations were then placed into one of four classes:

- Class 1. The Temne or Eskimo word is a true equivalent of the English word.
 Class 2. The Temne or Eskimo phrase is a true equivalent of the English word.
 Class 3. The Temne or Eskimo word or phrase is derived from an English word.
 Class 4. a) There is no way to express the term in Temne or Eskimo, or,
 b) The distinction is not made between the present word and one in classes 1, 2, or 3.

Table 5:1 List of 100 'geometrical-spatial' terms with Temne and Eskimo classes

<u>Word</u>	<u>Class</u>		<u>Word</u>	<u>Class</u>		<u>Word</u>	<u>Class</u>	
	<u>Temne</u>	<u>Eskimo</u>		<u>Temne</u>	<u>Eskimo</u>		<u>Temne</u>	<u>Eskimo</u>
square	3	2	third	4	4	south	4	1
triangle	3	2	quarter	4	2	northeast	4	4
rectangle	4	4	cube	2	4	southeast	4	4
circle	3	1	small	1	1	southwest	4	4
oval	4	2	large	1	1	northwest	4	4
round	4	4	short	1	1	direction	1	4
shape	4	4	long	1	1	there	1	1
form	4	4	up	1	1	where	1	1
angle	3	4	down	1	1	rightsideup	4	1
corner	4	1	left	1	1	upsidedown	4	1
line	1	2	right	1	1	slanting	2	4
curve	4	1	far	1	1	tilted	4	4
straight	1	1	near	1	1	leaning	4	1
zig-zag	1	1	close	4	4	position	4	4
height	1	1	open	1	1	orientation	4	4
distance	4	1	closed	1	1	top	1	1
area	4	4	inside	1	1	bottom	1	1
capacity	4	4	outside	1	1	side (of sq.)	4	4
boundary	4	2	between	1	1	side (of box)	4	4
contour	4	4	other side	1	1	opposite	1	1
space	4	4	this side	4	1	same	4	1
surface	4	1	by	1	1	similar	1	2
plane	4	4	over	4	1	quantity	1	2
congruent	4	4	under	1	1	accurate	4	1
parallel	4	1	above	4	1	fine	3	4
flat	4	1	below	4	1	exact	1	1
warped	4	1	separate (adj.)	1	1	map	3	1
cylinder	4	2	apart	4	4	smooth	1	1
radius	4	4	design (n.)	4	4	rough	2	1
diameter	4	4	horizontal	3	1	pattern	4	4
circumference	4	4	vertical	4	1	block	4	4
pair	2	1	east	2	1	size	4	2
symmetrical	4	1	west	2	1			
half	4	1	north	4	1			

Table 5:2 Summary of the 100 terms, by class and language:

<u>Class</u>	<u>Scots</u>	<u>Temne</u>	<u>Eskimo</u>	<u>d E/T</u>
1	100	33	57	+ 24
2	-	6	10	+ 4
3	-	7	0	- 7
4	-	54	33	- 21

It can be seen that the Temne find it necessary to make only about one-third of the 'geometrical-spatial' distinctions ^{that} as the Scots do, and the Eskimo a little more than one-half. More important, though, is that the Eskimo make, at least linguistically, twenty-eight more distinctions of this type than the Temne do without borrowing from English. The seven Temne borrowings from English suggest that the Temne are beginning to need these concepts, while the lack of Eskimo borrowing suggests that the Eskimo find their own system adequate.

From a less ethnocentric point of view, an attempt was made to discover any Temne 'geometrical-spatial' terms not found in English; none were found. But Mr. Raymond Gagné (personal communication), a linguist working with the Canadian Department of Northern Affairs, has discovered that the Eskimo possess an intricate system of words, termed 'localizers', which aid in the location of objects in space. These 'localizers' are concerned with such spatial dimensions as 'upness-downness', 'hereness-thereness', and 'insideness-outsideness', and form an integral part of the word. The use of them, and hence the distinction, is obligatory. These distinctions are not normally required of users of English, and so it possible that the Eskimo possess a 'geometrical-spatial' word system almost as complex as that of Western technical man.

It is apparent, then, that the Eskimo possess a complete system of words which aid in the dissection of, and communication about, the space around them. It is also apparent that the Eskimo will find it easier than the Temne to pass on more of these distinctions and concepts to their offspring.

(ii) Arts and Crafts

Practice of graphics, sculpture and the decorative arts provides considerable opportunity for the development of observational and spatial skills. A survey of the arts and crafts of the Temne and the Eskimo reveals another aspect of their cultures where they show marked differences.

The Eskimo is world-renowned for his fine soapstone carving and, more recently for his efforts in stencil and block printing. Both clothing and tools are intricately ornamented with embroidery or etchings, and most women are able to cut out skins and cloth for boots and parkas with a minimum of measurement. This concern with decoration and ornamentation of clothing was remarked upon by the early explorer, Samuel Hearne. While travelling across the Barren Lands from Fort Churchill to Coppermine, his party came upon a lone Eskimo woman who had become detached from her band; in the middle of the Barrens, she was sitting contentedly sewing patterns onto her clothing, (quoted in Mowat, 1960).

On the other hand, the Temne produce almost no graphics, sculpture or decoration. Clothing, when locally made, is relatively plain and simply made, although their choice of imported fabrics tends to be gaudy. Paintings and carvings are rare, and even religious objects, on which one might expect the highest creative development, are unimaginative and gross.

Skill in making maps seems to be lacking among the Temne as well (Littlejohn, 1963), while the Eskimo have been frequently observed making or using them. Galton (quoted in Werner, 1948),

... remarks on the almost fabulous geographical memory of an Eskimo whose feats were directly observed by a Captain Hall. With no aid except his memory, this Eskimo drew a map of a territory whose shores he had but once explored in his kayak. The strip of country was 1100 miles long as the crow flies, but the coast line was at least six times this distance. A comparison of the Eskimo's rude map with an Admiralty chart printed in 1870 revealed a most unexpected agreement.

Similar skill has been found by Carpenter (1955) who asked some present-day Eskimo to, "make sketches of the world as they conceived it"; the results were astonishingly accurate. Moreover, Bagrow (1948) has reported that the Eskimo are capable of making depressions and elevations on their maps to represent the third dimension.

The Eskimo themselves consider the relief maps more valuable, as giving a more accurate representation. The area is rugged, intersected by fiords, nunataks, and glaciers, and therefore relief maps help the nomadic Eskimo more readily to survey and identify a given locality.

Attempts were made, while living in Mayola, to discover if the Temne had an understanding of maps. A map of the village was drawn, and the features on it were explained as, "how Mayola would look if you were up there (in the sky)". Many villagers were interested, but few showed any signs of comprehension.

It is thus apparent that the artistic, craft-, and map-making skills of the Eskimo are much more highly developed than those of the Temne, and it is not difficult to conceive how practice of these skills could aid in the development of both the observational and spatial abilities required by the land.

(iii) Socialization Practices

The third cultural aid which is considered is the system of socialization practices used by a particular society.

Barry, Child and Bacon (1959) have investigated the relationship between subsistence economy and socialization practices. They suggested that, to best meet their economic needs, in societies with low food accumulation (hunting or fishing peoples), "adults should tend to be individualistic, assertive and venturesome"; while in societies with high food accumulation (pastoral or agricultural peoples), "adults should tend to be conscientious, compliant and conservative". They predicted that the socialization practices of societies would emphasize appropriate training to ensure the development of these traits.

By rating 104 societies on the degree of food accumulation and on six aspects of socialization practices (obedience-, responsibility-, nurturance-, achievement-, self-reliance-, and general independence training), they were able to demonstrate a significant relationship between the type of subsistence economy of a society and the socialization practices in use. They concluded that:

... child training tends to be a suitable adaptation to subsistence economy. Pressure toward obedience and responsibility should tend to make children into obedient and responsible adults who can best ensure the continuing welfare of a society with a high accumulation economy, whose food supplies must be protected and developed gradually throughout the year. Pressure toward self-reliance and achievement should shape children into venturesome independent adults who can take the initiative in wresting food daily from nature and thus ensure survival in societies with a low food accumulation.

This division of societies into low- and high-food-accumulators provides a useful approach to the study of Temne and Eskimo socialization practices. The Temne and Eskimo economies have already been examined; the Temne, with a single crop of rice each year, tend to be high food accumulators, while the Eskimo, with a hunting and fishing economy, tend to be low food accumulators (although in the winter months a large catch may be stored indefinitely by freezing). An examination of their respective socialization practices reveals that the Barry, Child and Bacon findings hold true for both groups, (in fact a "West Greenland Eskimo" society was included in their sample, and were rated close to the extreme on "pressure toward assertion").

Temne socialization practices have been examined by Dawson (1963a). In general, "the baby is treated with much affection until weaned (2 - 2½ years), after which it is subjected to considerable severity in disciplinary measures, and toilet training is from this stage very strict". Conformity is usually demanded of the child; "a child is generally not allowed to assert individuality", and, "witchcraft and swears are used against individuals who have deviated psychologically or socially from accepted forms of behaviour".

Eskimo practices, on the other hand, generally avoid the use of punishment. Butt (1950) has summarized much of the material available on Eskimo child training:

Children are treated lovingly and every care and consideration is lavished on them.

Children are scarcely ever subjected to blows or even to scolding and cross words, and they do practically as they wish, even to the extent of ordering about their parents and getting their own way in everything.

Hrdlicka (1941), in a paper devoted entirely to the Eskimo child, has confirmed that:

There is but little punishment of the children among the Eskimo. I have witnessed some spanking by the mother, but never by the father.

The evidence, then, indicates great differences between Temne and Eskimo methods of child rearing, especially with respect to the severity of discipline and pressure towards conformity. Witkin and his associates (1962) have shown that these opposing modes of socialization have definite consequences for perceptual ability within Western culture. They administered a series of orientation and perceptual tests, and found large differences in individual ability. Those people who found "it difficult to overcome the influence of the surrounding field, or to separate an item from its context", they termed 'field-dependent'. Those who could carry out these tasks with ease, they termed 'field-independent'. Several factors were considered to foster field-dependence, including severe disciplining, preventing the assumption of responsibility, and stressing conformity within the home. A combination of dominating mothers and passive fathers further tended to produce field-dependent characteristics.

Field-independence, on the other hand, was fostered by home encouragement to assume age-adequate responsibilities and activities, and by parental

stimulation of the child's curiosity and interests. Field-independence was considered to be psychologically more differentiated, and hence they suggested that field-independent subjects represented a higher level of perceptual development.

Dawson (1963a) was the first to apply Witkin's concepts in a cross-cultural setting. Noting that Africans had been found to have considerable difficulties on tests such as Kohs Blocks, (Jahoda, 1956; McFie, 1961), Dawson considered that, in addition to a lack of experience with shapes and forms, most African difficulties might be perceptual in nature, and furthermore might be related to Witkin's concept of field-dependence. He suggested that:

... in the traditional African family group, although there will be differences between tribal groups, there is a very strong traditional requirement for the development of those characteristics which are field-dependent.

To test this assumption, Dawson administered Kohs Blocks to over 500 relatively westernized subjects from a number of tribal groups in Sierra Leone, including some Temne who had taken up employment in the Marampa iron mines. Although all scores were well below Western norms, the inter-tribal differences (Temne-Mende) were still significantly related to their respective socialization practices.

In the present study, it is considered that, if significant differences in perceptual abilities can be found between tribes whose socialization practices both tend to foster field-dependence, but to different degrees, then the extreme differences in the practices existing between the Temne and the Eskimo should aid the development of perceptual skills to vastly different extents.

c) Hypotheses

On the basis of the discussion of ecological requirements and cultural aids, two sets of specific hypotheses were made concerning Temne and Eskimo perceptual skills. The first set was derived solely from the first requirement of the land - the Eskimo need to be more aware of fine detail to survive in their environment than the Temne do in theirs. The second set is derived from the second ecological requirement - the Eskimo need to organize these minute details into a spatial awareness, and from the three cultural aids to its development.

(i) Discrimination Skills

1. In a test for closure, despite equivalent acuity, the Eskimo will be more aware of small detail than the Temne, and hence less ready to form closure.
2. In a test of perceptual units, the Eskimo will tend to see smaller units than the Temne.

(ii) Spatial Skills

In four standard tests of spatial ability (Kohs Blocks, Witkin Embedded Figures, Morrisby Shapes, and Raven Matrices):

1. The Eskimo will score significantly higher than the Temne, for comparable degrees of westernization.
2. Furthermore, the Eskimo scores will more closely approximate the Scottish scores than the scores of the Temne samples of equivalent westernization.
3. As a result of contact with Western peoples and institutions, the Temne and Eskimo transitional samples will score higher than the respective traditional samples.
4. Within the six samples, these scores will be significantly related to level of education.
5. Within each sample, those rating themselves as more severely disciplined will score lower than those less severely disciplined.
6. Across the three cultures, those rating themselves as more severely disciplined will score lower than those less severely disciplined.

2) Discrimination Skills

a) Closure

(i) Introduction

If, as the Gestalt psychologists have maintained, the laws of perceptual organization are given in experience (Wertheimer, 1923), then we should expect to find little or no difference between cultural groups in such a fundamental perceptual phenomenon as closure. Michael (1953), in fact, has found just that. In a test for closure, using Navaho and white American subjects, he found, that despite a reluctance on the part of the Navaho to close designs in their art, and a general "fear of closure" in their culture, there were no significant differences between the two groups. His method of presentation used a dark room, a projector, and a screen. Circles with one to eight degrees of gap in them, and subtending a visual angle of 5.6 to 7.1 degrees were flashed on the screen for 0.1 second, and the subjects were asked to draw what they saw. Measures of the numbers of gaps in circles seen, the number of persons seeing any gaps in circles, and the median size of gap seen, all indicated equivalence between the Navaho and the whites.

The present hypothesis, already put forward, predicted a significant difference in closure formation between the Temne and the Eskimo despite equivalent acuity, the Gestalt Law, and Michael's finding. To test this hypothesis, the following test for closure was constructed and administered in the portable tachistoscope described in appendix 2.

(ii) Test Description

Cards measuring five centimetres by five centimetres were cut out and squares, rectangles and triangles were drawn on them with india ink (lines 1 mm. thick). Circles were not used, as in Michael's study, because in a pilot study it was found difficult to evaluate the circle drawings since the beginning and end of

the pencil line rarely met exactly. However in these linear forms, the stimulus gap was always midway in the lines forming the sides of the figures, and subjects' reproductions normally indicated whether they had or had not seen the gap.

The test consisted of thirteen cards presented in the following sequence. The size of the stimulus gap increased one millimetre on each successive card.

Table 5:3 Closure Test Specifications:

<u>Card</u>	<u>Size of opening</u>	<u>Position of opening</u>	<u>Shape</u>	<u>Approximate visual angle</u>
Trial	0	--	sq.	--
0	0	--	tri.	--
1	1 mm.	L	rect.	0.2 degrees
2	2	R	tri.	0.4
3	3	R	tri.	0.6
4	4	L	sq.	0.8
5	5	R	rect.	1.0
6	6	L	tri.	1.2
7	7	L	sq.	1.5
8	8	R	tri.	1.7
9	9	L	sq.	2.0
10	10	R	sq.	2.3
11	15	L	sq.	3.5

The instructions were given as follows:

Please look into this box and look straight ahead. The box is dark inside and you will not be able to see anything until I flash a light. When I flash the light, you will see a white piece of paper in front of you with a figure drawn on it. I would like you to draw the figure that you see.

Subjects were then given the test blank (see appendix 4) and a pencil, and the appropriate place for each drawing was indicated by pointing. The test was stopped as soon as the subject first drew a form with a gap in its side. The score was simply the size of the stimulus gap first seen and drawn. A score of twenty was assigned to those who drew no gap at all.

(iii) ResultsTable 5:4 Mean Gap First Seen, in millimetres:

<u>Sample</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>
Mayola	42	13.76	6.9
Pt.Loko	28	11.82	7.1
Edinburgh	59	9.70	6.5
Inverkeilor	53	8.34	5.8
Frobisher Bay	28	7.29	6.5
Pond Inlet	83	6.52	6.0

Test of hypothesis 1: In a test for closure, despite equivalent acuity, the Eskimo will be more aware of small detail than the Temne, and hence less ready to form closure.

	<u>t</u>	<u>p/</u>
<u>Traditional samples:</u> Mayola - Pond Inlet	5.79	.01
<u>Transitional samples:</u> Pt.Loko - Frobisher Bay	2.49	.01

(iv) Discussion

Despite equivalent acuity, the Eskimo samples are significantly more aware of smaller gaps than their Temne counterparts. This finding confirms the prediction based on the discussion of what is required of the Eskimo by their environment, but contradicts Michael's results and predictions based on Gestalt Laws of perceptual organization. Evidence for the Gestalt Laws was based solely upon data from European subjects, and so they were never really subjected to a test of the possible effects of varying cultural and ecological backgrounds. Michael's study was the first to question the universality of the law of closure, but found no differences in closure formation due to cultural variation. But the present study has been able to demonstrate a significant relationship between ecological demands and the size of gap first seen. This finding seems to confirm the early reports of travellers discussed in chapter 2, and Rivers' (1901) suggestion that some peoples have developed good, "powers of observation", based on the, "habit of attending to and discriminating any minute indications which are given by the organ of sense".

An analysis of the numbers of subjects able to see and draw the forms is given in table 5:5.

Table 5:5 Numbers of Subjects: "Can't see", and "Can't draw":

<u>Sample</u>	<u>Total</u>	<u>"Can't see"</u>	<u>"Can't draw"</u>	<u>Able to see and draw</u>	
	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>%</u>
Inverkeilor	62	4	0	53	93.5 %
Edinburgh	60	1	0	59	98.3
Pt. Loko	32	1	3	28	87.5
Mayola	90	5	43	42	46.7
Frobisher Bay	31	2	0	29	90.3
Pond Inlet	87	4	0	83	95.4

It is apparent that subjects in Mayola had great difficulty in representing what they saw on the paper provided. In all samples, those subjects who reported that they "can't see", or demonstrated an inability to draw what they saw, were not included in the calculation of the means.

An analysis of the numbers of subjects seeing any gap at all is given in table 5:6.

Table 5:6 Numbers and Percents of Subjects Drawing any Gap at all:

<u>Sample</u>	<u>N</u>	<u>N</u>	<u>%</u>
	<u>Able to see and draw</u>	<u>See any gap</u>	<u>See any gap</u>
Mayola	42	21	50.0 %
Pt. Loko	28	18	64.3
Edinburgh	59	47	79.7
Inverkeilor	58	48	82.8
Frobisher Bay	29	24	82.8
Pond Inlet	83	73	88.0

The results reported in table 5:4 are confirmed by using a different criterion: percent seeing any gap at all. The ranking of the samples in table 5:6 is identical to the table 5:4 ranking except for the Inverkeilor -- Frobisher Bay tie on the second criterion.

The formation of closure, then, appears to different extents in groups with different ecologies. Although this finding was predicted on the basis of the Eskimo need to be more aware of small detail in their environment, it is still possible that a general field-independent approach to visual material might

affect the result. An examination of the correlations between closure scores and the four spatial tests within each sample suggests that, to a moderate extent, this might be the case.

Table 5:7 Closure Score Correlations with Spatial Tests Scores:

<u>Sample</u>	<u>Kohs</u>	<u>EFT</u>	<u>Shapes</u>	<u>Matrices</u>
Inverkeilor	-.11	0	-.25 @	-.22 @
Edinburgh	-.07	0	-.13	-.12
Pt. Loko	-.05	-.07	--	+.22
Mayola	+.29 @	+.27 @	--	+.52 #
Frobisher Bay	-.12	-.15	-.23	-.33 @
Pond Inlet	-.29 #	0	-.29 #	-.02

Note: p $\begin{cases} \swarrow \\ \searrow \end{cases}$.01 are marked #
 p $\begin{cases} \swarrow \\ \searrow \end{cases}$.05 are marked @
 NS are unmarked.

All correlations, except in the Temne samples are negative or zero. Three of these are significant at the .05 level, two at the .01 level, and eight are in the suggested direction. Thus, for the Scottish and Eskimo samples, there is a tendency for subjects who are perceptually well developed (field-independent) to be more aware of small detail. In the case of the Temne samples, the four positive correlations are considered spurious; four Pt. Loko and forty-eight Mayola subjects did not produce a score on this test at all. Of the forty-two Mayola subjects who did score, only twenty-one saw any gap at all, and so there is not enough variance in the sample to yield a valid correlation. The same is true for both Temne samples with the Shapes test; this will be discussed fully in the next section, on spatial tests.

It is possible as well that familiarity with printed material might have affected the results. This does not seem likely since the Scottish samples, who have had the most experience with print (education and books) have not scored as well as either Eskimo sample. Furthermore, both traditional and transitional Temne and Eskimo samples were matched for Western contact and education, and it is between these samples that the greatest differences in score appear. But as a check, an examination was made of closure score correlations with education.

Graph 5:1 Closure: Age Trends.



Table 5:8 Closure Score Correlations with Years of Education:

<u>Sample</u>	<u>r</u>
Inverkeilor	-.08
Edinburgh	+.10
Pt. Loko	-.09
Mayola	+.77
Frobisher Bay	+.06
Pond Inlet	-.02

None of these correlations is significant except that of the Mayola sample; this is considered spurious, as before, because of the low variance in the sample. It is apparent that familiarity with printed material (as gauged by years of education) is not a significant factor in the production of closure scores.

However, the age of the subject appears to be related to these scores. An examination of the age trends on graph 5:1, page 48, reveals markedly poorer scores for those Temne and Eskimo subjects over forty years old, whereas the Scottish subjects do not show this trend. Since most Scottish subjects in this age group were wearing spectacles, it is likely that uncorrected presbyopia is the cause of this Temne and Eskimo closure score rise in old age.

b) Perceptual Unit

(i) Introduction

Wertheimer (1923) has shown how 'proximity' and 'similarity' can organize visual material into perceptual units.

When presented with a number of stimuli, we do not as a rule experience 'a number' of individual things, this one and that and that. Instead, larger wholes separated from and related to one another are given in experience.

Between cultural groups, then, we should expect to find little or no difference in which groups of objects members of different cultures see as units or wholes. But the present hypothesis, already put forward, has predicted that the Eskimo would tend to see smaller units or groups than the Temne. The following task was designed to test this prediction.

(11) Test Description

Seventeen test items, made up of x's and o's, were adapted from Wertheimer's study. These were arranged on two pages (see pages 51 and 52) which were given, back to back, to each subject so that only one page could be seen at a time. The first seven items were intended to be examples of the Law of Proximity; the next four, of the Law of Similarity; and the final six, of a combination of the two. Instructions were given as follows:

Here are two sheets of paper with some groups of marks on them. I would like you to take this pencil and draw around those marks which you see as belonging together. If you see them all together as one group, then draw around them all. If you see them broken up into smaller groups, then draw around those. There are no right or wrong answers - I am just interested in seeing what you see. Do you understand?

With the first ten items, Wertheimer's two Laws leave no doubt as to what is considered to be the perceptual unit; these are shown encircled on page 53. The last seven items, on the second page, were designed to be ambiguous, hence the designated perceptual unit is somewhat arbitrary; see pages 54 and 55 for alternatives designated as the perceptual unit.

Once the 'unit' was established, it was possible to add three more scoring categories, totalling four in all:

- W - whole test item is encircled.
- W/2 -- blocks are encircled, larger than the predicted unit, but smaller than W.
- U - the predicted unit is encircled.
- U/2 - smaller groups than U, or single marks are encircled

The sum of the numbers in the four scoring categories then totalled seventeen, that is, the number of individual test items.

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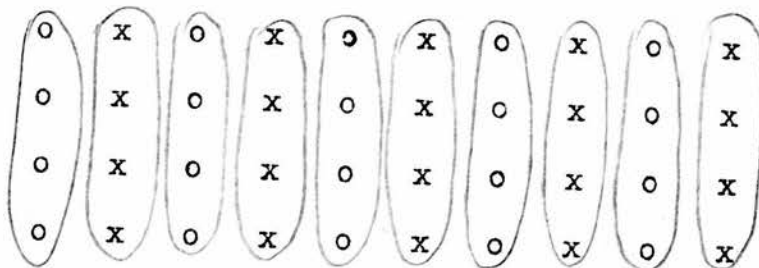
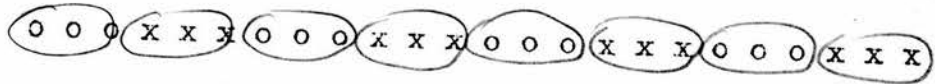
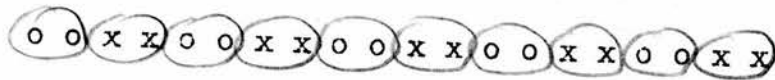
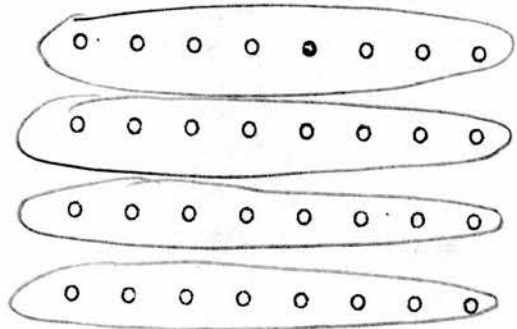
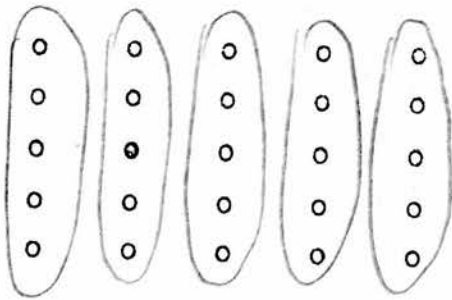
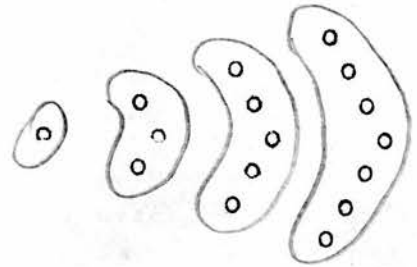
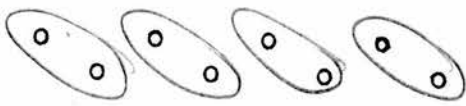
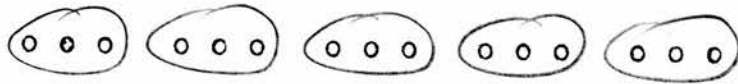
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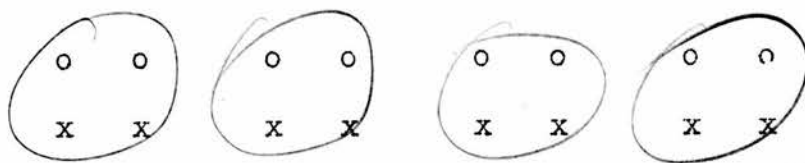
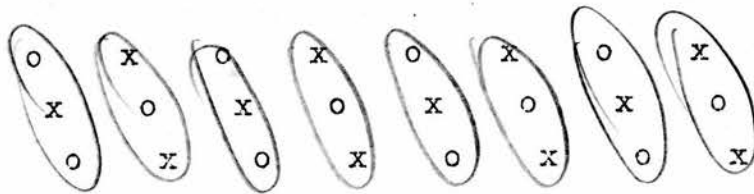
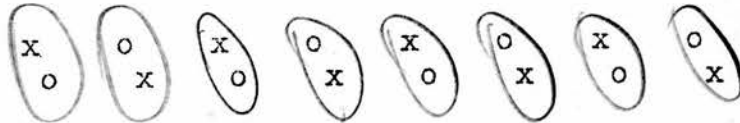
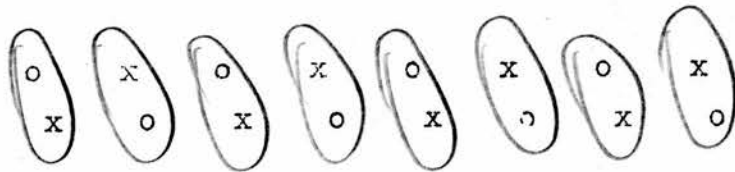
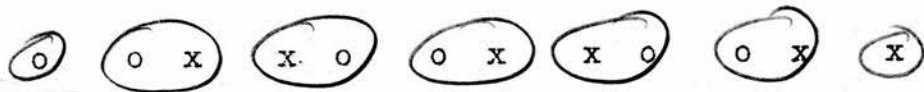
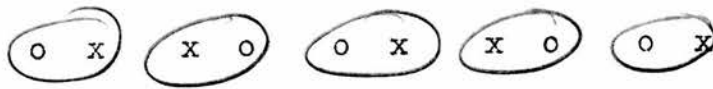
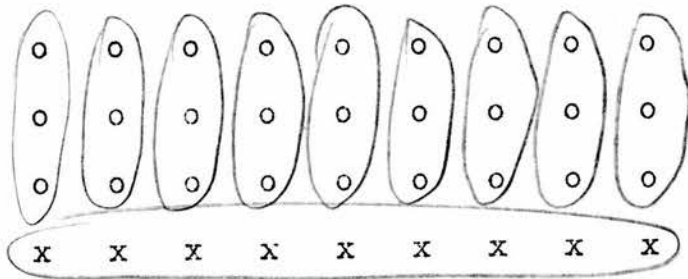
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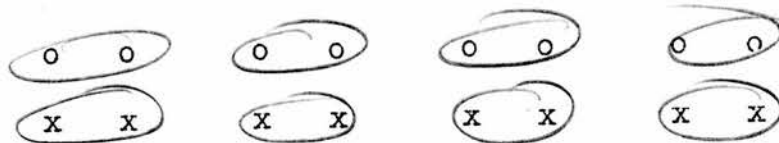
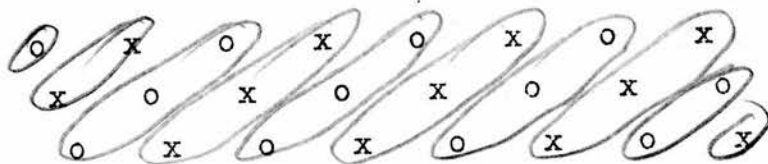
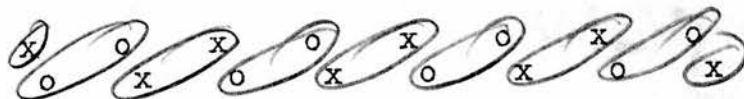
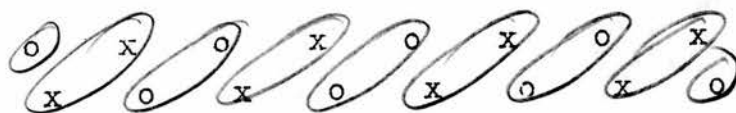
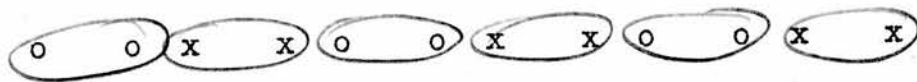
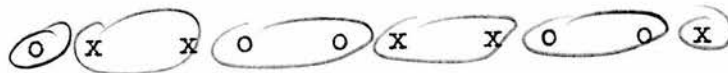
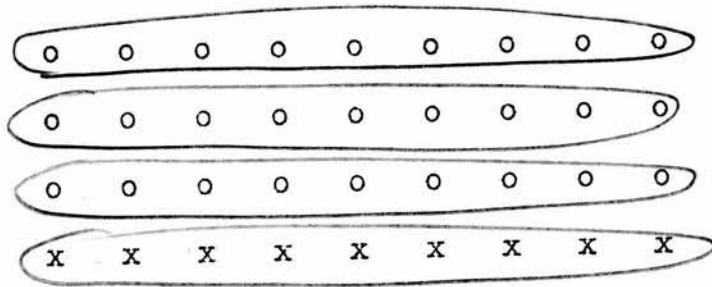
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(iii) ResultsTable 5:9 Mean 'W' and 'U/2' Responses:

<u>Sample</u>	<u>W</u>		<u>U/2</u>	
	<u>Mean</u>	<u>S.D.</u>	<u>Mean</u>	<u>S.D.</u>
Edinburgh	4.10	3.7	0.38	0.9
Inverkeilor	3.05	3.4	0.39	0.9
Mayola	1.80	2.4	1.03	1.6
Pond Inlet	1.27	2.0	1.59	2.0
Frobisher Bay	1.19	2.1	1.42	1.4
Pt.Loko	0.77	1.1	2.84	2.7

Test of hypothesis 2: In a test of perceptual units, the Eskimo will tend to see smaller units than the Temne. In terms of the scoring categories, the hypothesis predicts:

- a) higher W scores for the Temne than the Eskimo, and
- b) higher U/2 scores for the Eskimo than the Temne.

Traditional samples:

	<u>t</u>	<u>p/</u>
a) Mayola - Pond Inlet	1.68	.05
b) Mayola - Pond Inlet	2.11	.05

Transitional samples:

a) Pt.Loko - Frobisher Bay	-1.02	NS
b) Pt.Loko - Frobisher Bay	-2.63	.01

(iv) Discussion

Neither form of the hypothesis is confirmed. In the traditional samples, there is a trend toward the hypothesis (both significant at the .05 level), but in the transitional communities, this trend is strongly reversed. It would thus appear that the Eskimo as a whole do not see smaller groups of data than the Temne, although the prediction was verified for those living traditional lives. But neither can it be said that different cultural groups experience identical groupings. On both scores, the Scots are well-removed from the Temne and Eskimo trends. Furthermore, an examination of mean U responses suggests that Wertheimer's

predicted units are not 'normal' even for the Scottish subjects.

Table 5:10 Mean and Percent 'U' Responses:

<u>Sample</u>	<u>Mean</u>	<u>% of total responses</u>
Scots	10.8	63.8 %
Temne	12.9	76.0
Eskimo	13.0	76.6

If these Laws are really Laws of perceptual organization, then more than three-quarters of the responses might reasonably be expected to follow them.

The relatively global approach to the test displayed by both Scottish samples is difficult to account for. This combination of very high W scores and very low U/2 scores might be indicative of a relaxed approach to a relatively easy test which was administered between the more difficult Matrices and Shapes tests. With the Temne and Eskimo samples, the relative simplicity of the task would not be as readily apparent.

Witkin et al (1962) have suggested that field-dependence is associated with the traditional 'global attitude' in perceptual theory, and field-independence with the 'analytic attitude'. An examination of W and U/2 score correlations with Kohs scores produces no significant trend for W (global) correlations, but a consistently negative relationship (except in Mayola) for U/2 (analytic) correlations. Table 5:11 lists these correlations.

Table 5:11 'W' and 'U/2' Correlations with Kohs Scores:

<u>Sample</u>	<u>r W</u>	<u>r U/2</u>
Inverkeilor	-.17	-.32
Edinburgh	+.11	-.20
Pt. Loke	+.14	-.13
Mayola	0	+.11
Frobisher Bay	-.26	-.27
Pond Inlet	+.05	-.34

But, on the basis of Witkin's suggestion, we should expect negative correlations between W and Kohs Blocks scores, and positive correlations between

U/2 and Kohs Blocks scores. This difficulty may be resolved by examining the basis of Witkin's concepts. It has already been noted that field-independence is considered by these authors to represent a higher level of perceptual development in terms of differentiation and integration. On the present test, it is readily apparent that a high number of W scores might be produced by individuals at opposite ends of Witkin's continuum: those who are poorly developed perceptually (not yet differentiated), and those who are highly developed perceptually (highly integrated). It is similarly apparent that a high number of U/2 scores might be produced by individuals who are not perceptually developed to the point of integration, and by individuals who are frequently required to attend to small bits of data. Thus the test, as it was used in the field, potentially did not discriminate between perceptually undeveloped individuals and those who habitually attend to minute detail.

A small study was therefore made of a group of Edinburgh school children, aged five to nine, (ten males and ten females) to see if subjects low in perceptual development would produce a low number of W responses, and a high number of U/2 responses. Table 5:12 shows that this, indeed, is the case.

Table 5:12 'W' and 'U/2' Responses for Edinburgh Children and Main Sample:

<u>Sample</u>	<u>N</u>	<u>W</u>		<u>U/2</u>	
		<u>Mean</u>	<u>S.D.</u>	<u>Mean</u>	<u>S.D.</u>
Edinburgh School Children (aged 5-9)	20	0.90	1.1	1.65	1.4
Edinburgh Main Sample (aged 10-40+)	60	4.10	3.7	0.38	0.9

It is therefore considered possible that the present test results have been affected by levels of perceptual development, and that the test, as it was used in the field, might not have adequately discriminated between perceptually undeveloped individuals and those who habitually attend to minute detail.

3) Spatial Skills

a) Introduction

To examine the spatial skills of the Temne and the Eskimo, four standard tests of spatial ability were included in the battery. Since it was anticipated that marked differences would exist between the Temne and the Eskimo, tests had to be selected which would be able to discriminate fine degrees of ability at both ends of the scale. Four tests were used, rather than a single test, partly to ensure reliability of measurement, and partly to gauge their relative usefulness in a cross-cultural setting. Since each of the four tests underwent some modification for use with non-literate samples, full descriptions of the tests, as used in the field, appear in the following section.

b) Test Descriptions

(i) Kohs Blocks

The original seventeen design test was used in order that fine gradations of ability might be measured. Shorter versions usually leave out some of the easier designs, and hence cannot discriminate lower levels of functioning as well as the full test can. The trial design was demonstrated, copied by the subject, and demonstrated again if necessary. Design number one was also demonstrated where comprehension of the task was slow. Standard instructions were used, but the time limits on some designs were extended as follows:

Table 5:13 Kohs Blocks Time Limits:

<u>Design no.</u>	<u>Original Time</u>	<u>Modified Time</u>	<u>Design no.</u>	<u>Original Time</u>	<u>Modified Time</u>
Practice	untimed	untimed	9	2.0 min.	3.0 min.
1	1.5 min.	2.0 min.	10	3.0	3.5
2	1.5	2.0	11	3.5	unchanged
3	1.5	2.0	12	3.5	"
4	2.0	2.5	13	3.5	"
5	2.0	2.5	14	3.5	"
6	2.0	2.5	15	4.0	"
7	2.0	3.0	16	4.0	"
8	2.0	3.0	17	4.0	"

The time limits were increased to make the test more fair for those subjects with no experience of manipulating blocks, and with no value on speed in performing a task. In some cases, (mostly among the Temme) the blocks were assembled correctly, but were rotated ninety or ~~one-hundred-eighty~~ degrees to the design; these were scored as if correct. The maximum score attainable was one-hundred thirty-one.

(ii) Witkin Embedded Figures Test (EFT)

Witkin's original test of twenty-four designs (Witkin, 1950), each with a five minute time limit, was considered too long for inclusion in the battery. Jackson (1956) has selected twelve of these (with a three minute time limit for each design) as a short form, but this was considered too long as well. Six of Jackson's twelve designs were therefore selected for use in the present study, and two others were selected for use as demonstration designs.

Table 5:14 EFT Specifications:

<u>Sequence</u>	<u>Design no.</u>	<u>Time Limit</u>	<u>Use</u>
1	P-1	untimed	practice
2	F-1	"	"
3	G-1	3 min.	test
4	D-2	"	"
5	A-3	"	"
6	C-1	"	"
7	D-1	"	"
8	C-2	"	"

A shortened form of the standard verbal instructions was used, but much demonstration and pointing was added. The time taken to find the embedded figure (maximum = 6 tests X 180 seconds = 1080 seconds) was subtracted from 1080 to yield a score comparable in direction to the other three spatial tests.

(iii) Raven Matrices

All subjects were administered the Coloured Progressive Matrices, sets A, Ab, and B (1956 order, Raven, 1963). Those who scored at least four out of five

correct on items B8 to B12 were also administered the Standard Progressive Matrices, sets C, D, and E (Raven, 1960). The test was not timed and care was taken to ensure that all subjects looked at all six choices before pointing to their answer with a brush. Standard instructions were used, and the first four items in series A were discussed after subjects had made their choice. However, when the choice was incorrect, it was scored as such. The maximum score attainable on the first series was thirty-six. Series C, D, and E results will be used for comparative purposes only.

(iv) Morrisby Shapes

The Shapes Test (Morrisby, 1955) is part of the Differential Test Battery, and requires the subject to, "mentally 'manipulate' spatial figures", (see examples, page 62).

Each item consists of three identical quadrilateral figures printed in solid green, but with a small circular blank spot within the figure. Two of these figures show the same side, but the remaining one has been turned over, so that it is a mirror image of the others. All three figures are in different degrees of rotational orientation with each other. The subject is required to determine which of the three figures has been turned over ... this item type seems to discourage, or at least not to encourage, a subject to use learned methods of geometry in the solution of the problems, but requires him to see the figures as perceptual forms and to manipulate them as wholes.

The test contains sixty of these items, and has a ten minute time limit. In administering the test, great care had to be taken with instructions and demonstrations. The original test contains a printed trial series using the letter 'P', and a second trial series using quadrilaterals similar to the actual test. In the present study, this first trial series was replaced by plastic cut-outs of the house-shape familiar to each culture, (see page 63 for drawings of these shapes). Thus the subject could actually manipulate the pieces of plastic and learn the principle involved. A second series of trial problems was also

Shapes Test: Examples

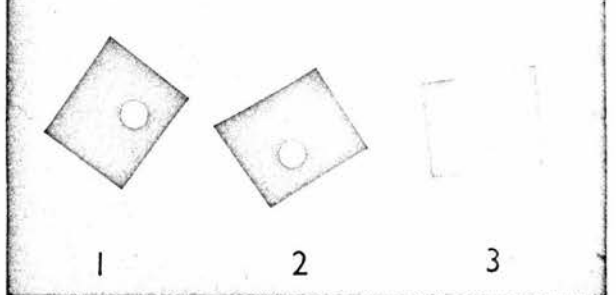
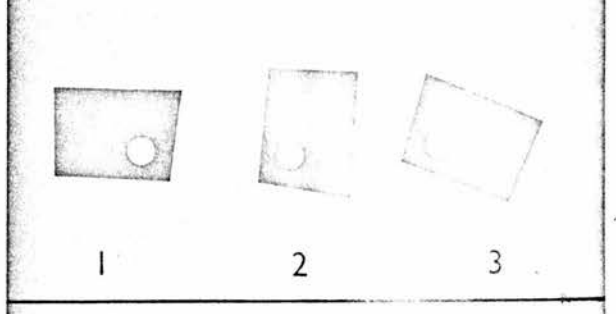
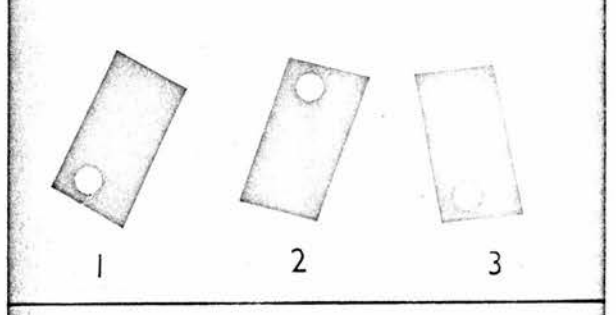
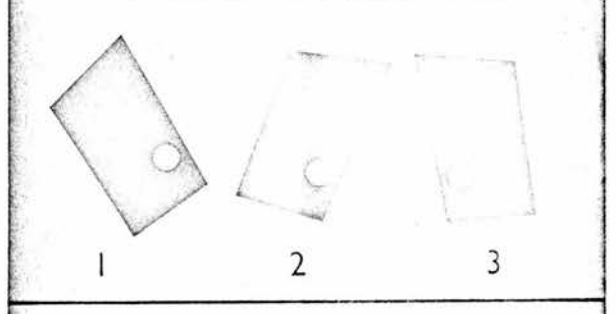
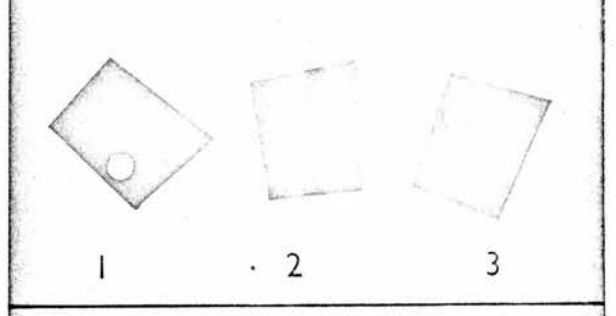
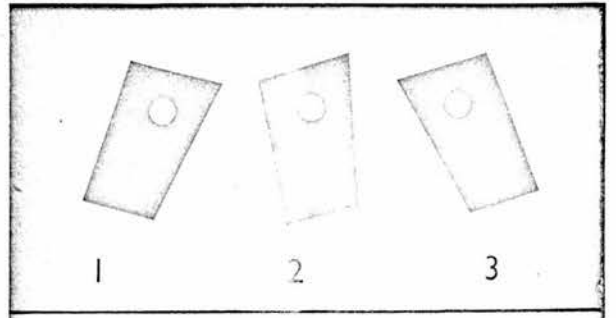
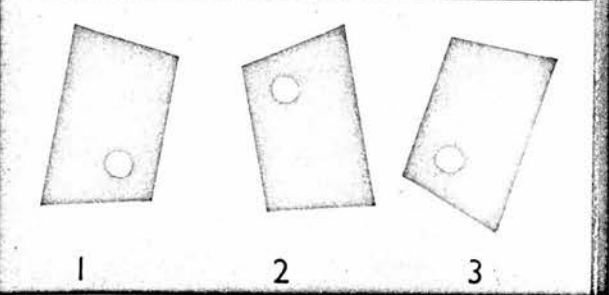
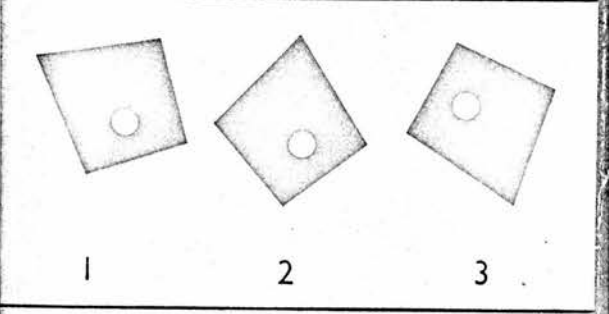
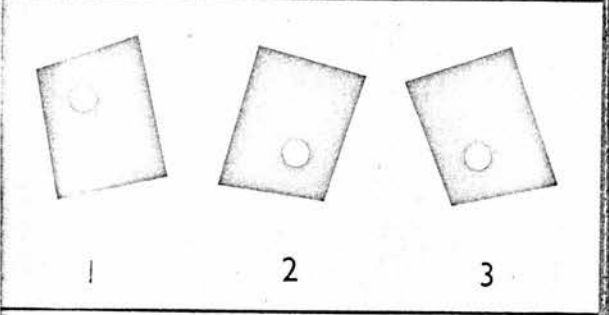
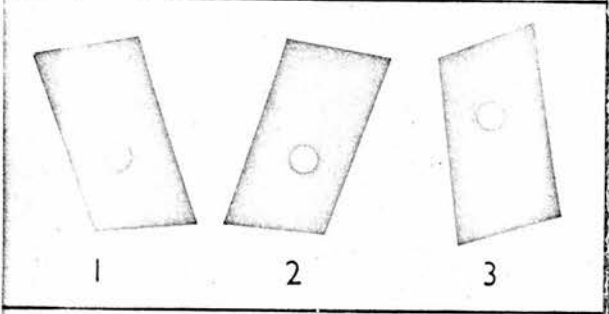
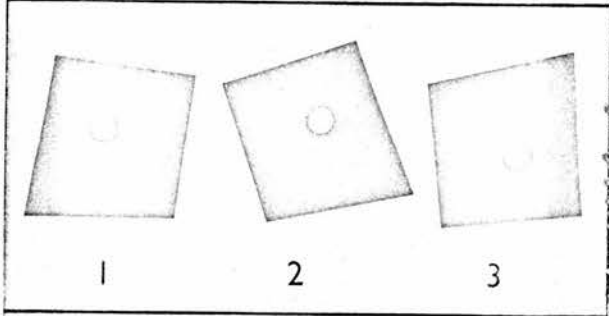
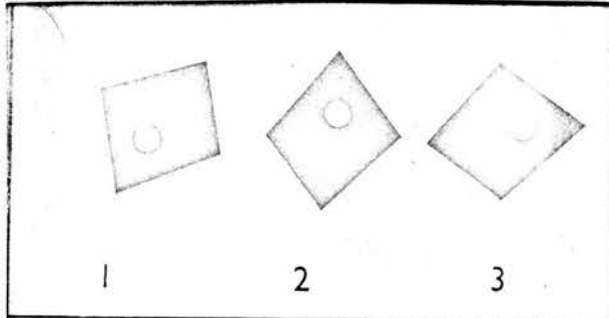
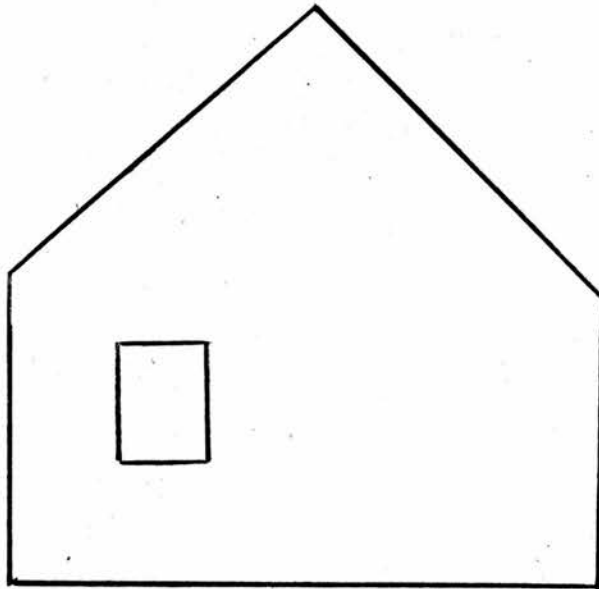
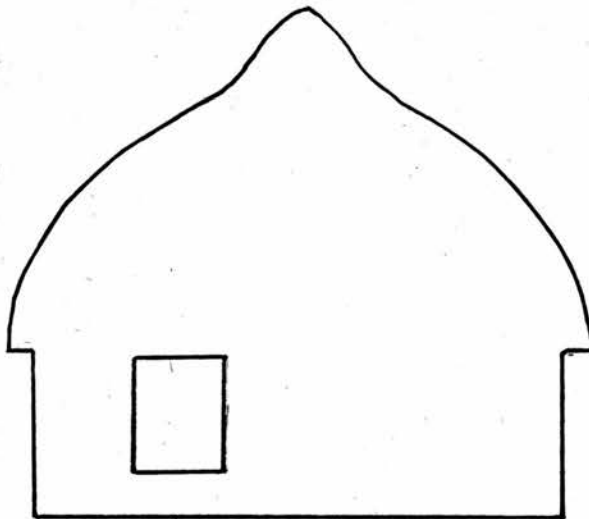


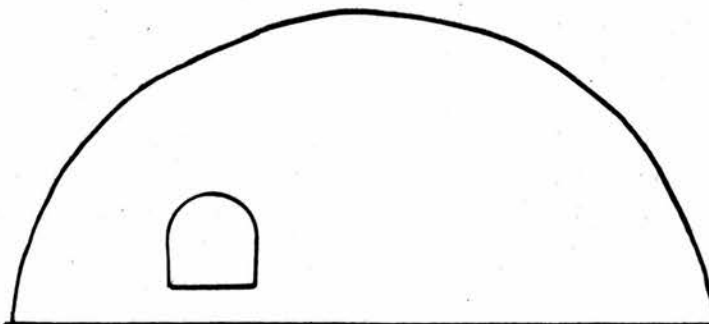
Figure 5:1 House Profiles used in Shapes Test: Plastic Cut-outs.



Scottish



Temne



Eskimo

added based on these house shapes in gradual transition to quadrilaterals, (see pages 65, 66, and 67). These were then replaced by a set of green aluminium shapes identical to the first item in Morrisby's second trial series. The subjects could then manipulate the more abstract green quadrilaterals and become familiar with the principle applied to the actual test. The pieces of aluminium were then taken away, and subjects attempted to solve the printed items in Morrisby's second trial series. If these were done satisfactorily (two out of four correct), the test was administered. If the subject could not do them, the testing was discontinued.

Morrisby scored his original test by subtracting a correction factor from the total number correct. This was done to eliminate, not only the effects of guessing, but also the effects of an 'inferior' method of solving the item. In the present study it was considered that, although incorrect, an 'inferior' method was better than true guessing, and if eliminated, might unfairly penalize the Temne and Eskimo subjects. Hence in scoring the test, the usual correction for guessing was used (correct - $\frac{1}{2}$ wrong), and the score used for calculations was the raw score rather than a scale score suggested by Morrisby. The maximum score attainable was sixty.

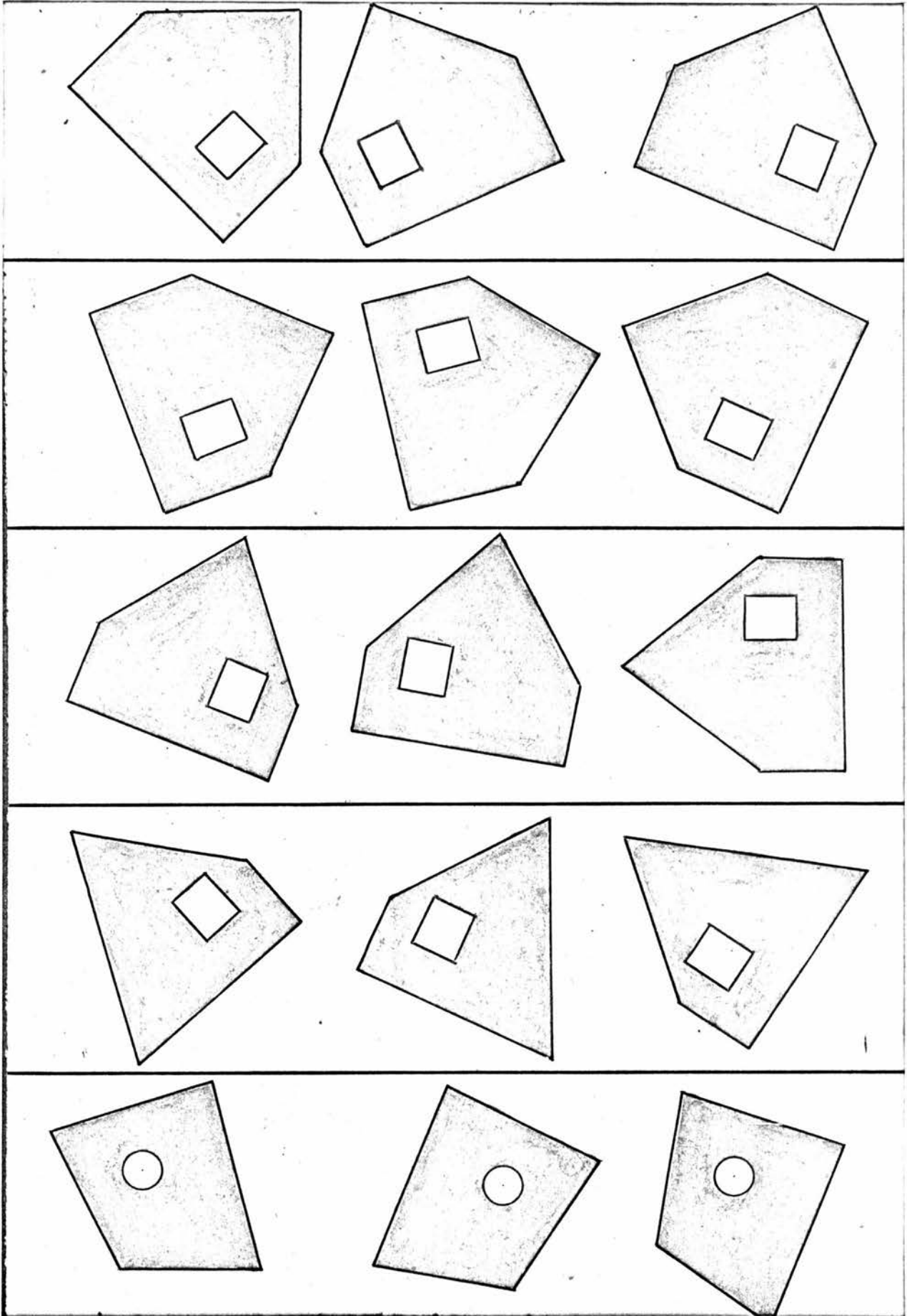
c) Results

Intercorrelations

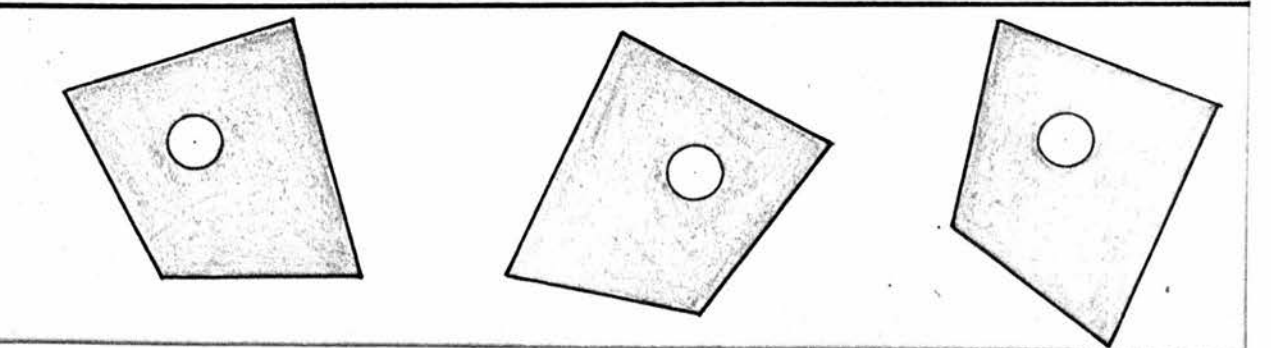
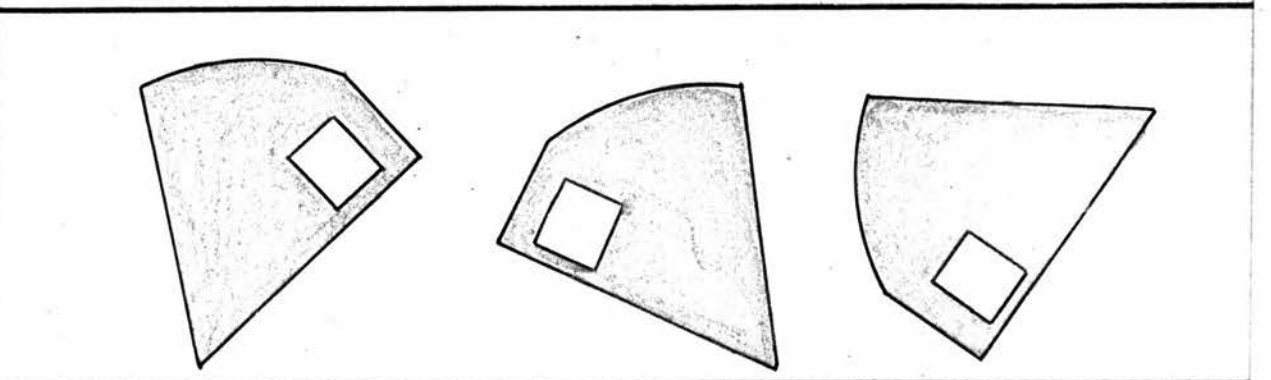
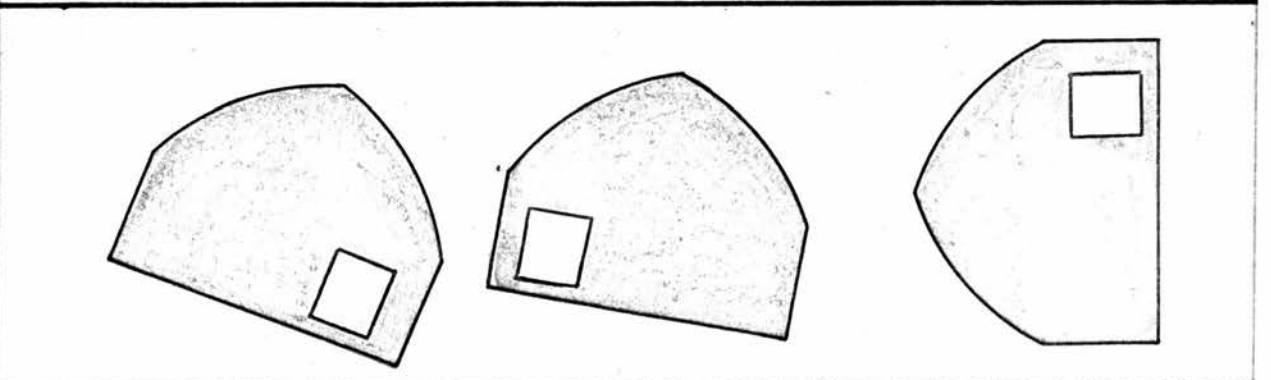
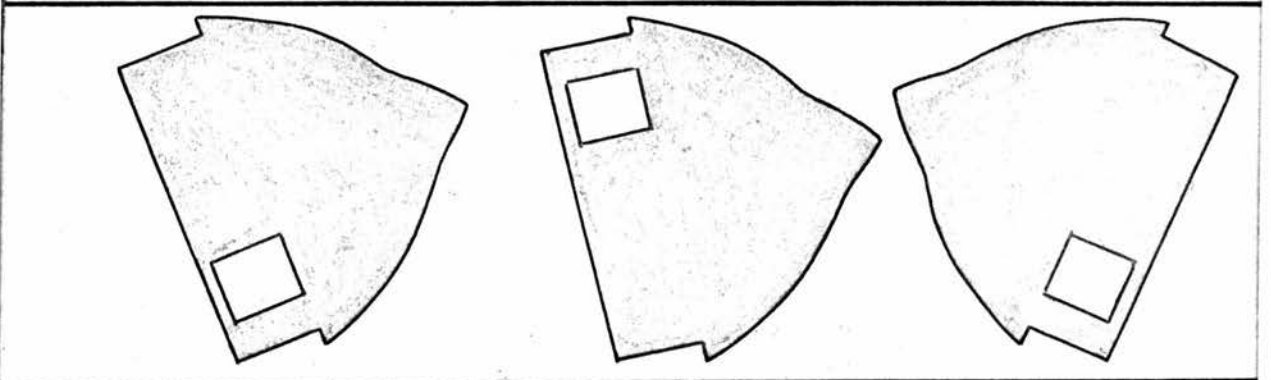
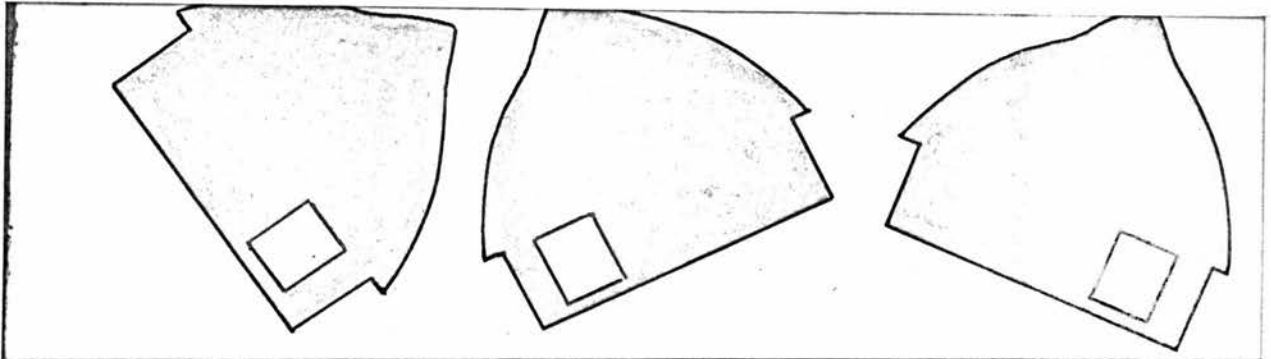
The four spatial tests are reported together because they are significantly intercorrelated in all six samples, with the exception of Matrices with EFT in both Temne samples. Shapes scores did not differ sufficiently from zero in the Temne samples to yield valid correlations; the low EFT correlations in the Temne samples may also reflect the high number of subjects who scored zero.

Table 5:15 shows the intercorrelations between the four tests in the six samples.

Scottish Training Series



Temne Training Series



Eskimo Training Series

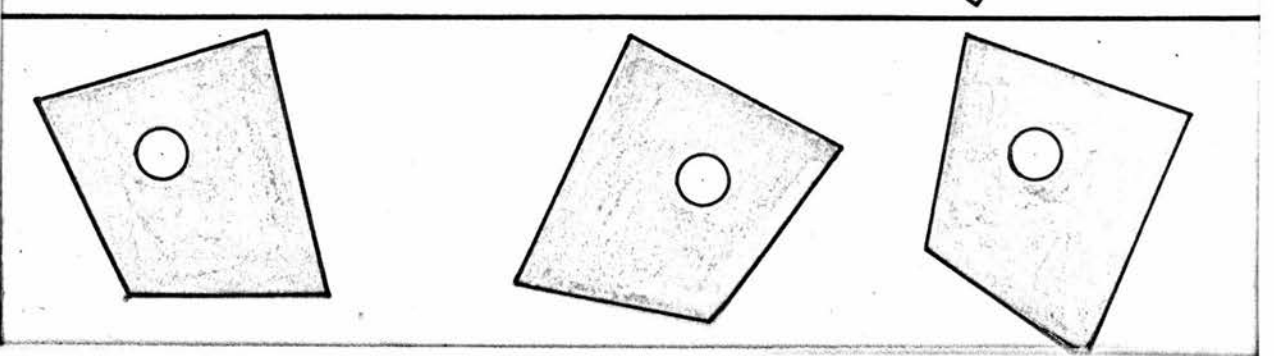
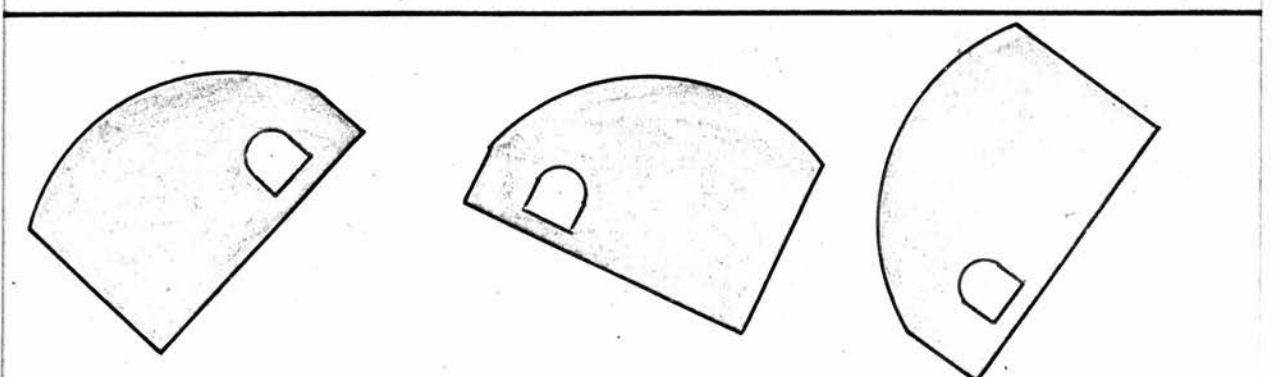
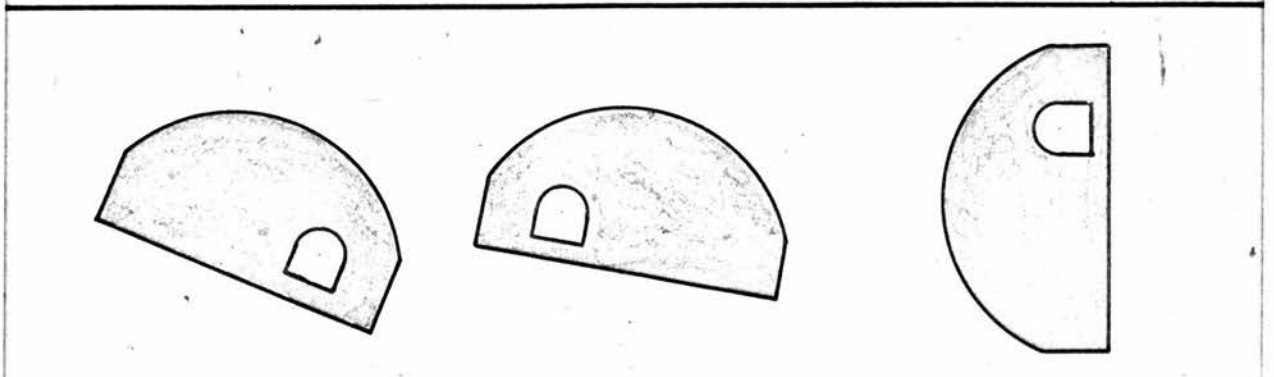
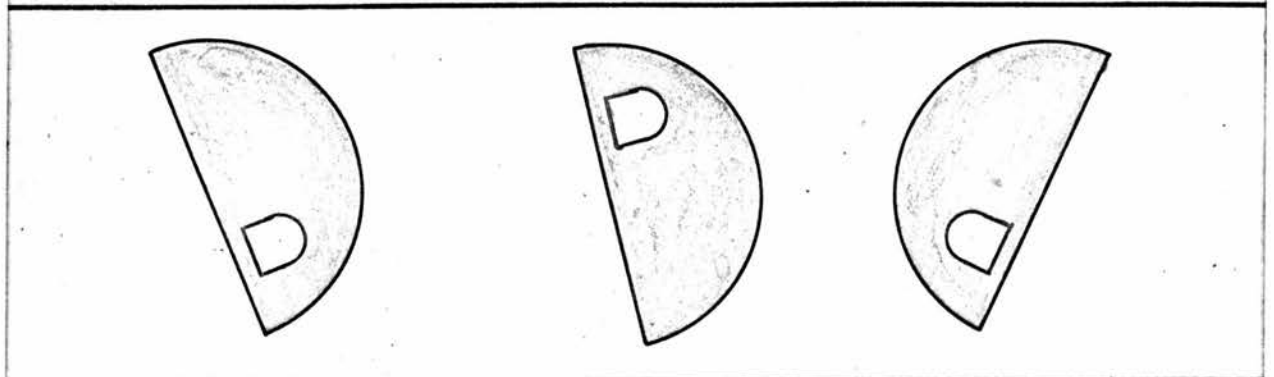
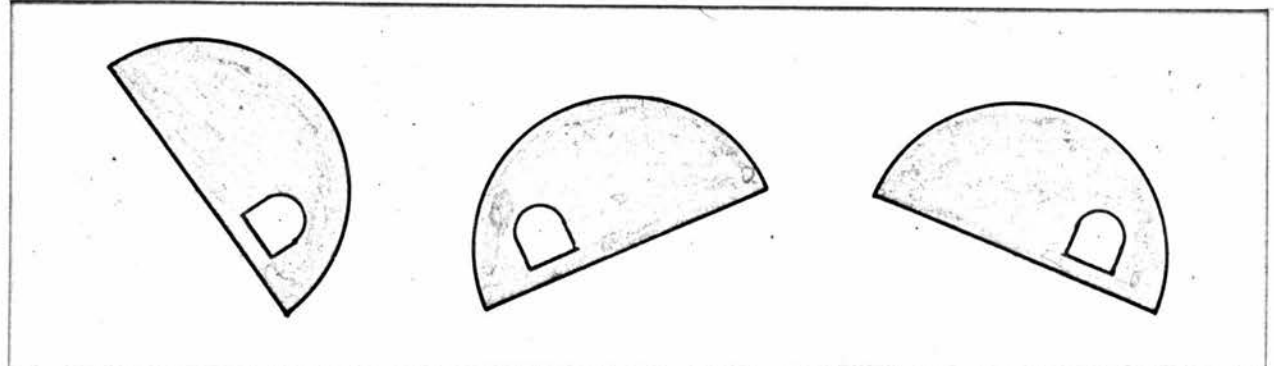


Table 5:15 Spatial Test Intercorrelations in the Six Samples:

	<u>Kohs</u>	<u>EFT</u>	<u>Shapes</u>
<u>Inverkeilor</u>			
EFT	.84		
Shapes	.66	.51	
Matrices	.81	.70	.67
<u>Edinburgh</u>			
EFT	.72		
Shapes	.69	.54	
Matrices	.70	.62	.63
<u>Pt. Loko</u>			
EFT	.59		
Shapes	-	-	
Matrices	.58	.23 NS	
<u>Mayola</u>			
EFT	.45		
Shapes	-	-	
Matrices	.37	.15 NS	
<u>Frobisher Bay</u>			
EFT	.66		
Shapes	.57	.52	
Matrices	.62	.54	.38 @
<u>Pond Inlet</u>			
EFT	.68		
Shapes	.64	.48	
Matrices	.60	.51	.45

Note:

Shapes correlations in the Temne samples not valid.

p / .01 are unmarked.

p / .05 are marked @

NS are marked NS

The results of the four spatial tests in the six samples are shown in table 5:16.

Table 5.16 Means of Four Spatial Tests in the Six Samples:

Kohs Blocks

<u>Sample</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>N Scoring Zero</u>
Inverkeilor	90.2	33.2	62	0
Edinburgh	90.3	31.6	60	0
Pt.Loko	15.6	14.6	32	2
Mayola	6.4	6.9	90	11
Frobisher Bay	89.9	28.2	31	0
Pond Inlet	78.6	30.6	91	0

EFT

<u>Sample</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>N Scoring Zero</u>
Inverkeilor	744.3	237.7	62	1
Edinburgh	813.5	208.8	60	0
Pt.Loko	148.9	234.0	32	19
Mayola	27.7	92.4	90	80
Frobisher Bay	795.8	148.1	31	0
Pond Inlet	737.1	213.7	91	0

Shapes

<u>Sample</u>	<u>Mean</u>	<u>S.D.</u>	<u>N Able To Do</u>	<u>N Not Able To Do</u>
Inverkeilor	16.4	14.2	61	1
Edinburgh	14.2	14.3	60	0
Pt.Loko	-0.2	5.2	23	9
Mayola	0.9	6.3	45	45
Frobisher Bay	22.0	12.9	31	0
Pond Inlet	15.1	10.2	90	1

Matrices

<u>Sample</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>N Scoring Zero</u>
Inverkeilor	29.5	4.9	62	0
Edinburgh	31.0	4.2	60	0
Pt.Loko	13.9	3.8	30	0
Mayola	13.1	2.4	89	0
Frobisher Bay	28.9	3.1	31	0
Pond Inlet	26.8	3.2	91	0

Test of hypothesis 1: The Eskimo will score significantly higher than the Temne, for comparable degrees of westernization.

<u>Kohs Blocks</u>	t	p /
<u>Traditional samples:</u> Pond Inlet - Mayola	21.9	.01
<u>Transitional samples:</u> Frobisher Bay - Pt.Loko	13.1	.01

EFT

<u>Traditional samples:</u> Pond Inlet - Mayola	29.1	.01
<u>Transitional samples:</u> Frobisher Bay - Pt.Loko	13.1	.01

Shapes

<u>Traditional samples:</u> Pond Inlet - Mayola	9.82	.01
<u>Transitional samples:</u> Frobisher Bay - Pt.Loko	8.61	.01

Matrices

<u>Traditional samples:</u> Pond Inlet - Mayola	33.3	.01
<u>Transitional samples:</u> Frobisher Bay - Pt.Loko	16.9	.01

Test of hypothesis 2: The Eskimo scores will more closely approximate the Scottish scores than the scores of the Temne samples of equivalent westernization. Note:

t test based on the difference $(M_e - \frac{M_s + M_t}{2})$.

<u>Kohs Blocks</u>	t	p /
<u>Traditional samples:</u> Pond Inlet - Mayola	6.89	.01
<u>Transitional samples:</u> Frobisher Bay - Pt.Loko	6.05	.01

EFT

<u>Traditional samples:</u> Pond Inlet - Mayola	11.0	.01
<u>Transitional samples:</u> Frobisher Bay - Pt.Loko	7.21	.01

Shapes

<u>Traditional samples:</u> Pond Inlet - Mayola	3.57	.01
<u>Transitional samples:</u> Frobisher Bay - Pt.Loko	5.42	.01

Matrices

<u>Traditional samples:</u> Pond Inlet - Mayola	9.48	.01
<u>Transitional samples:</u> Frobisher Bay - Pt.Loko	7.68	.01

All tests of both hypotheses are significant beyond the .01 level of confidence. Not only do the Eskimo exceed the Temne scores, but they much more closely approximate the scores of educated, literate and technical Scots, than those of the Temne who are at a comparable level of westernization.

Furthermore, an examination of Eskimo scores in relation to Scottish scores shows that the Eskimo have exceeded the Scots in one case, matched them in four, and were lower in three, as the following table shows:

Table 5:17 Tests Between Eskimo and Scottish Scores on the Four Spatial Tests:

<u>Kohs Blocks</u>		<u>t</u>	<u>p /</u>
	Inverkeilor - Pond Inlet	2.19	.05
	Edinburgh - Frobisher Bay	0.06	NS
<u>EFT</u>			
	Inverkeilor - Pond Inlet	0.19	NS
	Edinburgh - Frobisher Bay	0.46	NS
<u>Shapes</u>			
	Inverkeilor - Pond Inlet	0.61	NS
	Edinburgh - Frobisher Bay	-2.63	.01
<u>Matrices</u>			
	Inverkeilor - Pond Inlet	3.32	.01
	Edinburgh - Frobisher Bay	2.71	.01

The implications of these results will be examined in the Discussion.

Test of hypothesis 3: The Temne and Eskimo transitional, more westernized samples will score higher than the respective traditional samples.

<u>Test</u>	<u>TEMNE</u>		<u>ESKIMO</u>	
	<u>Pt. Loko - Mayola</u>		<u>Frobisher Bay - Pond Inlet</u>	
	<u>t</u>	<u>p /</u>	<u>t</u>	<u>p /</u>
Kohs Blocks	3.43	.01	1.89	.05
EFT	2.85	.01	1.69	.05
Shapes	-0.76	NS	2.68	.01
Matrices	3.45	.01	3.24	.01

In each case, with the exception of the Shapes scores in the Temne samples, the transitional, more westernized samples have produced significantly higher scores than their traditional counterparts.

Test of hypothesis 4: Within the six samples, spatial test scores will be significantly related to level of education.

Table 5:18 Correlations Between Education and Spatial Test Scores in Six Samples:

<u>Sample</u>	<u>Kohs</u>	<u>EFT</u>	<u>Shapes</u>	<u>Matrices</u>
Inverkeilor	.53	.38	.40	.47
Edinburgh	.51	.43	.44	.47
Pt. Loko	.57	.62	-	.56
Mayola	.15 $\#$.43	-	.04 $\#$
Frobisher Bay	.48	.38 \oplus	.45	.53
Pond Inlet	-.25	-.34 $\#$	-.40	-.14 $\#$

Note:

Shapes correlations in the Temne samples are not valid.

p \angle .01 are unmarked.

p \angle .05 are marked \oplus

NS are marked $\#$

In all samples but one, there is a consistent positive relationship between the number of years of education and spatial test performance. Even Mayola, where the only education is in the Arabic school, tends toward this positive relationship. The interesting exception of Pond Inlet underlines the fact that it is only the youngest (and hence those who are less perceptually developed) subjects who have had any schooling at all.

Socialization Differences

During the interview preceding the test battery, each subject was asked, "When you were young, did your parents treat you very strict, fairly strict, or not so strict?" (see questionnaire, appendix 4). The results of this question are shown in table 5:19.

Table 5:19 Self-ratings on Severity of Discipline in the Six Samples - N:

<u>Sample</u>	<u>Total N</u>	<u>NOT SO STRICT</u>			<u>FAIRLY STRICT</u>			<u>VERY STRICT</u>		
		<u>Male</u>	<u>Fem.</u>	<u>Tot.</u>	<u>Male</u>	<u>Fem.</u>	<u>Tot.</u>	<u>Male</u>	<u>Fem.</u>	<u>Tot.</u>
Inverkeilor	62	7	14	21	13	16	29	7	5	12
Edinburgh	60	8	2	10	20	25	45	3	2	5
Pt. Loko	32	5	1	6	0	0	0	15	11	26
Mayola	90	1	0	1	0	0	0	44	45	89
Frobisher Bay	31	13	14	27	3	1	4	0	0	0
Pond Inlet	31	42	44	86	4	0	4	0	1	1
Kotia (Mende)	30	4	5	9	4	7	11	7	3	10

It is apparent that the Temne and the Eskimo subjects answered the question in an 'all or none' fashion; neither Temne sample produced any 'fairly strict' replies, and there was only one 'very strict' self-rating among the Eskimo. The Scottish replies, on the other hand, are more evenly distributed, although the majority replied 'fairly strict'. In no sample is there a strong indication of sex differences in the severity of discipline. Table 5:20 shows the spatial test scores by category of discipline.

Table 5:20 Spatial Test Scores by 'Severity of Discipline' Categories:

	N	<u>NOT SO STRICT</u>		N	<u>FAIRLY STRICT</u>		N	<u>VERY STRICT</u>	
		<u>Mean</u>	<u>S.D.</u>		<u>Mean</u>	<u>S.D.</u>		<u>Mean</u>	<u>S.D.</u>
<u>Kohs Blocks</u>									
Inverkeilor	21	90.1	38.7	29	97.8	23.9	12	72.0	37.3
Edinburgh	10	108.7	27.3	45	87.6	31.8	5	78.2	28.9
Pt.Loko	6	34.7	20.4	0	-	-	26	11.2	8.5
Mayola	1	27.	0	0	-	-	89	5.9	6.2
Frobisher Bay	27	89.2	27.3	4	94.5	38.2	0	-	-
Pond Inlet	86	79.6	30.9	4	54.0	10.1	1	93.	0
<u>EFT</u>									
Inverkeilor	21	765.7	197.7	29	785.8	214.6	12	606.9	314.8
Edinburgh	10	930.2	139.0	45	791.3	218.9	5	779.6	177.0
Pt.Loko	6	378.8	351.5	0	-	-	26	95.8	166.0
Mayola	1	396.	0	0	-	-	89	19.8	76.8
Frobisher Bay	27	796.9	145.3	4	793.7	190.2	0	-	-
Pond Inlet	86	739.2	216.4	4	634.5	113.7	1	958.	0
<u>Shapes</u>									
Inverkeilor	21	13.5	16.6	29	19.0	13.2	11	15.3	11.6
Edinburgh	10	23.5	17.9	45	12.8	13.2	5	8.1	10.9
Pt.Loko	6	1.4	4.9	0	-	-	17	-0.83	5.3
Mayola	1	1.5	0	0	-	-	44	0.90	6.4
Frobisher Bay	27	23.1	12.9	4	14.5	11.2	0	-	-
Pond Inlet	85	15.5	10.0	4	5.0	8.3	1	28.5	0
<u>Matrices</u>									
Inverkeilor	21	29.2	5.6	29	30.3	4.0	11	27.7	5.6
Edinburgh	10	33.4	2.4	45	30.7	4.4	5	28.6	3.3
Pt.Loko	5	15.6	4.3	0	-	-	25	13.6	3.8
Mayola	1	17.	0	0	-	-	88	13.0	2.3
Frobisher Bay	27	28.7	3.0	4	30.3	4.1	0	-	-
Pond Inlet	86	26.8	3.3	4	26.8	1.7	1	27.	0

Test of hypothesis 5: Within each sample, those rating themselves as more severely disciplined will score lower than those less severely disciplined.

By eliminating the two scores where N is only one in Mayola and Pond Inlet, it is possible to test this hypothesis by using only two categories of severity: 'more severe', and 'less severe'. In the two Scottish samples, the test will be made in the same way, between the most severe and the least severe categories, ignoring the middle rating.

Table 5:21 Tests of Significance Between Categories of Severity: Spatial Tests:

		<u>MEANS USED FOR t TESTS</u>					
		<u>N</u>	<u>Less Severe</u>	<u>N</u>	<u>More Severe</u>	<u>t</u>	<u>p /</u>
<u>Kohs</u>	Inverkeilor	21	90.1	12	72.2	1.33	NS
	Edinburgh	10	108.7	5	78.2	2.03	.05
	Pt.Loko	6	34.7	26	11.2	2.76	.01
	Mayola	1	-	89	-	-	-
	Frobisher Bay	27	89.2	4	94.5	-0.27	NS
	Pond Inlet	86	79.6	4	54.0	4.27	.01
<u>EFT</u>	Inverkeilor	21	755.7	12	606.9	0.51	NS
	Edinburgh	10	930.2	5	779.6	1.68	NS
	Pt.Loko	6	378.8	26	95.3	1.95	.05
	Mayola	1	-	89	-	-	-
	Frobisher Bay	27	796.9	4	793.7	0.03	NS
	Pond Inlet	86	739.2	4	634.5	1.72	.05
<u>Shapes</u>	Inverkeilor	21	13.5	11	15.3	-0.37	NS
	Edinburgh	10	23.3	5	8.1	2.03	.05
	Pt.Loko	6	1.4	17	-0.83	0.93	NS
	Mayola	1	-	44	-	-	-
	Frobisher Bay	27	23.1	4	14.5	1.41	NS
	Pond Inlet	85	15.5	4	5.0	2.44	.01
<u>Matrices</u>	Inverkeilor	21	29.2	11	27.7	0.76	NS
	Edinburgh	10	33.4	5	28.6	1.63	NS
	Pt.Loko	5	15.6	25	13.6	1.06	NS
	Mayola	1	-	88	-	-	-
	Frobisher Bay	27	28.7	4	30.3	-0.77	NS
	Pond Inlet	86	26.8	4	26.8	0	NS

In sum, the levels of significance are:

	<u>Kohs</u>	<u>EFT</u>	<u>Shapes</u>	<u>Matrices</u>
Inverkeilor	+	+	-	+
Edinburgh	.05	+	.05	+
Pt.Loko	.01	.05	+	+
Mayola	(not valid)			
Frobisher Bay	-	+	+	-
Pond Inlet	.01	.05	.01	0

Out of a possible twenty-four tests, 4 are not valid, 13 are not significant, (10 in the predicted direction, 3 in the opposite direction), 4 are significant at the .05 level, and 3 at the .01 level of confidence.

Test of hypothesis 6: Across the three cultures, those rating themselves as more severely disciplined will score lower on Kohs Blocks than those less severely disciplined.

Table 5:22 Kohs Blocks Scores by Severity of Discipline Across the Three Cultures:

<u>Severity</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>t</u>	<u>p /</u>
Not so strict	151	82.6	34.8	16.98	.01
Fairly strict	82	89.9	29.9		
Very strict	133	16.3	27.0		

The difference between the two extreme categories is highly significant, but contrary to the prediction, those disciplined 'fairly strictly' have scored significantly higher than those disciplined less strictly ($t = 1.68, p / .05$).

d) Discussion

Intercorrelations

The large number of significant intercorrelations among the four spatial tests (table 5:15, page 68), especially when they are used cross-culturally, is, in itself, a significant result. In general, they are the highest for the Scottish samples, as might be expected, and lowest for the Temne samples.

Table 5:25 Mean Spatial Test Intercorrelations for the Six Samples:

<u>Sample</u>	<u>N</u>	<u>Mean r</u>
Inverkeilor	6	.70
Edinburgh	6	.65
Pt.Loko	3	.47
Mayola	3	.32
Frobisher Bay	6	.55
Pond Inlet	6	.56

This general high level of intercorrelation suggests that, even in cultures as diverse as those as the Temne and the Eskimo, these tests designed in Britain and America, are measuring some characteristic fairly consistently. A moderate degree of reliability may therefore be attributed to the tests as used in the present study. It cannot be said with assurance, though, whether this characteristic is purely spatial (Thurstone's, 1944, factor 'A'), or whether general ability ('g') has combined with a group spatial factor (Vernon, 1950) to produce the significant intercorrelations.

Hypothesis 1

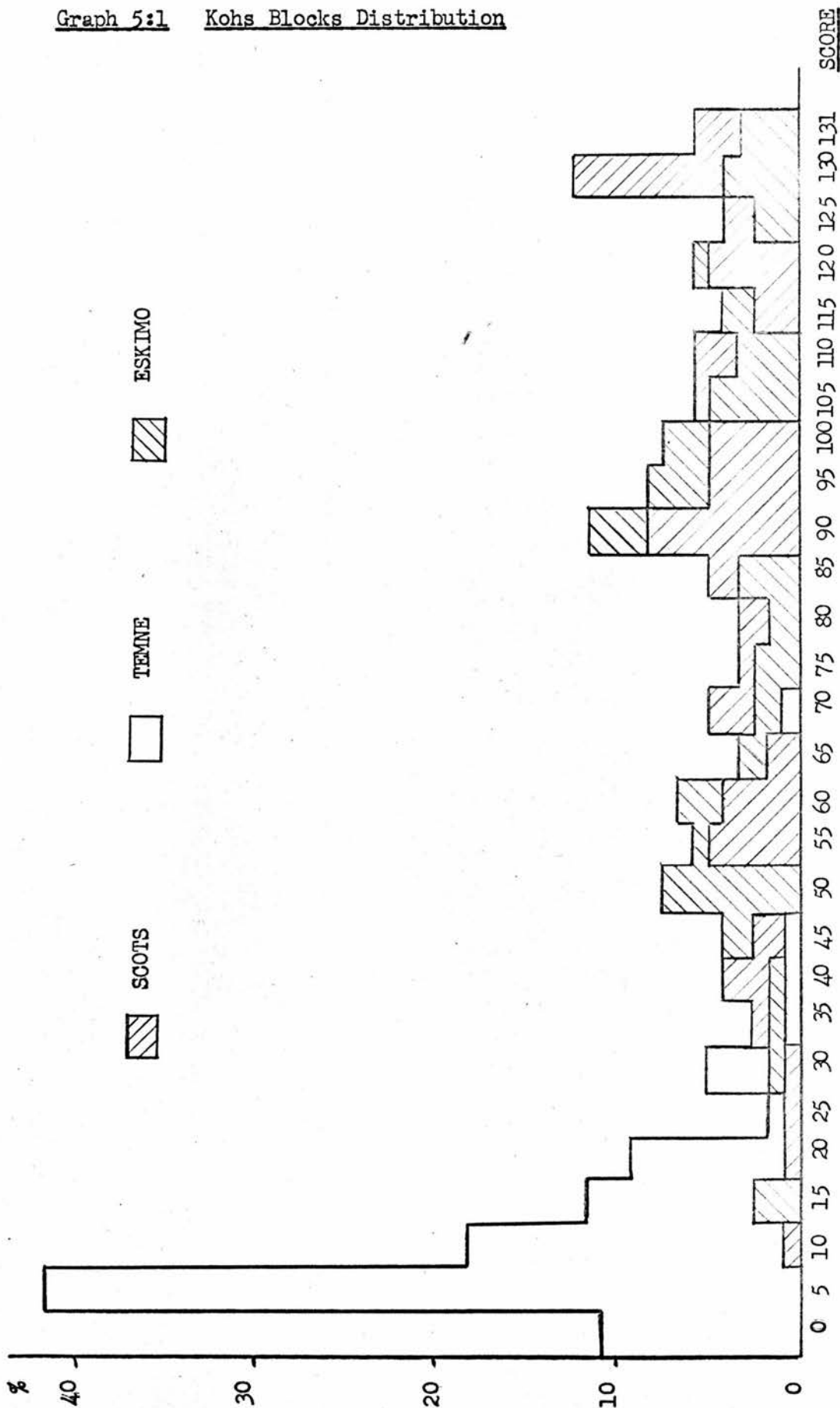
The eight tests of significance which were applied for this hypothesis are really unnecessary; a great gulf exists between Temne and Eskimo spatial ability, so great that the tests seem merely pedantic. Kohs Blocks and Matrices distributions are plotted on graphs 5:1 and 5:2, on pages 77 and 78, to illustrate the minimal degree of overlap between the two societies. A further graph, 5:3, on page 79 plots the scores of the four spatial tests as a percent of the maximum attainable score. It is immediately apparent that the Scots and the Eskimo tend to form a group towards the upper end of the scale, while the Temne scores fall well below them. The relatively poor scores for all samples on the Shapes test (in relation to the maximum attainable) is due the fact that the test was designed, not for administration to the general population, but as a selection test for the engineering trades.

Hypothesis 2

The eight tests of significance of this hypothesis are more revealing. Not only have the Eskimo exceeded Temne spatial scores, but they very nearly matched Scottish performance (table 5:17, page 71). At first glance, this result seems remarkable when the large differences in material and educational opportunities are considered. But it is to be remembered that this result was predicted on the basis of Eskimo alternatives to Scottish opportunity - the gradual development of spatial skills on the land, aided by linguistic, artistic and socialization practices.

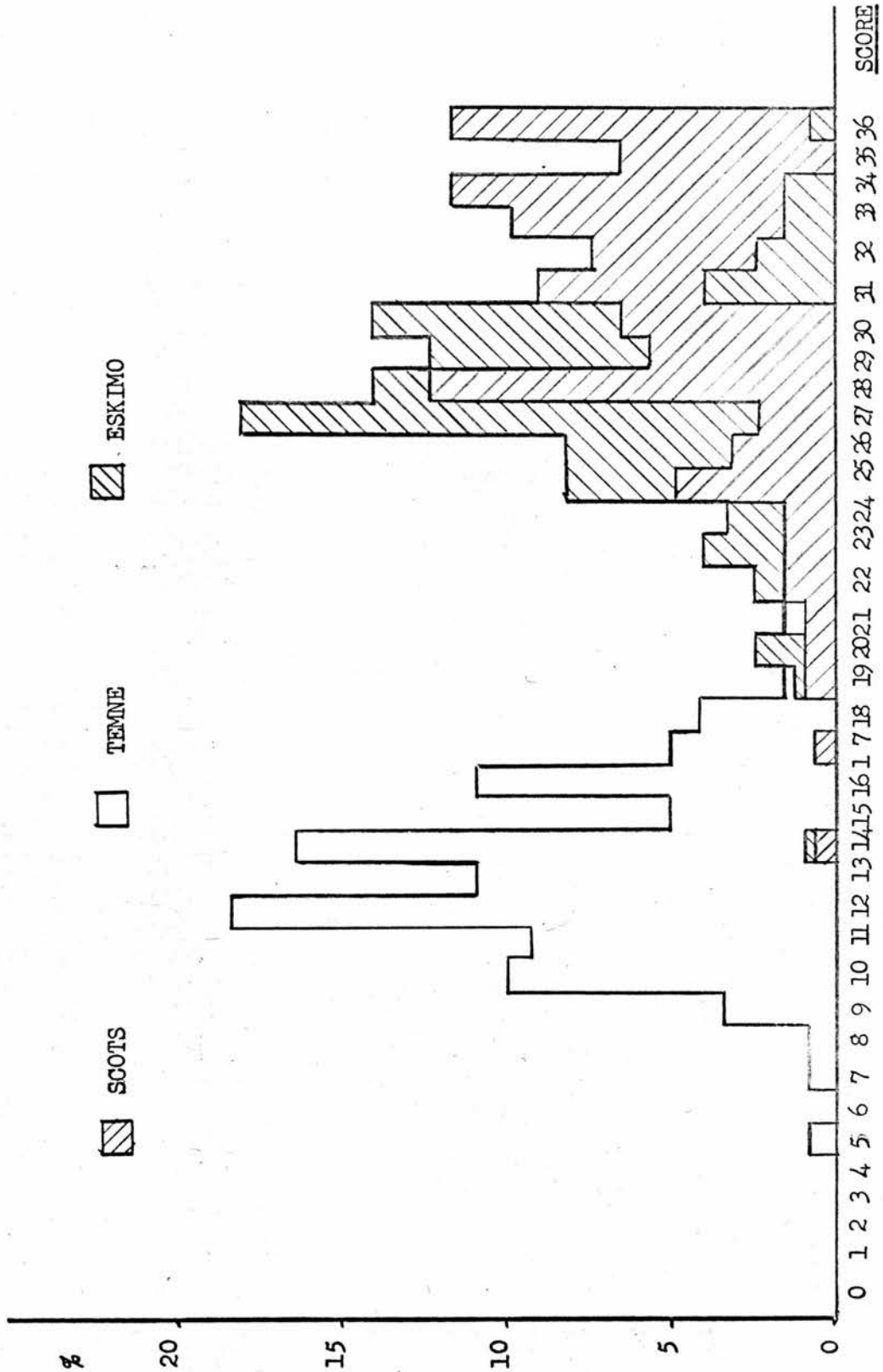
The low overall means of the two Scottish samples on Raven Matrices series A, Ab, and B call for some explanation. Since this coloured series was designed for use with, "young children and old people, for anthropological studies and for clinical work", (Raven Manual, 1963), it is difficult to assess the means of two 'normal' Scottish samples, especially when they include subjects aged ten to

Graph 5:1 Kohs Blocks Distribution



Graph 5:1 Kohs Blocks Distribution

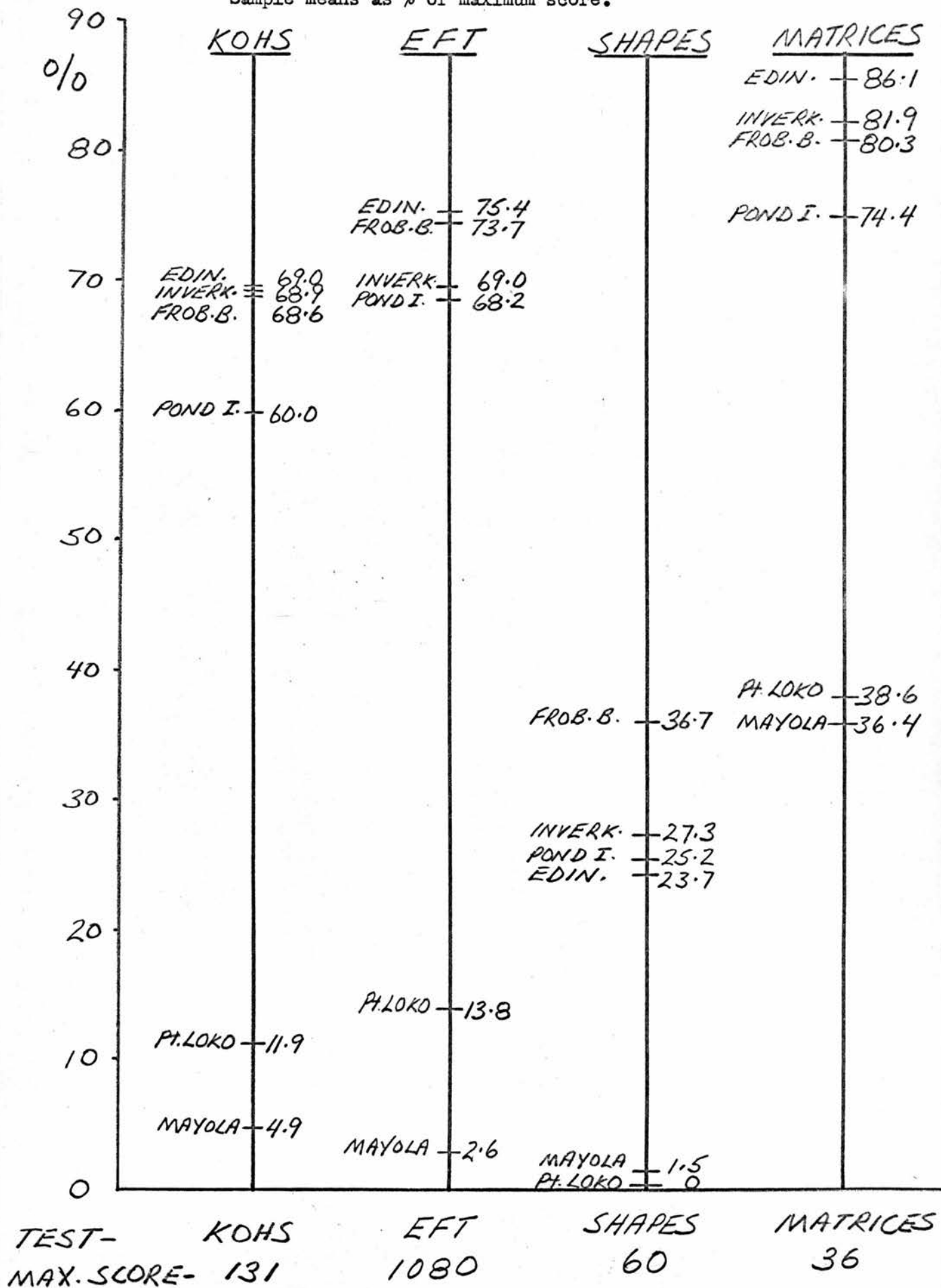
Graph 5:2 Raven Matrices Distribution



Graph 5:2 Raven Matrices Distribution

Graph 5:3 Spatial Tests: 6 Sample Comparison

Sample means as % of maximum score.



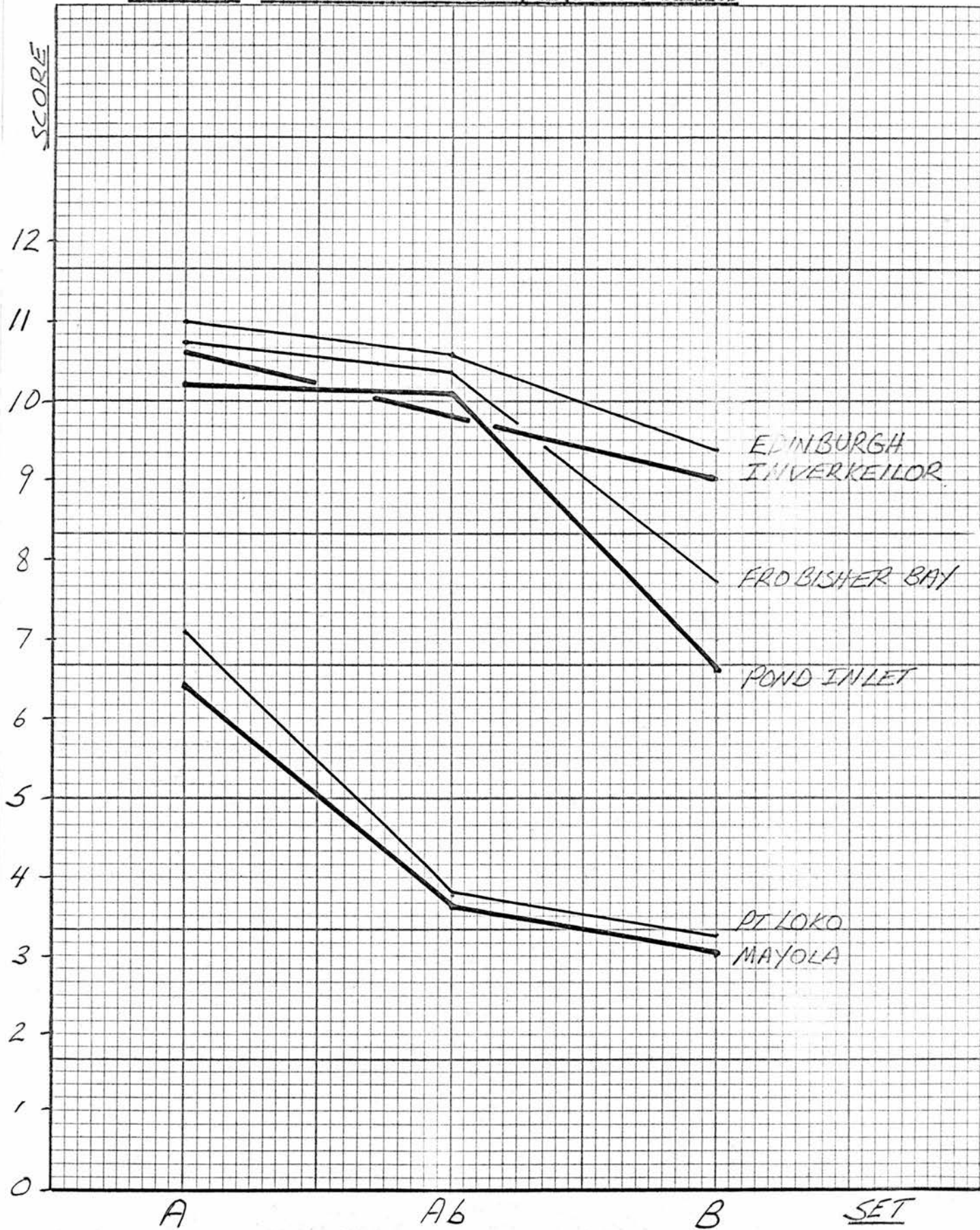
seventy-three. Two justifications are offered for its use:

1. It was necessary to have a test on which all subjects, including the Temne, could produce a score.
2. Raven, himself, considers that, "the scale of thirty-six problems as a whole is designed to assess as accurately as possible, mental development up to intellectual maturity" (1963, manual).

An examination of the distribution of Matrices scores (page 78) shows that the Scottish samples have been cut off near the maximum attainable score. However, in all test areas those subjects who scored four out of five correct on test items B8 to B12 were allowed to go on to series C, D, and E; forty-five Scots went on to the more advanced series, while only five Eskimo and no Temne subjects did so. It is apparent, then, that the true central tendency of the Scottish population is somewhat higher. But even if new means were to be estimated, the pattern of the results would not be altered, for the Scottish samples, even at the present means, are significantly higher scorers than the Eskimo at the .01 level of confidence. This criticism, concerning a possible limiting of Scottish scores, does not apply to any of the other three tests; Scottish means were all well below maximum attainable scores, and in each case, the full test, as used when testing Western samples, was administered.

Graph 5:4 illustrates the Scottish, Temne and Eskimo scores on the three sets within the Coloured Matrices (page 81). It is apparent that on the more 'perceptual' sets A and Ab, the Eskimo have matched Scottish scores, but have fallen down on set B which tends to be more 'intellective'. The Temne, on the other hand, show the greatest drop in score on set Ab, which was designed by Raven to be a 'Gestalt' test. The addition of set Ab was considered necessary by Raven (1963) so that, "discrete figures could be apprehended as parts of an organized 'whole'". Once again, the perceptual difficulties of the Temne, in relation to the Eskimo, are highlighted by trends in the scores.

Graph 5.4 Matrices Means : Sets A, Ab, & B : 6 Samples



Hypothesis 3

It was considered that contact with Western life, especially with schools, cinemas and magazines would tend to change traditional ways and to override, to some extent, traditional perceptual characteristics. It is apparent from the results that spatial skills have been improved in the Temne and Eskimo groups as a result of westernization. With the exception of the Shapes results with the Temne, all scores are significantly higher in the transitional communities.

Hypothesis 4

No rating could be made of the availability of cinemas and magazines to individual subjects, but it was possible to note the number of years spent in school. Correlations between education and spatial scores indicate a strong positive relationship.

These correlations are strongest, as might be expected, in the two Scottish samples and in the two transitional samples where Western education is readily available. Even in Mayola, where Arabic education only is available, there is a strong relationship with the EFT score. This result tends to confirm the opinion expressed earlier, in the section on culture description, that these schools familiarize students with the basic classroom demands of sitting still and responding to questions, as well as introducing them to pictorial and graphic material. The consistent negative correlations in the Pond Inlet sample emphasize the fact that schools have been in the area only for the past few years. The youngest subjects, those less perceptually developed, were the only ones able to report having attended formal classes.

Socialization Differences

The self-ratings for severity of discipline during childhood confirm the trends reported by anthropologists -- the Temne exercise harsh control over their offspring, while the Eskimo are notably lenient. In fact there is very little overlap between the self-ratings of the two societies.

Table 5:24 Temne and Eskimo 'Severity of Discipline' Self-ratings:

	<u>Not so strict</u>	<u>Fairly strict</u>	<u>Very strict</u>
Temne	7	0	115
Eskimo	113	8	1

This difference is highly significant ($X^2 = 228.3$, $df = 2$, $p < .01$).

Hypothesis 5

The elimination of scores where N is less than four is permissible by usual statistical practice. Unfortunately, this operation leaves only two testable categories in both the Temne and Eskimo samples. To conform to these resultant 'more strict' and 'less strict' categories, the middle Scottish rating in each sample was eliminated, and significance tests have been made only between the two extreme categories. In the case of Mayola only one category was left; hence no test of significance could be made.

In general, the hypothesis tends to be confirmed, but the trend is by no means strong. There are no significant differences at all in Inverkeilor and Frobisher Bay; in fact, three of the eight possible tests showed opposing trends. Pt.Loko and Edinburgh each had two significant results, and the remaining six were in the predicted direction; Pond Inlet had three significant results, while there was no difference at all in the fourth. By tests, the Raven Matrices produced no differences, while Kohs Blocks had three, and EFT and Shapes produced two each.

This result tends to confirm the findings of Dawson (1963a) who first applied these ideas to the Temne and the Mende. In his work, the severity of the mother and the father were rated separately, and it was found that subjects who had harsh mothers were significantly poorer scorers on Kohs Blocks than those with fairly strict or lenient mothers. The severity of the father, however, seemed to have little effect on the scores. It should be noted that most of Dawson's subjects were males living on wage employment, and represent a higher degree of westernization in terms of education and urbanization than the Mayola subjects and possibly even the Pt.Loko subjects. In spite of these differences, his general findings concerning the effects of severity of discipline between two African tribes seem to be confirmed.

Hypothesis 6

A test across the three cultures for the relationship between Kohs Blocks scores and the severity of discipline serves only to highlight the trend established so far. The highly significant difference between the Kohs scores of the least and the most severely disciplined subjects is essentially another Eskimo-Temne contrast. But the pattern first displayed in Inverkeilor is repeated for all three-hundred sixty-six subjects; it is not those who have been least severely disciplined who produce the highest Kohs scores, but those who have been moderately disciplined. This result confirms another of Dawson's findings; those subjects with moderately severe mothers scored higher on Kohs Blocks than those with lenient mothers.

A small sample of thirty Mende subjects was also administered Kohs Blocks. Despite self-ratings less severe than those in Mayola (see table 5:19, page 72), the overall Kotia score was lower (Mean = 3.87, S.D. = 5.6). But the Mende tested in the present study are those bordering Temne country (see map, appendix 1), with whom they tend to share many socialization practices despite the more lenient self-ratings. Hence this result is not considered a challenge to the hypothesis.

Further Analyses of Spatial Test Scores

(i) Maternal Dominance

Among the self-ratings obtained during the interview were answers to the following questions:

Source of Discipline: When you were young, who disciplined you, your father or your mother?

Identification: Who do you 'take after' more, your father or your mother?

Dominant Parent: Who was the boss in your family, your father or your mother?

This information was sought in order to investigate Witkin's finding that field-dependent subjects tend to have had dominating mothers. The following table lists the numbers and percentage of subjects who fall into the various categories. Males and females are listed and discussed separately.

Table 5:25 Maternal Dominance Self-ratings:

	<u>Source of Discipline</u>				<u>Parent Identification</u>				<u>Parent Dominant</u>			
	<u>Father</u>		<u>Mother</u>		<u>Father</u>		<u>Mother</u>		<u>Father</u>		<u>Mother</u>	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
<u>Inverkeilor</u>												
Males	11	41	10	36	13	48	11	41	15	56	7	26
Females	17	49	12	34	9	26	21	60	22	63	8	23
<u>Edinburgh</u>												
Males	16	52	14	45	7	23	22	71	24	77	7	23
Females	8	28	16	55	17	59	10	34	17	59	10	34
<u>Pt. Loko</u>												
Males	12	60	6	30	10	50	10	50	14	70	6	30
Females	3	25	9	75	1	8	11	92	8	67	4	33
<u>Mayola</u>												
Males	30	67	13	29	26	58	19	42	40	89	5	11
Females	3	7	41	91	10	22	35	78	39	87	6	13
<u>Kotia</u>												
Males	12	80	3	20	13	87	2	13	17	93	1	7
Females	6	40	9	60	13	87	2	13	15	100	0	0
<u>Frobisher Bay</u>												
Males	7	44	8	50	7	44	8	50	14	88	2	12
Females	3	20	11	73	6	40	9	60	11	73	4	27
<u>Pond Inlet</u>												
Males	15	33	31	67	21	45	24	52	38	83	7	15
Females	8	18	36	80	7	16	38	84	24	53	21	47

This information becomes clearer when the seven samples are ranked, by sex, for each of the three self-ratings.

Table 5:26 Sample Rankings: Males:

<u>Mother Disciplined</u>		<u>Mother Identification</u>		<u>Mother Dominant</u>	
Pond Inlet	67 %	Edinburgh	71 %	Pt. Loko	30 %
Frobisher Bay	50	Pond Inlet	52	Inverkeilor	26
Edinburgh	45	Frobisher Bay	50	Edinburgh	23
Inverkeilor	37	Pt. Loko	50	Pond Inlet	15
Pt. Loko	30	Mayola	42	Frobisher B.	12
Mayola	29	Inverkeilor	41	Mayola	11
Kotia	20	Kotia	13	Kotia	7

Table 5:27 Sample Rankings: Females:

<u>Mother Disciplined</u>		<u>Mother Identification</u>		<u>Mother Dominant</u>	
Mayola	91 %	Pt. Loko	92 %	Pond Inlet	47 %
Pond Inlet	80	Pond Inlet	84	Edinburgh	34
Pt. Loko	75	Mayola	78	Pt. Loko	33
Frobisher Bay	73	Frobisher Bay	60	Frobisher B.	27
Kotia	60	Inverkeilor	60	Inverkeilor	23
Edinburgh	55	Edinburgh	34	Mayola	13
Inverkeilor	34	Kotia	13	Kotia	0

Table 5:28 Maternal Dominance Rank Correlation with Kohs Blocks Scores: 7 Samples:

	<u>Mother Disciplined</u>	<u>Mother Identification</u>	<u>Mother Dominant</u>
Males	+0.68	+0.61	+0.61
Females	-0.57	-0.14	+0.61

It is apparent that, in those samples where the mothers discipline the males most frequently, Kohs scores tend to be high. This pattern is repeated for the males in the cases of 'mother identification' and 'mother dominance' as well, but all are contrary to Witkin's findings.

The results for the females tend to the opposite; those who are disciplined by, and identify with their mothers have lower Kohs scores, but a self-rating of 'mother dominant' has a similar effect upon the females as upon the males. None of these correlations is significant ($df = 6$), but the trend is consistent for the males.

But evidence within the six main samples indicates that there is no consistent relationship between Kohs scores and maternal dominance.

Table 5:29 Kohs Scores Means: Mother Dominant/Father Dominant:

	<u>Source of Discipline</u>				<u>Parent Identification</u>				<u>Dominant Parent</u>			
	<u>Mother</u>		<u>Father</u>		<u>Mother</u>		<u>Father</u>		<u>Mother</u>		<u>Father</u>	
	<u>M</u>	<u>S.D.</u>	<u>M</u>	<u>S.D.</u>	<u>M</u>	<u>S.D.</u>	<u>M</u>	<u>S.D.</u>	<u>M</u>	<u>S.D.</u>	<u>M</u>	<u>S.D.</u>
Inverkeilor	89.9	35	89.1	32	85.8	36	95.3	30	88.3	38	92.9	30
Edinburgh	90.7	32	87.0	33	90.9	31	85.9	33	89.9	33	91.8	31
Pt. Loko	17.8	19	13.1	9	16.2	17	14.4	10	20.9	20	13.1	11
Mayola	4.8	6	8.7	8	5.7	6	7.3	8	3.7	4	6.7	7
Frobisher Bay	93.6	28	85.8	29	86.5	28	93.7	30	93.7	25	89.0	29
Pond Inlet	79.2	30	76.0	32	80.8	30	75.1	32	79.5	26	79.0	32

None of these differences is significant except in Mayola, where father-disciplined subjects scored higher ($t = 2.39$, $p < .01$), father-identifying subjects scored higher ($t = 1.02$, but NS), and father-dominated subjects scored higher ($t = 2.57$, $p < .01$). But in Pt. Loko, this Temne trend is reversed, although it is not significant. It is apparent that maternal dominance, as rated by these scales, produces no consistent effect on Kohs Blocks performance.

(ii) Sex Differences

Witkin (1962) has found consistent sex differences in field-dependence in his Western samples, women tending to be more field-dependent than men. These differences have been confirmed in English, French, Dutch, Italian, and Hong Kong samples. He considered that, "women as a group tend toward a global field approach in their perceptual and intellectual functioning, men toward an analytical approach", and suggested that these differences might arise from the, "differences between men and women in biological role and anatomic make-up". He further considered that the cause, "may lie in the encouragement of a more dependent role for women in our culture". The different social roles of men and women in a number of cultures have been investigated by Barry, Bacon and Child (1957), who found that in most societies, boys are trained for work and warfare, while girls are trained for a nurturant role. The usual training for boys, then, fosters independence, while that for girls fosters dependence.

Giffen (1930), who examined the roles of men and women in traditional Eskimo society, pointed out that, "the education of the Eskimo boy is centred around his career as a future hunter", while the girl, at home, is instructed in domestic duties. But we have seen that despite the different economic roles, the Eskimo women and children are in no way treated as dependent in the society; very loose controls are exercised over both wives and children. The Temne, on the other hand, exercise strong control over their wives and children, producing, as we have seen, field-dependent characteristics in the society as a whole.

On this basis, it was suspected, although not predicted, that the Eskimo might exhibit minimal sex differences in these spatial tests, while the Temne might show them somewhat more. Table 5:30 shows male and female scores on these tests, and the tests of significance between them, for the Temne and Eskimo samples.

Table 5:30 Male and Female Scores on Spatial Tests: Tests of Significance:

Test	Sample	MALE			FEMALE			t	p /
		N	Mean	S.D.	N	Mean	S.D.		
<u>Kohs</u>									
	Pt.Loko	20	17.9	16.1	12	11.8	11.3	1.27	NS
	Mayola	45	8.8	7.8	45	3.9	4.9	3.62	.01
	Frobisher B.	16	92.8	28.7	15	86.9	28.4	0.59	NS
	Pond Inlet	46	76.8	31.5	45	80.6	30.0	-0.58	NS
<u>EFT</u>									
	Pt.Loko	20	228.8	264.0	12	15.6	54.0	3.63	.01
	Mayola	45	55.5	125.3	45	0	0	2.98	.01
	Frobisher B.	16	794.0	153.2	15	797.7	147.3	-0.07	NS
	Pond Inlet	46	720.0	234.8	45	754.1	190.8	-0.76	NS
<u>Shapes</u>									
	Pt.Loko	17	-0.4	5.7	6	0.8	3.6	-0.74	NS
	Mayola	32	0.8	6.3	13	1.2	6.3	-0.30	NS
	Frobisher B.	16	25.2	11.1	15	18.5	14.2	1.42	NS
	Pond Inlet	46	15.3	11.2	44	15.3	9.1	-0.03	NS
<u>Matrices</u>									
	Pt.Loko	19	14.1	4.0	11	13.6	3.8	0.36	NS
	Mayola	45	13.7	2.1	44	17.4	2.5	2.67	.01
	Frobisher B.	16	29.1	3.6	15	28.7	2.6	0.34	NS
	Pond Inlet	16	27.0	3.5	45	26.6	2.9	0.59	NS

In four out of eight cases, the Temne males have scored significantly higher than the females. In Pt.Loko, Kohs and Matrices scores were in the predicted direction, but in both Temne samples, Shapes scores were in the opposite direction. In no case is there any significant difference between Eskimo male and female scores; in four of the eight tests, the males were higher than the females, and in the other four cases, female scores exceeded the male scores.

An examination of sex differences in the two Scottish samples reveals a pattern similar to that of the Temne; four of eight male scores are significantly higher, and all are in the same direction.

Table 5:31 Sex Differences on Spatial Tests in Scottish Samples:

Sample	Kohs		EFT		Shapes		Matrices	
	t	p /	t	p /	t	p /	t	p /
Inverkeilor	0.30	NS	0.40	NS	2.84	.01	0.21	NS
Edinburgh	1.91	.05	3.02	.01	2.48	.01	1.52	NS

The Temne and the Scottish samples, then, tend to confirm Witkin's finding of sex differences in field-dependence, but, as suspected, the Eskimo do not.

(iii) Age Trends

All six samples were composed of approximately equal numbers of subjects in five age classes. It is thus possible to observe developmental trends in the scores which occasionally throw some light on traditional cultural processes and changes with westernization.

The four spatial test age scores are plotted in graphs 5:5 to 5:8, pages 90 to 93.

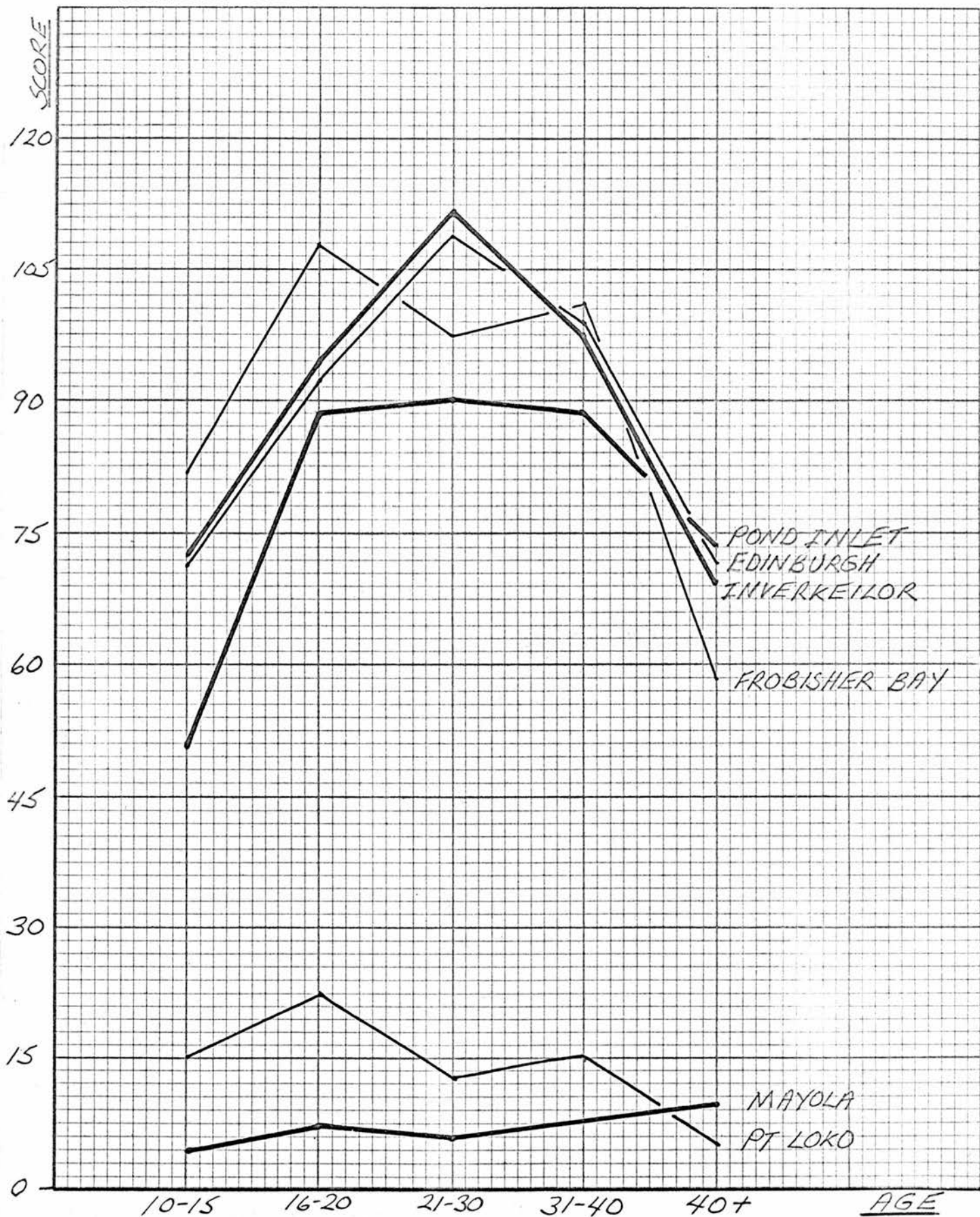
The most striking feature of these graphs is the great gulf between the Temne and the Eskimo performance, and the minimal difference between the Eskimo and the Scots (cf, hypotheses 1 and 2). For the first two groups, there are no crossings of the plots, while for the latter two, intersections are frequent.

The second most apparent feature is the fairly consistent difference in all three cultures between the rural/traditional samples and the urban/transitional samples (represented by thick and thin lines respectively; cf. hypotheses 3 and 4).

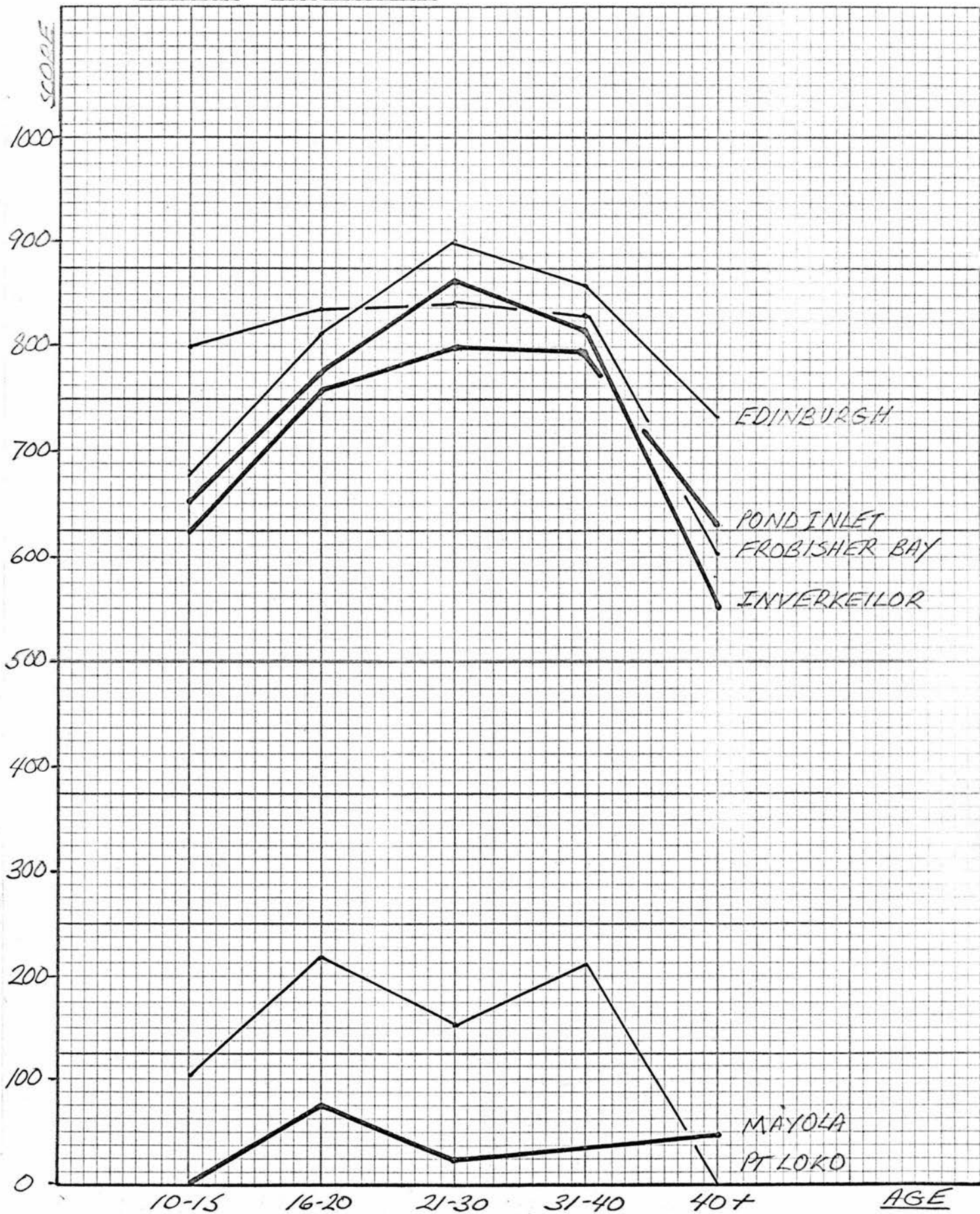
The age trends are consistent for the Scottish and Eskimo samples; low scores in the youngest age groups increase to a maximum at approximately twenty-five years of age, and decrease in later years to scores comparable to those of the ten to fifteen year old group. The Temne samples, on the other hand, have consistently flatter graphs. This peculiarity is considered to reflect the lack of any need to develop these skills; the basic ability to produce a score on the test apparently exists from age ten onwards, and there is no later development through lack of demand by the environment or the society for any of these abilities.

In both Pt. Loko and Frobisher Bay, there is a noticeable inflation of scores over the normal pattern in the two age groups 10-15 and 16-20. This trend is particularly strong in the Kohs and Matrices scores for both samples, in EFT for Frobisher Bay, and is the strongest in the Shapes scores for Frobisher Bay. This pattern is considered to be a result of the relatively stronger effects of westernization on the younger, when compared to the older, members of the transitional communities. They are the ones who have gone to the school, have learned the new language, and have directed themselves toward the new way of life.

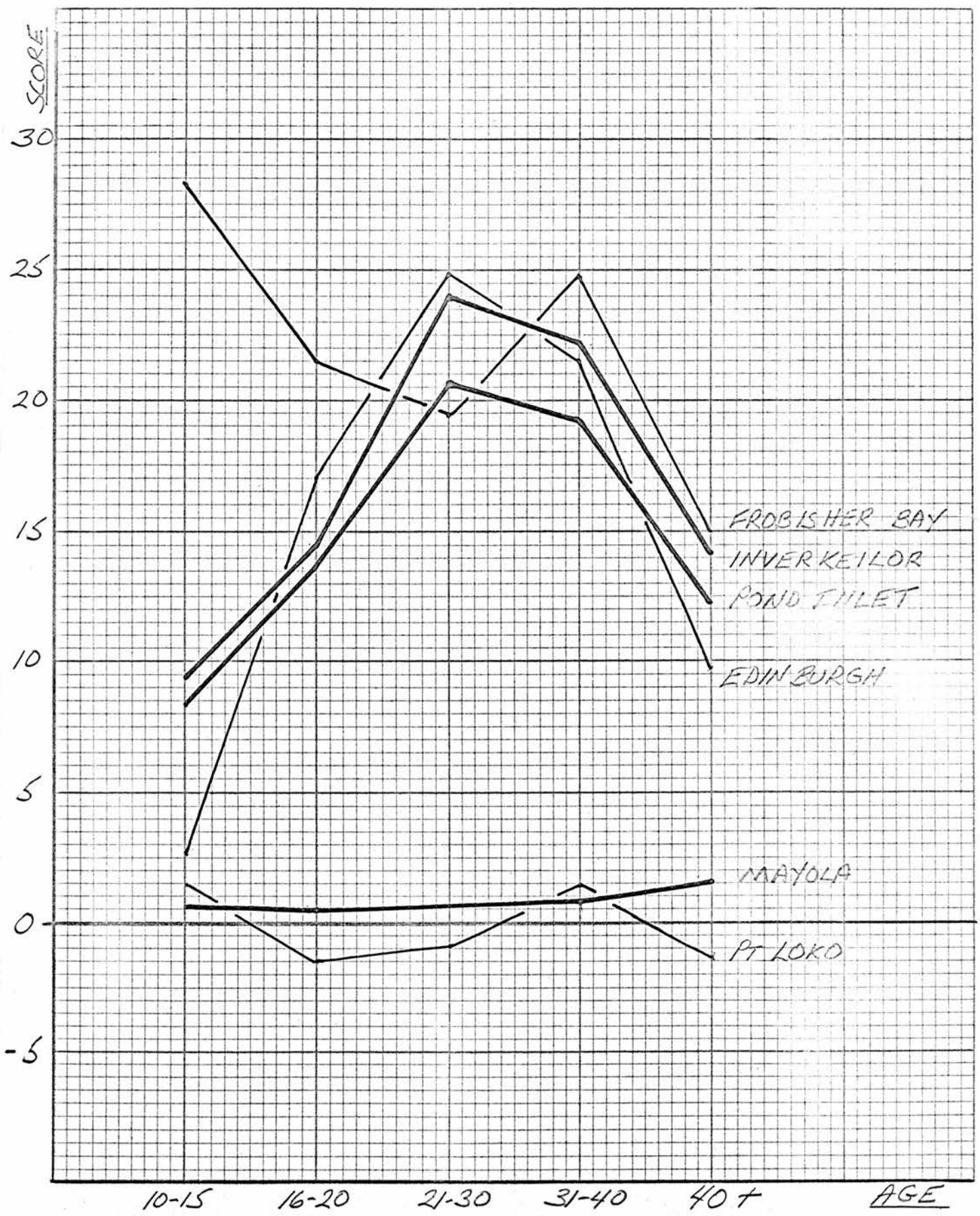
Graph 5:5 Kohs Blocks: Age Trends



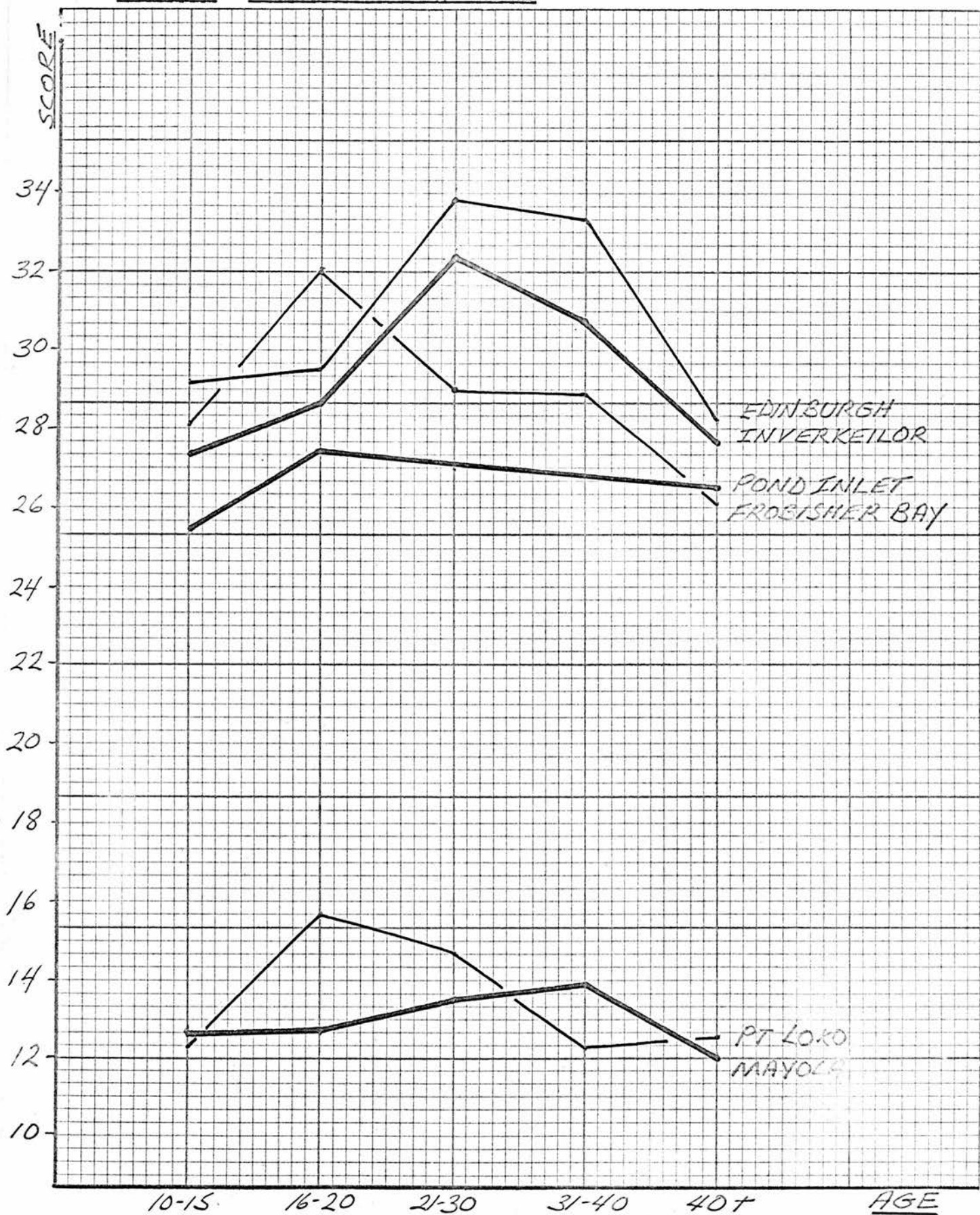
Graph 5:6 EFT: Age Trends



Graph 5:7 Shapes: Age Trends



Graph 5:8 Raven Matrices: Ages Trends



4) Conclusions

In this study, great weight should not be placed on tests of statistical significance. The data were collected from subjects with whom perfect communication was impossible, and under conditions of varied temperature, comfort and noise level. To rely blindly on sophisticated statistical tests, and to ignore the relative crudity of the data themselves is to ascribe a level of precision to the study which is not inherent in the original data and methods. For this reason, only two levels of significance have been employed, and no statistic more complex than the mean, standard deviation, correlation, t and Chi square tests has been employed.

In this cautious light, conclusions for the study of perceptual skills can now be made.

a) Discrimination Skills

Although the overall results of the test of perceptual units are equivocal and not fully consistent with the closure test results, it is considered that a strong case has been made for the hypothesis that, despite equivalent acuity, the Eskimo will display a greater awareness of small detail than the Temne.

The face validity of the closure test is much higher than that of the test of perceptual units; the apprehension of small gaps at tachistoscopic speed is likely to be more strongly related to the task of isolating minute detail from a barren and uniform background than is the task of encircling groups of marks. The potential inability of the latter task to discriminate between perceptually undeveloped individuals and habitual attenders to small detail has already been noted. Furthermore, uncontrolled factors such as aesthetic judgement and the influence of the surrounding items might affect the latter task, whereas the closure test was a strict reproduction task with presentation confined to the tachistoscope.

It is therefore considered that, as predicted, the Eskimo have shown themselves capable of isolating slight variation in visual stimulation, while the Temne have demonstrated their inability to do so.

b) Spatial Skills

It is considered that an even stronger case has been made for the hypotheses concerning the development of spatial skills.

Hypotheses 1 and 2, that the Eskimo will perform better than the Temne, and almost match the Scots on the spatial tests, are accepted without reservation; not only have the Eskimo exceeded the Temne performance on these tests, but they have come very close to matching the Scottish scores. Hypotheses 3 and 4, that the urban, more westernized samples would perform better, and that this performance would be related to the number of years of education, are also accepted without reservation; contact with Western culture, especially with Western education, produces significantly better spatial scores in both the Temne and the Eskimo societies. It is likely that this increase in ability to perform the tests is partly due to a somewhat better understanding of the task, as well as to the benefits derived from informal perceptual training (with print and pictorial material) in the classroom, from magazines and cinemas, and from contact with English language spatial and geometric concepts. All these factors are considered to have been more important contributors to the rise in spatial scores in transitional communities than the trend toward Western socialization practices also noticeable in these samples. Compared to changes in the former factors, new child rearing practices tend to be adopted much less readily.

Hypothesis 5, concerning the effects of severity of discipline, tends to be confirmed, but the results are not strong. It is apparent that the self-rating scale for severity of discipline suffered from poor discrimination at the extremes in both Mayola and Pond Inlet. The test of hypothesis 6, as already suggested, is really only another Temne-Eskimo contrast due to the dichotomous nature of the self-ratings.

The effects of maternal dominance on Kohs Blocks scores were not consistent with those expected on the basis of Witkin's studies, but the evidence was not strong.

The analysis of sex differences suggests the conclusion that in societies where women assume a dependent role, they will have more field-dependent perceptual characteristics than the men, but in societies where women are allowed independence, sex differences will disappear. It is possible, of course, that in societies where men assume a dependent role, sex differences might be reversed, but the samples tested in the present study do not allow this possibility to be tested.

The age trends suggest that in societies where spatial skills are required, maximum ability is attained between twenty and thirty years of age, but where these skills are not needed, the minimal level of ability already possessed at an early age remains fairly constant (and undeveloped) throughout life. These trends furthermore demonstrate the relatively greater impact that Western life has on the younger members of the transitional communities.

Although these great differences between the Temne and the Eskimo were predicted on the basis of cultural and ecological differences, this study has not been able to isolate the relative contributions of 'ecological demands' and 'cultural aids'. It is apparent, though, that the cultural characteristics developed by the respective societies do not inhibit the development of the skills required by their environments. It is thus possible that linguistic and artistic development, as well as, "... systems of child training ... represent unconscious attempts at creating out of human raw material that configuration of attitudes which is (or once was) the optimum under the tribes' particular natural conditions and economic-historic necessities" (Erikson, 1943). If societies have ever existed which possessed cultural characteristics that tended to inhibit the development of psychological abilities demanded by their environments, it is not likely that they survived the struggle for continued existence without some form of cultural adaptation.

Chapter 6. Study 2: Perceptual Characteristics

1) Introduction

This chapter will report four separate studies which are all concerned with the relationship between cultural and ecological characteristics, and visual perception under conditions not usually encountered in everyday life. Unlike the studies reported in chapter 5, where perceptual skills in daily use were investigated, these tests were administered in circumstances deliberately constructed to reduce veridical perception (cf. Gibson's, 1950, 'literal perception') and allow cultural and ecological differences to manifest themselves (cf. Vernon's, 1955, 'schematic perception').

It was considered that an investigation of visual perception in abnormal situations might reveal some of the characteristics of normal perceptual processes. The four studies that follow were therefore administered under conditions of suggestion, binocular conflict, ambiguity, and illusory stimulation.

2) Acquiescence

a) Introduction

The value system of the Temne and Eskimo people emphasize many opposing characteristics; one of the most striking of these is the Eskimo stress on self-reliance, and the Temne emphasis on adherence to group patterns, or what may be called 'group-reliance'.

Traditionally, the Eskimo have placed great value on personal self-reliance (Chance, 1960); they have emphasized, "skill and ingenuity" (Lantis, 1959), and have greatly feared, "dependency and incompetence" (Kardiner, 1939). This value emphasis, as we have seen, is intimately related to economic necessity; Barry, Child and Bacon (1959) have shown that pressure toward self-reliance and achievement is an important part of most low food accumulating societies. Mirsky (1937) has remarked on the, "extraordinary amount of individualism" in Eskimo

society, and has related this to the fact that hunting, especially, "kayaking implies a solitary venture".

Mirsky has also noted that, "the same strong sense of individualism that characterizes their technology ... is markedly present in their social system ... no political unity ... organized leadership or social stratification". These patterns have been confirmed by Butt (1950), who in a survey of Eskimo culture concluded that, "as might be expected from the simple organization of the Eskimo and their hatred of coercion and submission to authority, class distinctions are non-existent. There are no chiefs, no slaves". As we have seen, prestige and the informal leadership of the group are usually awarded to the most able man on the hunt or the one most skilled in social matters. Self-reliance, then, is required by the economics of their life, and is rewarded by their social and political systems to such an extent that it becomes one of their most notable characteristics.

The Temne, on the other hand, exhibit strict adherence to group norms and patterns. Dawson (1963a) has observed that, "witchcraft and swears are used against individuals who have deviated psychologically or socially from accepted forms of behaviour", and that, "children who are too intelligent and speak up for themselves are said to be affected by witchcraft". An economic basis for this tendency has already been noted; high food accumulating societies in general tend to foster obedience and conformity (Barry, Child and Bacon, 1959).

Politically and socially, there are few rewards for individualistic behaviour in Temne society. The chiefs, although elected, must belong to one of the few 'chiefly families' to be considered for the post; ambition and ability will not necessarily help a person gain political power within the tribal structure. Socially, as Dawson has pointed out, the Temne tend to restrain deviant behaviour by the imposition of witchcraft sanctions (oaths taken out against an alleged offender, who suffers pain, disease, or death if guilty). Concern for, and reliance upon the group are thus required by the Temne economy and rewarded by both the social and political systems.

This major difference in value orientation between the Temne and the Eskimo suggests that differences might exist in the extent to which members of these societies will be affected by the suggestion of the group norm during a perceptual task requiring the judgement of line length. The finding of Linton (1955) that field-dependent subjects tended to greater conformity than field-independent subjects strengthens this possibility; to investigate it, the following test was devised.

b) Test Description

The technique developed by Asch (1960⁵⁶) used a series of length judgement tasks, (one standard line, and three varying lines) in which the critical subject was instructed to select which of the three lines was equal in length to the standard. This judgement was to be made after seven or eight subjects had already publically selected (under instruction) an incorrect line.

Asch's method was not considered practical for use with the Temne and the Eskimo since it was impossible to train secretly a group of people to lie systematically when testing in a small village situation. Therefore two important changes were made to Asch's technique in the present study:

1. One line was simply designated, during the instructions, as the one most frequently chosen by the Temne or Eskimo people.
2. Since the situation was not as socially forceful, the task was made somewhat more difficult. Instead of using Asch's $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$ inch differences between the lengths of the lines, differences of only 1, 2, or 3 millimetres were used; furthermore eight lines, rather than only three, were available for judgement.

Six test items were prepared, each one with a standard horizontal line centred near the top, and eight horizontal lines of varying lengths underneath, displaced slightly to the left;(see pages 100 to 105 for copies of the test sheets). A small pilot study indicated the optimum difference in length between successive lines which would yield moderate accuracy in judgement.

Sheet A

X







The test consisted of six sheets of white card board, 8" by 10", placed back to back, and encased in clear plastic waterproof envelopes. The lines were drawn in black india ink, 1 millimetre thick. The sheets were presented on a near vertical stand at table height, so that the direction of gaze was normal to the sheet surface, and at a distance of four feet.

Sheet A (page 100) was a demonstration of the task, and a trial item. The difference between successive lines was 3 mm. Subjects were told the following:

Here is a sheet with nine lines on it. One line is here at the top (point), and there are eight lines of different lengths beneath it (point). I would like *you* to tell me which one of these eight lines is the same length as this one at the top (point again).

Sheet B (page 101) was a trial item as well (2 mm. difference between lines), and the same instructions were given as for sheet A.

Sheet C (page 102) was the first test item (2 mm. difference between lines). An 'X' was placed beside test line no. 6, and subjects were told the following:

Here is another sheet with nine lines on it, one here at the top, and eight beneath it (point). This time I am going to give you a hint. Most Temne (or Eskimo, or Scottish) people say this line (E pointed to no. 6) is equal in length to the one at the top. Which one do you say?

Sheets D, E, and F (pages 103 to 105) were presented with the same instructions as for sheet C. In each case, one line was indicated as the one most frequently chosen by his people, and the subject was asked for his choice. The differences between successive lines were: sheet D = 1 mm., sheet E = 2 mm., and sheet F = 3 mm. that is, the discrimination was eased over the three test sheets.

On sheet C, the indicated line (no.6) was actually the same length as the standard line (9.6 cm.). On sheet D, the indicated line (no.7) was 8.5 cm. long, or five 1 mm. steps removed from the correct line (no.2, 9.0 cm. long). On sheet E, the indicated line (no.8) was 10.4 cm. long, or five 2 mm. steps removed from the correct line (no.3, 9.4 cm. long). On sheet F, the indicated line line (no.7) was 8.5 cm. long, or five 3 mm. steps removed from the correct line (no.2, 10.0 cm. long).

All this information is summarized in table 6:1.

Table 6:1 Values Test Specifications:

<u>Sheet</u>	<u>Difference in Length btwn. lines</u>	<u>Length of Standard Line</u>	<u>Line Designated</u>		<u>Line Correct</u>	
			<u>Rank</u>	<u>Length</u>	<u>Rank</u>	<u>Length</u>
G	2 mm.	9.6 cm.	6	9.6 cm.	6	9.6 cm.
D	1 mm.	9.0 cm.	7	8.5 cm.	2	9.0 cm.
E	2 mm.	9.4 cm.	8	10.4 cm.	3	9.4 cm.
F	3 mm.	10.0 cm.	7	8.5 cm.	2	10.0 cm.

The subject indicated his choice by reaching forward and pointing to the line with a brush. The response was noted, and later scored as follows:

Sheet C: score was the absolute number of scale steps removed from the indicated and correct line.

Sheet D, E, and F: score was the number of scale steps removed from the correct line toward the indicated line (maximum = + 5), or the number of scale steps removed from the correct line away from the indicated line (maximum = -1 for D and F, -2 for E).

Thus a subject who chose the correct line would receive a score of 0, while one who chose the indicated line (on D, E, and F), a score of + 5. On the three test items, then, an individual's score could range from - 4 to + 15.

c) Hypotheses

Sherif (1935) has found that group norms persist in an individual even when the group is not present to take account of his behaviour. Hypothesis 1, then, follows:
Hypothesis 1: The Temne, who have been characterized as 'group-reliant' will exhibit greater acceptance of the suggested group norm than the Eskimo, who have been characterized as 'self-reliant', even though the group is not present.

Deutsch and Gerard (1955) have found that normative social influence upon individual judgements was greater among individuals forming a group than among individuals in a mere aggregate, and Bass (1961) has summarized the evidence for conformity being greater in 'more attractive' groups. Festinger, Schachter and Bach (1950) have introduced the concept of 'cohesiveness', or the total field of

forces acting on members to remain in a group, that is, the attraction of a group for its members. It is considered that social cohesion is greater in the rural/traditional samples than in the urban/transitional ones, and that the suggestion of 'Temne' or 'Eskimo' or 'Scottish' is more attractive to the rural/traditional samples than it is to the urban/transitional ones which are already moving away from traditional life toward Western ways. Hypothesis 2, then, follows:

Hypothesis 2: In all three societies, the rural/traditional samples will exhibit greater acceptance of the suggested group norm than the urban/transitional samples.

d) Results

Table 6:2 Mean Scores: Values Test:

<u>Sample</u>	<u>Absolute Deviation toward indicated line</u>				<u>Total Score</u>	
	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>Mean</u>	<u>S.D.</u>
Mayola	1.12	3.50	2.91	2.63	9.04	3.3
Pt.Loko	1.16	3.62	2.82	2.17	8.61	3.2
Inverkeilor	1.00	1.77	1.57	0.66	4.00	3.8
Edinburgh	1.05	1.93	1.42	0.50	3.85	3.0
Pond Inlet	1.27	1.31	1.15	0.29	2.75	2.9
Frobisher Bay	1.32	1.29	0.91	0.05	2.25	2.5

Graph 6:1 has plotted these separate values for D, E, and F, for the six samples, (page 109).

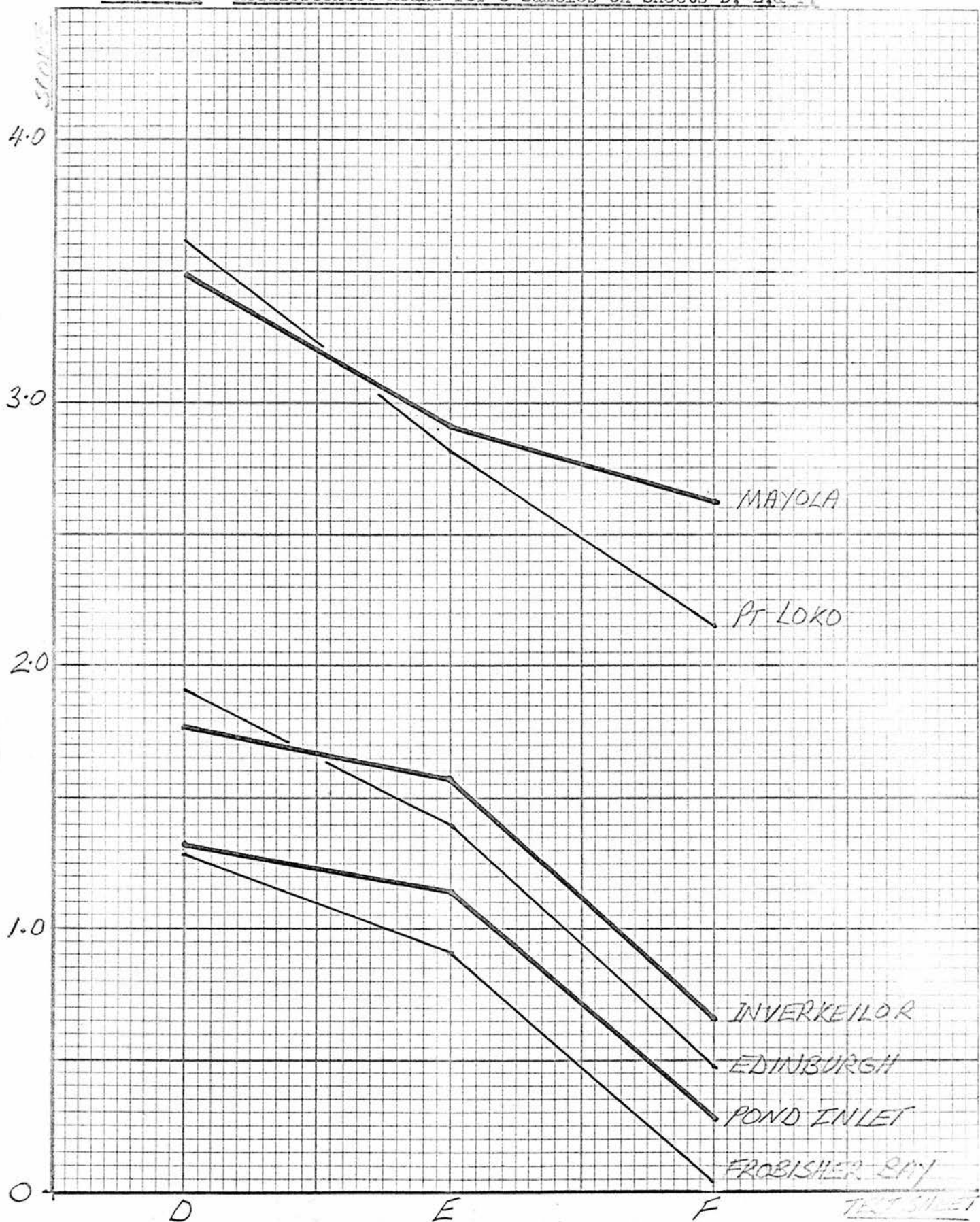
Test of hypothesis 1: The Temne will exhibit greater acceptance of the suggested group norm than the Eskimo.

	<u>t</u>	<u>p /</u>
<u>Traditional samples:</u> Mayola -- Pond Inlet	13.73	.01
<u>Transitional samples:</u> Pt.Loko -- Frobisher Bay	8.69	.01

Test of hypothesis 2: The rural/traditional samples will exhibit greater acceptance of the suggested group norm than the urban/transitional samples.

	<u>t</u>	<u>p /</u>
Inverkeilor -- Edinburgh	0.24	NS
Mayola -- Pt.Loko	0.65	NS
Pond Inlet -- Frobisher Bay	0.93	NS

Graph 6:1 Acquiescence: Means for 6 Samples on Sheets D, E, & F.



e) Discussion

In the test of hypothesis 1, both traditional and transitional Temne samples show a highly significant tendency to accept the suggestion of the group norm, while the Eskimo almost disregard it. No attempt was made to question subjects on their reaction to the test, but one Temne (subject T-90, in Mayola) did offer the following spontaneous comment: "When Temne people choose a thing, we must all agree with the decision -- this is what we call cooperation". On the other hand, Eskimo subjects, although saying nothing, would often display a quiet, knowing smile as they pointed to a line close to the correct one.

An examination of columns D and F in table 6:2, and of the graph on page 109, reveals that on the most difficult discrimination (sheet D), both Eskimo samples were well below the means of both Temne samples on the easiest discrimination (sheet F); there is no overlap.

An examination of column C in the same table shows that both Temne samples were more accurate than the Eskimo samples in judging line length when the indicated line is also the correct one.

In the test of hypothesis 2, although all the rural/traditional samples show a greater tendency to accept the suggestion of the group norm than their urban/transitional counterparts, none of the differences is significant. In the Temne and Scottish cases, there is a curious reversal of the trend on test sheet D, where the urban samples score higher, but even among the Eskimo, where the trend is consistent, the difference between the rural/traditional and urban/transitional samples is below the level of significance. This fairly consistent trend can also be seen in column C, where the correct line was also the designated line; here the rural/traditional samples all score lower than their urban/transitional counterparts.

Further Analyses

(i) Difficulty of Discrimination

Three levels of difficulty of discrimination were built into the test. Sheet D was the most difficult with only one millimetre difference between successive lines, sheet E the second most difficult with two millimetres difference between lines, and sheet F the easiest with three millimetres difference between lines. It was considered that these levels of difficulty might produce successively decreasing scores over the three test items. Graph 6:1, on page 109, demonstrates how striking these differences are. From an almost common starting point on sheet C (the range is only 0.32, from 1.00 to 1.32), scores on sheet D jump to three distinct levels, followed by a gradual decline in score as the discrimination becomes easier.

The fact that there is a decline in score as the discrimination eases argues strongly for the perceptual nature of this task. If subjects were merely agreeing or disagreeing to different extents with the suggestion of the group norm, without attempting to discriminate the lines, then we should expect a minimal or no decline in score as the nature of the task eases. It is frequently assumed that the experiments performed by Asch (1960) were not really perceptual at all, but merely tools for the study of independence and conformity. This may be the case for his tests since there was no significant decline in errors made in successive trials, but it cannot be doubted that the present test items constitute a perceptual task.

(ii) Relationship with Field-Dependence

Within each sample (except in Pt.Loko), there is a slight tendency for the total D + E + F score to correlate negatively with the Kohs Blocks scores. Table 6:3 lists these correlations.

Table 6:3 Values Score Correlations with Kohs Blocks for Six Samples:

<u>Sample</u>	<u>r</u>	<u>Note:</u>
Inverkeilor	-.19 ⊗	p / .01 are unmarked.
Edinburgh	-.13 ⊗	p / .05 are marked ⊗
Pt.Loko	+.15 ⊗	NS are marked ⊗
Mayola	-.14 ⊗	
Frobisher Bay	-.32 ⊗	
Pond Inlet	-.24	

This result is generally consistent with Linton's (1955) finding that field-dependence and conformity are positively related, but can hardly be said to constitute a cross-cultural proof of this relationship.

Sex differences also tend to offer little support for the expectancies based on the concept of field-dependence. Table 6:4 shows the total Values score for males and females separately.

Table 6:4 Values Scores: Males and Females:

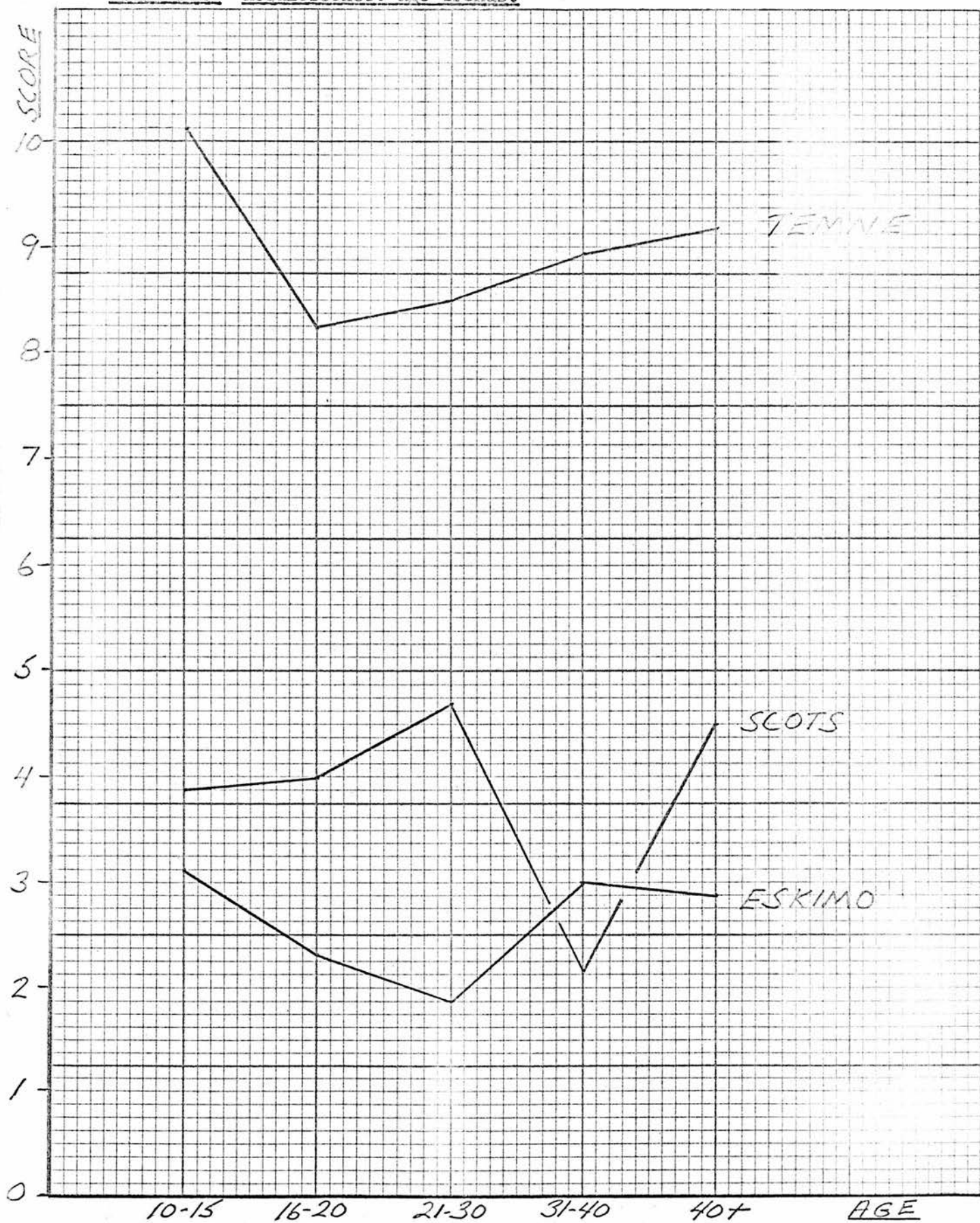
<u>Sample</u>	<u>MALES</u>		<u>FEMALES</u>		<u>t</u>	<u>p /</u>
	<u>Mean</u>	<u>S.D.</u>	<u>Mean</u>	<u>S.D.</u>		
Inverkeilor	4.61	3.8	3.42	3.8	-1.23	NS
Edinburgh	3.84	2.6	3.86	3.4	0.03	NS
Pt.Loko	8.50	2.9	8.82	3.9	0.25	NS
Mayola	8.84	3.6	9.74	3.0	0.57	NS
Frobisher Bay	2.48	2.6	2.00	2.4	-0.54	NS
Pond Inlet	2.48	2.8	3.02	3.0	0.89	NS

In four of the six samples females have shown themselves to be more susceptible to the suggestion of the group norm than males, but none of these differences is significant. Once again, then, these results by no means constitute a cross-cultural confirmation of expectancies based on Witkin's and Linton's studies.

(iii) Age Trends

Age trends are plotted on graph 6:2, page 113. Similar patterns are apparent for both the Temne and the Eskimo; a high acceptance of the suggestion (probably aided by low perceptual development) at age ten to fifteen is followed by a sharp decline, or rejection at age sixteen to thirty. Thereafter, there is an increasing

Graph 6:2 Acquiescence: Age Trends.



acceptance with advancing age, but scores in later years never match those of late childhood. The apparent rejection of the group norm in late adolescence and early adulthood suggests that the Temne and Eskimo youths might be somewhat dissatisfied with traditional ways (cf. the greater impact of Western life on youths noted in chapter 5). These trends, however, are not considered to be part of the oft-found general adolescent rejection of the adult community, since this trend does not appear in the Scottish plotting.

f) Conclusions

The first hypothesis, that the Temne would accept the suggestion of the group norm to a greater extent than the Eskimo is accepted without reservation. It is apparent that an aspect of the value system in use in particular societies can produce perceptual differences between members of these societies. This difference is not considered to be a result of differential acuity (since the samples were matched for this). Nor is it considered to be mainly due to differences in basic ability to discriminate line length, since the Eskimo samples have scored lower than the Scots, who, it is likely, possess greater ability as a result of wider experience of this type of task than the Eskimo.

The tendency for the rural, more traditional samples to be more susceptible than the urban/transitional groups is consistent, but not significant. Deutsch and Gerard's original finding pertained to 'groups' on the one hand, and mere 'aggregates' on the other, whereas the present study has compared socially more cohesive groups with groups whose social patterns are changing more rapidly, and are probably less cohesive. It is therefore not surprising that the difference, although in the predicted direction, falls below the level of significance.

3) Selection

a) Introduction

Binocular rivalry occurs when two stimuli are presented to corresponding areas of the two retinae, and the two stimuli are sufficiently different in terms of colour or form to compete with one another. When the difference is great enough, the subject sees one side or the other first, usually followed by an alternation between the two pictures. When the difference is not sufficient, there follows fusion, of parts of one picture with parts of the other.

Most experiments with binocular rivalry have used non-pictorial material, usually plain colours or patterns of lines (eg. Breese, 1909). But the presentation of pictorial material has also had a long history, dating to the late nineteenth century, when Sir Francis Galton (and A.L. Austin, reported in a letter to Charles Darwin) both discovered that two photographs of faces presented in the stereoscope produced a composite with a, "decided improvement in beauty" (Galton, 1883). Engel (1956) has continued the investigation of the effects of meaningful content on binocular resolution by presenting upright faces paired with inverted faces also in a stereoscope. He found that upright faces 'predominated' in forty-one of forty-eight presentations.

Bagby (1957) continued this approach by presenting ten pairs of photographs with Mexican and American content to twelve Mexican and twelve American subjects matched for age, sex, education, occupation, and socio-economic status. Subjects reported what they saw for sixty seconds, but only the data from the first fifteen seconds were used in the analysis. Bagby found four types of report:

1. Subjects simply reported seeing one side or the other.
2. Subjects reported seeing first one side and then the other.
3. Subjects reported seeing a single picture which was a mixture of the two.
4. Subjects reported seeing two pictures, one superimposed on the other.

Bagby's results, based upon data from all four types of report are given in table 6:5

Table 6:5 Bagby's Results for Mexican and American Subjects:

<u>Subjects</u>	<u>N</u>	<u>Mexican Content</u>	<u>American Content</u>	<u>Total</u>
		<u>Predominant</u>	<u>Predominant</u>	
Mexican	12	89	31	120
American	12	19	101	120

The tendency to select own-culture material was significant at the .01 level of confidence, but was reduced to .02 when reports of types 3 and 4 were eliminated.

Bagby concluded that:

Under conditions of perceptual conflict ... those impingements possessing the more immediate first person meaning would be expected to predominate in visual awareness.

Levelt (1965), however maintains that this, and other studies relating experience to binocular rivalry, "has little to do with ... binocular means of stimulus presentation", and goes on to suggest that a, "superimposed projection of the two photographs as a control stimulus", would presumably yield the same result.

The present study stems directly from Bagby's work. It is considered that the technique is worth using, and the results worth analysing, despite Levelt's criticism, for whether the process involved is true binocular rivalry or not does not matter; it is still a useful technique for presenting doubled pictorial material to the retinae, and for studying the effects experience might have on the immediate selection of visual material.

It was considered, though, that Bagby's method might be improved in two ways:

1. By using a larger, more representative sample than his twenty-four mainly middle class subjects, it was thought possible to improve the generality of the conclusions.

2. A more rigid definition of 'predominance' was used, limited to Bagby's type 1, and to type 2 only where there is a definite report of which was the first picture seen. No attempt was made, as Bagby did, to judge which, "picture seemed to be present most of the time". Where parts or wholes of both pictures were reported, the report was scored as a fusion of the two.

b) Hypotheses

The first hypothesis follows from the foregoing discussion:

Hypothesis 1: Even with a more rigid definition of 'predominance', in all three cultures, familiar visual material will be selected more often than material from the other two cultures.

On the basis of the discussion of the field-dependence and group-reliance of the Temne, and the field-independence and self-reliance of the Eskimo, it seemed reasonable to expect that the Temne and the Eskimo might select familiar material to different extents. Hypothesis 2, then, follows:

Hypothesis 2: People of different cultures, while selecting familiar visual material more often than the unfamiliar, will do so to different degrees, depending upon known characteristics of field-dependence and group-reliance. More specifically, the Eskimo, while selecting predominantly Eskimo material, will do so to a lesser extent than the Temne will select predominantly Temne material.

c) Test Description

A number of coloured 35 mm. slides of Scotland, Temne country, and Baffin Island were collected. From these, five of each culture were selected and printed in colour, one each of:

- A male person.
- A female person.
- A group of people.
- A scene with a distinctive house.
- A scene with a distinctive terrain. (See page 118 for a black and white copy

of these pictures). Each picture was designated as follows:

<u>Picture</u>	<u>Scottish</u>	<u>Temne</u>	<u>Eskimo</u>
Male	1	A	a
Female	2	B	b
Group	3	C	c
House	4	D	d
Terrain	5	E	e

Selection Test Pictures

SCOTS



1



2



3



4



5

TEMNE



A



B



C



D



E

ESKIMO



a



b



c



d



e

The fifteen possible pairs were then assigned an index number, as follows:

Table 6:6 Index Numbers of the Fifteen Test Pairs:

<u>Index No.</u>	<u>Pair</u>	<u>Index No.</u>	<u>Pair</u>	<u>Index No.</u>	<u>Pair</u>
1	1 A	6	2 B	11	A a
2	b 2	7	d 4	12	D d
3	c 3	8	a 1	13	e E
4	4 D	9	5 e	14	B b
5	E 5	10	3 C	15	C c

The letter or number on the left indicates that it was presented in the stereoscope to the left eye; that on the right, to the right eye. The positions, whether left or right, were assigned from a random table. A description of the stereoscope may be found in appendix 2.

The ten presentations during the testing were in the following sequence:

Table 6:7 Sequence of Picture Pair Presentations to the Three Societies:

<u>Sequence</u>	<u>INDEX NUMBER</u>		
	<u>To Scots</u>	<u>To Temne</u>	<u>To Eskimo</u>
1	1	11	8
2	2	6	14
3	3	10	15
4	4	12	7
5	5	13	9
6	6	14	2
7	7	4	12
8	8	1	11
9	9	5	13
10	10	15	3

Each subject was thus presented with ten pairs, each pair consisting of one picture from his own culture, and one from either of the other two.

The subject was requested to look into the stereoscope and say if the target (a cross and a circle) was in focus. If it was not, then it was adjusted. The subject was then asked if the cross (presented to the left eye) were sticking out of the circle (presented to the right eye) on the left side or on the right side. Adjustments were made until the cross appeared to be right inside the circle.

The subject was then told:

I am now going to show you some coloured pictures. Please look right into the box and tell me what you see. It is important to keep both eyes open, and to tell me exactly what you see as soon as you look in.

The subject's report was translated immediately, usually consisting of less than ten words, and written down in English. Each response was later scored as:

- + saw own-culture material.
- saw other-culture material.
- 0 saw a fusion of the two.
- / report inadequate and unscorable.

Before the presentation of the picture pairs, each subject was given the V-scope test three times to determine eye dominance. If all three trials were consistently left or right, subjects were scored as such. If they were not consistent, then the subject was scored as L/R, no dominance consistently shown.

d) Results

Marked eye dominance in some of the subjects reduced the number of scorable reports. If eight or more out of ten of the reports were from the dominant eye, the data from the subject were discarded. Since the cultural content of the pictures was balanced left and right, the effect of eliminating all predominantly left or right responses was to eliminate equally from each possible + or - score. Thus the data have been 'cleaned' but not distorted. The numbers discarded for this reason are shown in table 6:8.

Table 6:8 Numbers and Percent Discarded, and Numbers Analysed, in Six Samples:

<u>Sample</u>	<u>Total N</u>	<u>Discarded</u>		<u>Analysed</u>
		<u>N</u>	<u>%</u>	<u>N</u>
Inverkeilor	54	10	18.5 %	44
Edinburgh	57	9	15.8	48
Pt. Lokc	31	10	32.3	21
Mayola	87	9	10.3	78
Frobisher Bay	31	14	45.2	17
Por.d Inlet	91	32	35.2	59

Table 6:9 Results of the Visual Selection Test:

	N	+		-		0	/	Total
		Mean	S.D.	Mean	S.D.	Mean	Mean	
a) <u>Scots-Temne</u> <u>1, 4, 5, 6, 10.</u>								
Inverkeilor	44	5.18	1.8	3.27	0.8	1.50	0.05	10.00
Edinburgh	48	5.92	1.4	3.17	0.8	0.83	0.08	10.00
Pt.Loko	21	6.00	1.0	3.14	0.9	0.86	0	10.00
Mayola	78	5.95	1.5	3.64	1.0	0.33	0.08	10.00
b) <u>Scots-Eskimo</u> <u>2, 3, 7, 8, 9.</u>								
Inverkeilor	44	5.18	1.8	2.91	0.7	1.73	0.18	10.00
Edinburgh	48	6.04	1.5	2.79	0.8	1.17	0	10.00
Frobisher B.	17	4.82	1.5	4.59	1.1	0.59	0	10.00
Pond Inlet	59	5.25	1.4	4.44	1.0	0.31	0	10.00
c) <u>Temne-Eskimo</u> <u>11, 12, 13, 14, 15.</u>								
Pt.Loko	21	7.71	1.1	2.00	0.8	0.29	0	10.00
Mayola	78	5.41	1.5	3.95	0.9	0.54	0.10	10.00
Frobisher B.	17	4.94	1.1	4.59	1.3	0.47	0	10.00
Pond Inlet	59	5.46	1.4	4.37	1.2	0.17	0	10.00

Test of hypothesis 1: In all three cultures, familiar visual material will be selected more often than material from the other two cultures.

Table 6:10 Test of Hypothesis 1: Combined Samples:

Sample	N	M	S.D.	M	S.D.	t	p /
		+		-			
Scots	92	5.60	1.6	3.03	1.0	5.05	.01
Temne	99	5.93	1.3	3.54	1.0	4.90	.01
Eskimo	76	5.25	1.5	4.44	1.1	2.43	.01

Table 6:11 Temne and Eskimo Samples Only:

Sample	N	Temne Content		t	p /
		Mean	S.D.		
Pt.Loko	21	7.71	1.1	7.90	.01
Frobisher Bay	17	4.59	1.3		
Mayola	78	5.41	1.5	4.52	.01
Pond Inlet	59	4.37	1.2		
Sample	N	Eskimo Content		t	p /
		Mean	S.D.		
Pt.Lokc	21	2.00	0.8	9.24	.01
Frobisher Bay	17	4.94	1.1		
Mayola	78	3.95	0.9	8.38	.01
Pond Inlet	59	5.46	1.4		

Test of hypothesis 2: The Eskimo will select less own-culture material than the Temne.

Table 6:12 Selection of Own-Culture Material for All Ten Presentations:

<u>Sample</u>	<u>N</u>	<u>+</u>		<u>t</u>	<u>p /</u>
		<u>Mean</u>	<u>S.D.</u>		
Pt.Loko	21	6.86	1.0	4.67	.01
Frobisher Bay	17	4.88	1.5		
Mayola	78	5.65	1.5	1.26	NS
Pond Inlet	59	5.34	1.4		
Temne	99	5.93	1.3	3.13	.01
Eskimo	75	5.25	1.5		

e) Discussion and Conclusions

The finding of Bagby has been confirmed, but the present results are much less clear-cut. Whereas his results almost formed a clear dichotomy, the present degree of selection of the culturally familiar in all areas is less than sixty percent. This reduced effect is considered to be a result of the more rigid definition of 'predominance'. But even with a stricter control over the scoring of the reports, it is apparent that the culturally familiar predominates in a situation of visual conflict.

It is also apparent that, although the familiar predominates in all samples, it does so to different degrees; this difference appears to be related to the known group-reliance and field-dependence of the samples. The total Temne sample has selected their material significantly more often than the Eskimo have selected theirs.

An examination of the rank order correlations between the selection of the familiar and acquiescence (as a measure of group-reliance), and Kohs Blocks (as a measure of field-dependence) yields moderate support for this second hypothesis. Table 6:13 lists these correlations.

Table 6:13 Selection, Acquiescence, and Field-Dependence Correlations:

Sample	Selection	Acquiescence	Field-Dependence
	Rank	Rank	Rank
Pt.Loko	1	2	5
Edinburgh	2	4	1
Mayola	3	1	6
Pond Inlet	4	5	4
Inverkeilor	5	3	2
Frobisher Bay	6	6	3
	<u>r</u>	<u>t</u>	<u>p /</u>
Selection - Acquiescence	+.60	1.40	NS
Selection - Field-dependence	-.26	0.54	NS

Neither correlation is significant ($df.= 5$), but both are in the expected direction.

Further Analyses

(i) Effects of Eye Dominance

Although the responses of subjects who selected material almost exclusively with their dominant eye were eliminated, it is still possible that pictures presented to one side might be inherently more attractive because of lightness or colour, and hence reinforce the effects of dominance. To check for this possibility, an analysis was made of scored + responses made by left dominant and by right dominant subjects. Table 6:14 lists these data.

Table 6:14 + Responses of Left and Right Eye Dominant Subjects:

Sample	N	LEFT		N	RIGHT		t	p /
		Mean	S.D.		Mean	S.D.		
Inverkeilor	5	5.60	1.1	39	5.13	1.8	0.82	NS
Edinburgh	17	5.89	1.7	31	6.03	1.3	0.29	NS
Pt.Loko	3	7.00	0	17	6.88	1.0	0.50	NS
Mayola	13	6.46	1.5	62	5.50	1.5	2.09	.05
Frobisher Bay	5	4.20	1.3	12	5.17	1.6	1.30	NS
Pond Inlet	<u>18</u>	<u>5.50</u>	<u>1.5</u>	<u>41</u>	<u>5.31</u>	<u>1.5</u>	<u>0.45</u>	<u>NS</u>
	61	5.79	1.7	202	5.57	1.8	0.88	NS

In only one sample (Mayola) is there a significant relationship between the number of own-culture responses and the dominant eye; no consistent trend appears in the six samples as a whole. It is therefore considered that eye dominance has not played a significant role in the determination of the overall results.

(ii) Sex Differences

Since there is a moderate negative correlation between the number of own-culture responses and Kohs Blocks scores (as a measure of field-dependence), it is possible that sex differences might exist in the degree to which people select familiar material. Table 6:15 lists male and female scores separately.

Table 6:15 + Responses of Male and Female Subjects:

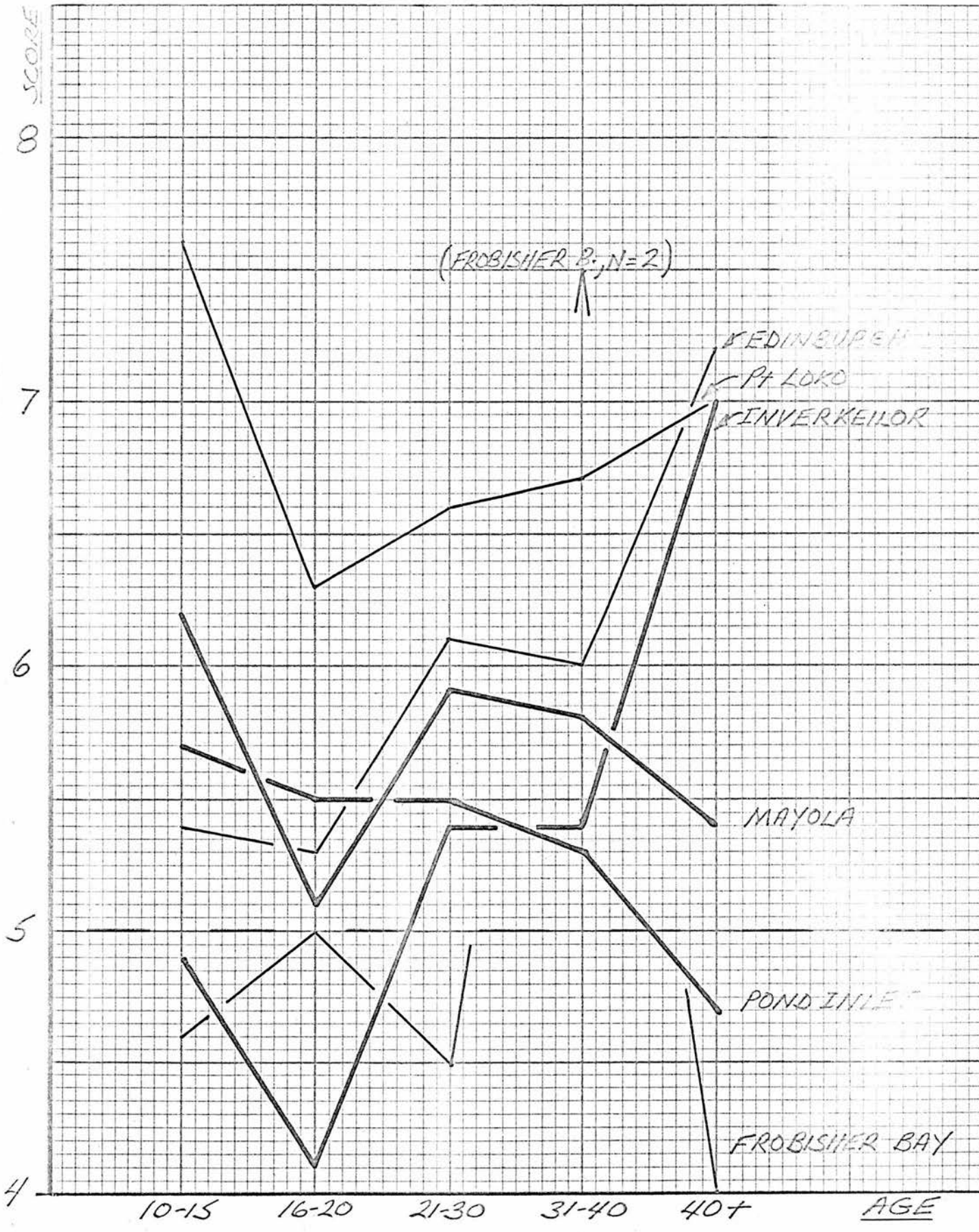
<u>Sample</u>	<u>MALE</u>			<u>FEMALE</u>			<u>t</u>	<u>p /</u>
	<u>N</u>	<u>Mean</u>	<u>S.D.</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>		
Inverkeilor	21	5.67	2.0	23	4.74	1.4	-1.76	.05
Edinburgh	25	5.92	1.5	23	6.04	1.5	0.27	NS
Pt.Loko	16	6.69	0.9	5	7.40	1.1	1.30	NS
Mayola	37	5.56	1.5	41	5.66	1.6	0.28	NS
Frobisher Bay	8	5.00	1.9	9	4.78	1.3	-0.27	NS
Pond Inlet	<u>31</u>	<u>5.42</u>	<u>1.5</u>	<u>28</u>	<u>5.25</u>	<u>1.4</u>	<u>-0.45</u>	<u>NS</u>
	138	5.73	1.9	129	5.48	1.6	-1.16	NS

It is apparent that there are no sex differences in the selection of the culturally familiar. A slight trend for females to select fewer own-culture pictures exists in Inverkeilor, Frobisher Bay, and Pond Inlet, but it only reaches significance in Inverkeilor.

(iii) Age Trends

Age trends are plotted on graph 6:3, page 125. In the Scottish and Temne samples, there is a tendency for the lowest number of own-culture responses to occur in the 16-20 age group, which seems to parallel the age trends found in the study of acquiescence. But the gradual rise with increasing age found in that study now occurs only in three of the six samples: Inverkeilor, Edinburgh and Pt.Loko. In Mayola, there is a decline in + responses with advancing age.

Graph 6:3 Selection Test: Age Trends



Put in the two Eskimo samples, there is a different pattern altogether. In Pond Inlet, there is a gradual decline in + scores through all the age groups, and a similar pattern exists in the Frobisher Bay sample, except for the large score of the 31-40 age group, where, however, N equals only two.

No evidence is available to help explain these divergent trends, except that a much larger portion of Eskimo responses was discarded because of marked eye dominance. But how this differential elimination might affect scores in this way cannot be understood, since the experimental design was balanced left and right for own-culture material.

4) Assimilation

a) Introduction

In an early paper Gibson (1929) investigated, "the ways in which the reproduction of visually perceived forms varies from the original stimuli". He found that material presented to subjects tended to be altered in five distinct ways:

1. Object Assimilation, in which the reproduction is clearly changed so that it more nearly resembles the familiar thing than does the stimulus figure.
 2. Verbal Analysis, in which the stimulus figure is analysed verbally, and the reproduction resembles the analysis.
 3. Figure Assimilation, in which the stimulus figure is apprehended as resembling another stimulus figure.
 4. Completion, in which figures with gaps are drawn with a continuous contour, and Disintegration, in which the figures with gaps are drawn in two or more pieces.
 5. Rectilinearity, in which curved lines tend to be drawn as straight ones.
- The first type of change (object assimilation) had already been investigated by Wulf (1922), who had termed the phenomenon 'normalizing', or a change in the direction of a familiar object.

Bartlett (1932) has performed a series of experiments requiring the reproduction of visual material presented tachistoscopically. His presentations ranged in complexity from simple geometric forms, through more detailed figures, to complex drawings usually accompanied by words. Alterations similar to these five types were frequently noted, especially the tendency to assimilate the more complex drawings to familiar objects.

In their well-known paper (1932), Carmichael, Hogan and Walter investigated Gibson's second type of change (verbal analysis) by preceding the figure presentations with the suggestion that, "the next figure resembles a ... ". Other investigators have studied various aspects of this type of change: varying the interval between presentation and reproduction, followed by subsequent rather than prior naming (Hanawalt and Demarest, 1939), immediate reproduction (Bruner, Busiek and Minturn, 1952), selecting from a range of previously drawn pictures rather than making a reproduction (Prentice, 1954), and varying set and exposure time (Herman, Lawless and Marshall, 1957).

But no subsequent work has been done on the first (and according to Gibson, the more frequent) type of change, that of object assimilation. The last of the above series of investigations (Herman, Lawless and Marshall, 1957) found that about one-fifth of their control group (which had received no verbal suggestion at all) reproduced the figures in an altered fashion. They asked, "How is it that subjects reproduce figures to resemble objects not labelled for them?", and answered that, "organisms tend to perceive objects, both ambiguous and un-ambiguous, in terms of meanings and associations that objects have for them", which is essentially what Wulf, Gibson and Bartlett all discovered thirty years earlier.

b) Hypotheses

In this study, 'object assimilation' or 'normalization' is investigated by using subjects who have markedly different sets of, "meanings and associations".

It is considered that outline forms presented to peoples of divergent backgrounds, such as the Temne and the Eskimo, will be reproduced (where possible) with considerable modification toward the culturally familiar form of the object.

Hypothesis 1, then, follows:

Hypothesis 1: Reproductions of outline forms, presented tachistoscopically, will show assimilation to a culturally familiar form.

The studies of perceptual skills suggest a further hypothesis; that the Eskimo samples will show a lesser tendency to assimilate the objects to the culturally familiar than the Temne. A greater awareness of detail and a suitable system of geometrical terms might enable the Eskimo to apprehend, momentarily retain, and reproduce the forms with a lesser degree, both of total change and of assimilation to the familiar. Hypothesis 2, then, follows:

Hypothesis 2: The Eskimo will reproduce the forms more accurately, both in terms of total change, and in terms of change toward the culturally familiar (assimilation) than the Temne.

c) Test Description

A group of nine outline forms (see page 129) was prepared. Of these nine, three were suitable for presentation to the Scots and the Temne, three were suitable for the Scots and the Eskimo, and three were suitable for the Temne and the Eskimo. Each group was thus presented with six drawings, according to the following plan:

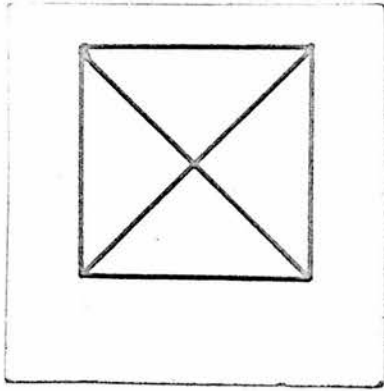
Table 6:16 Sequence of Drawings Presented to the Three Societies:

<u>Sample</u>	<u>Sequence, and No. of Drawing</u>					
Scots	1	2	3	4	5	6
Temne	1	2	3	7	8	9
Eskimo	4	5	6	7	8	9

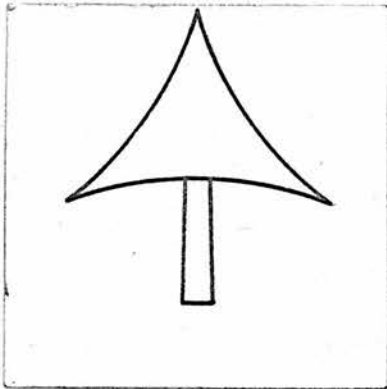
The pictures were drawn on white cardboard, five centimetres by five centimetres, with black india ink, lines one millimetre thick, and were presented in the tachistoscope described in appendix 2. Those subjects who could not draw, as gauged

Assimilation: Outline Forms

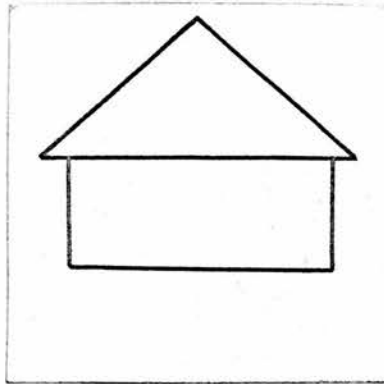
Trial



Scots-
Temne



1

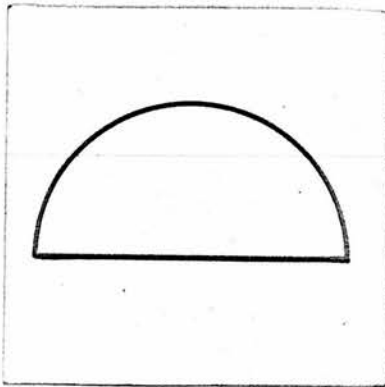


2

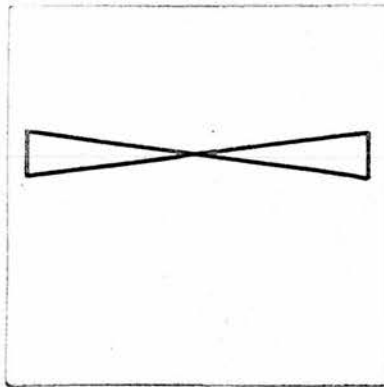


3

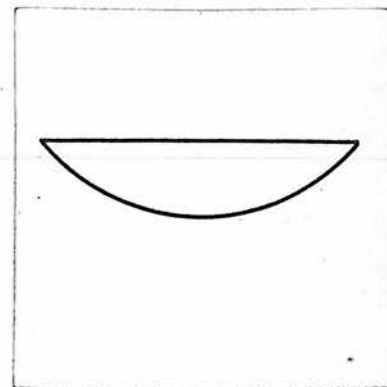
Scots-
Eskimo



4

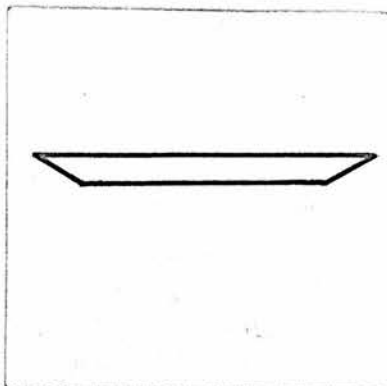


5

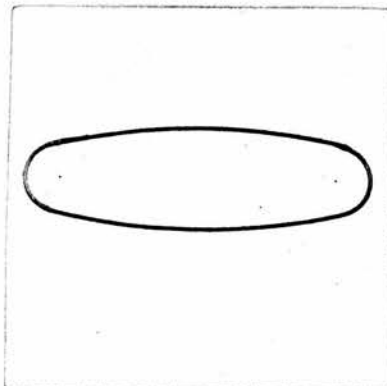


6

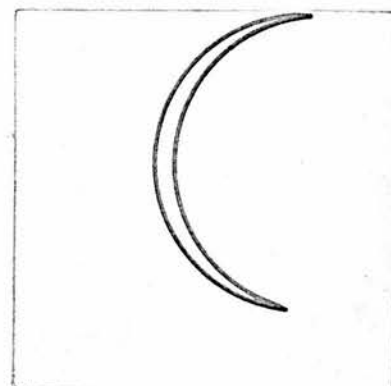
Temne-
Eskimo



7



8



9

by the closure test, were not administered these forms (see table 6:17). A trial form was also administered, prior to the actual test, as a further check on drawing ability. All others, who were able to draw, were told:

I am going to show you some more pictures in this box. I would like you to draw exactly what you see.

The trial picture was then presented, followed by the six test forms in the sequence given above. After the subject had drawn all six pictures, he was asked, for each one:

Do you think that you could describe what you saw?

Subjects usually responded in one of three ways:

1. By naming what he thought the object was.
2. By giving an objective, geometric description of it.
3. By saying that he could not describe it, or did not know what it was.

Each drawing was rated, after all had been collected from the three areas, on two scales. These ratings were checked by Mr. David Hall, who questioned forty-nine of the total 1752 ratings; thirty-three changes were finally agreed upon. The two initial ratings were for the overall degree of change in the reproduction, and for the type of description given the drawing by the subject.

Rating 1: For degree of change in the reproduction:

No, or minimal change	rated 0
Moderate change	rated 1
Large change	rated 2

Rating 2: For type of description:

Subject named the reproduction	rated A
Geometrical description given	rated B
'Cannot describe', or 'Don't know'	rated C
Cannot rate	rated D

All those drawings rated 'A', for degrees of change 1 and 2, were then examined for arbitrary changes in the reproductions which were not in the direction indicated by the subject's own description of it, that is, for changes described by the subject as a culturally familiar form, but considered random by the rater; those drawings not eliminated in this way were considered to be valid examples of assimilation.

Examples of Scottish, Temne and Eskimo (S-90, T-93, and E-52) reproductions, and their ratings are shown on pages 132 to 134. The subject's description of each drawing is written below it in quotation marks; comments made after questioning are written within brackets. The two ratings, for 'degree of change', and 'type of description' appear beneath the descriptions. In these three examples no reproductions have been eliminated for arbitrary distortions.

d) Results

The groups of three figures presented to a pair of societies will be considered as units; for example, figures 1, 2, and 3 form a unit shared by the Scots and the Temne.

Table 6:17 shows the number of subjects able to draw in the six samples.

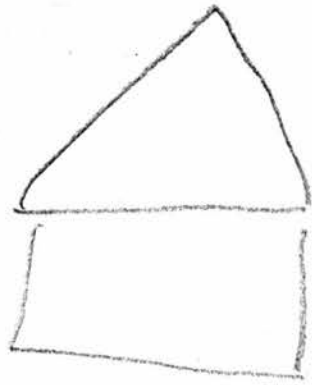
Table 6:18 shows the percentage of drawings in each sample showing assimilation in 'degree of change' categories 1 and 2.

Table 6:19 shows the percentage of drawings in each sample falling in the three 'degree of change' categories, for those rated 'A' only; table 6:20 shows the percentage of drawings in each sample in the three 'degree of change' categories, for all reproductions (those rated A, B, C, or D); table 6:21 shows the percentage of drawings in each sample falling in the four 'type of description' categories, for all reproductions rated 0, 1, or 2.

1



2



3



4



5



6



1

"A stool"

2

"A house"

3

"A telegraph pole"

4

"Half a circle"

5

"A gate"

6

"Half a circle"

	1	2	3	4	5	6	TOTAL
CHANGE	1	0	1	0	1	1	
PREDICTION	A	A	A	B	A	B	

NAME LOC. NO. 5-90

REMARKS
.....
.....
.....

1



2



3



4



5



6



1

"a tree"

2

"a house"

3

"a hook-stick"

4

"a boat"

5

"a moon"
(later described
as a "full-moon")

6

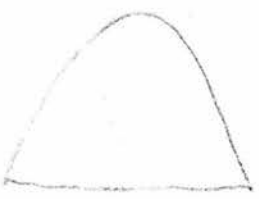
"the moon"

	1	2	3	4	5	6	TOTAL
CHANGE	2	2	1	1	0	0	
PREDICTION	A	A	A	A	A	A	

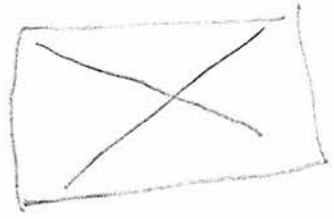
NAME LOC. NO. 7-93

REMARKS
.....
.....
.....
.....
.....
.....

1



2



3



4



5



6



1

"Hill"

2

"Flag"

3

"Boat"

4

"Boat"

5

"Don't know"

6

"Moon"

	1	2	3	4	5	6	TOTAL
CHANGE	0	2	1	1	0	0	
PREDICTION	A	A	A	A	C	A	

NAME LOC. NO. E-57

REMARKS

.....
.....
.....
.....
.....
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.....
.....

Table 6:17 Numbers of Subjects in Six Samples:

<u>Sample</u>	<u>Number able to do Closure Test</u>	<u>Number not able to draw Present Figures</u>	<u>Net Number in Samples</u>
Inverkeilor	58	0	58
Edinburgh	59	0	59
Pt.Loko	28	4	24
Mayola	42	2	40
Frobisher Bay	29	1	28
Pond Inlet	83	0	83

Table 6:18 Percentage of Drawings Showing Assimilation:

<u>Figures</u>	<u>DEGREE OF CHANGE</u>			
	<u>1</u>		<u>2</u>	
	<u>Moderate Change</u>		<u>Large Change</u>	
<u>Scot-Temne</u> <u>1, 2, and 3</u>	Pt.Loko	48.6 %	Mayola	55.0 %
	Edinburgh	48.5	Pt.Loko	22.2
	Inverkeilor	32.7	Inverkeilor	6.3
	Mayola	30.0	Edinburgh	3.4
<u>Scot-Eskimo</u> <u>4, 5, and 6</u>	Edinburgh	11.8 %	Edinburgh	2.9 %
	Inverkeilor	7.5	Pond Inlet	2.7
	Pond Inlet	6.4	Frobisher B.	2.4
	Frobisher B.	3.6	Inverkeilor	1.7
<u>Temne-Eskimo</u> <u>7, 8, and 9</u>	Mayola	35.8 %	Mayola	21.7 %
	Pt.Loko	26.4	Pt.Loko	13.9
	Pond Inlet	13.6	Pond Inlet	0.8
	Frobisher B.	7.1	Frobisher B.	0
<u>Totals:</u>	Pt.Loko	37.5 %	Mayola	38.4 %
	Mayola	32.9	Pt.Loko	18.1
	Edinburgh	30.1	Inverkeilor	4.0
	Inverkeilor	20.1	Edinburgh	2.9
	Pond Inlet	10.0	Pond Inlet	1.8
	Frobisher B.	5.4	Frobisher B.	1.2
	Average	11.1 %	Average	22.7 %

Table 6:19 Percentage of Drawings in 'Degree of Change' Categories: 'A' Only:

<u>Figures</u>	<u>DEGREE OF CHANGE</u>					
	0		1		2	
	<u>No Change</u>		<u>Moderate Change</u>		<u>Large Change</u>	
<u>Scot-Temne</u> <u>1, 2, and 3</u>	Edinburgh	31.6 %	Pt.Loko	52.8 %	Mayola	56.7 %
	Inverkeilor	22.4	Edinburgh	49.7	Pt.Loko	22.2
	Pt.Loko	15.3	Inverkeilor	33.3	Inverkeilor	6.9
	Mayola	4.2	Mayola	30.0	Edinburgh	3.4
<u>Scot-Eskimo</u> <u>4, 5, and 6</u>	Pond Inlet	63.9 %	Edinburgh	11.8 %	Edinburgh	2.9 %
	Frobisher B.	50.0	Inverkeilor	7.5	Pond Inlet	2.7
	Edinburgh	42.9	Pond Inlet	6.7	Frobisher B.	2.4
	Inverkeilor	36.2	Frobisher B.	3.6	Inverkeilor	1.7
<u>Temne-Eskimo</u> <u>7, 8, and 9</u>	Frobisher B.	70.2 %	Mayola	40.8 %	Mayola	25.0 %
	Pond Inlet	66.3	Pt.Loko	27.8	Pt.Loko	13.9
	Pt.Loko	54.2	Pond Inlet	14.1	Pond Inlet	0.8
	Mayola	20.0	Frobisher B.	7.1	Frobisher B.	0
<u>Totals:</u>	Pond Inlet	65.1 %	Pt.Loko	40.3 %	Mayola	40.9 %
	Frobisher B.	60.0	Mayola	35.4	Pt.Loko	18.1
	Edinburgh	37.3	Edinburgh	30.8	Inverkeilor	4.3
	Pt.Loko	29.7	Inverkeilor	20.4	Edinburgh	3.2
	Inverkeilor	29.3	Pond Inlet	10.4	Pond Inlet	1.8
	Mayola	<u>12.1</u>	Frobisher B.	<u>5.4</u>	Frobisher B.	<u>1.2</u>
	Average	38.9 %	Average	23.7 %	Average	12.6 %

The total of the three averages = 75.2 %, or all those rated 'A'.

Table 6:20 Percentage of Drawings in 'Degree of Change' Categories: A,B,C, and D:

<u>Figures</u>	<u>DEGREE OF CHANGE</u>					
	<u>0</u>		<u>1</u>		<u>2</u>	
	<u>No Change</u>		<u>Moderate Change</u>		<u>Large Change</u>	
<u>Scot-Temne</u> <u>1, 2, and 3</u>	Edinburgh	32.2 %	Edinburgh	61.6 %	Mayola	64.2 %
	Inverkeilor	29.3	Inverkeilor	59.2	Pt.Loko	31.9
	Pt.Loko	15.3	Pt.Loko	52.8	Inverkeilor	11.1
	Mayola	4.2	Mayola	31.7	Edinburgh	6.3
<u>Scot-Eskimo</u> <u>4, 5, and 6</u>	Frobisher B.	90.5 %	Edinburgh	16.4 %	Inverkeilor	4.0 %
	Pond Inlet	87.5	Inverkeilor	16.1	Edinburgh	3.5
	Edinburgh	80.2	Pond Inlet	9.8	Pond Inlet	2.7
	Inverkeilor	79.9	Frobisher B.	7.2	Frobisher B.	2.4
<u>Temne-Eskimo</u> <u>7, 8, and 9</u>	Frobisher B.	91.6 %	Mayola	47.5 %	Mayola	28.3 %
	Pond Inlet	83.2	Pt.Loko	29.2	Pt.Loko	15.3
	Pt.Loko	55.6	Pond Inlet	16.1	Pond Inlet	0.8
	Mayola	24.1	Frobisher B.	8.3	Frobisher B.	0
<u>Totals:</u>	Frobisher B.	91.0 %	Pt.Loko	41.0 %	Mayola	46.3 %
	Pond Inlet	85.4	Mayola	39.6	Pt.Loko	23.6
	Edinburgh	61.2	Edinburgh	39.0	Inverkeilor	7.8
	Inverkeilor	54.6	Inverkeilor	37.7	Edinburgh	4.9
	Pt.Loko	35.4	Pond Inlet	12.9	Pond Inlet	1.8
	Mayola	<u>14.3</u>	Frobisher B.	<u>7.8</u>	Frobisher B.	<u>0.4</u>
	Average	56.2 %	Average	29.7 %	Average	14.1 %

The total of the three averages = 100.0 %.

Table 6:21 Percentage of Drawings in 'Type of Description' Categories: 0,1 and 2:

'A' - Figure Named:

Pt.Loko	93.1 %
Mayola	88.4
Pond Inlet	77.8
Edinburgh	71.2
Frobisher B.	66.7
Inverkeilor	<u>54.0</u>
Average	75.2 %

'C' - 'Cannot describe', or 'Don't know':

Frobisher B.	30.9 %
Pond Inlet	22.8
Inverkeilor	13.5
Mayola	8.4
Pt.Loko	2.8
Edinburgh	<u>1.5</u>
Average	13.3 %

'B' - Geometric Description:

Inverkeilor	32.5 %
Edinburgh	27.5
Frobisher B.	2.4
Mayola	0.4
Pond Inlet	0
Pt.Loko	<u>0</u>
Average	10.5 %

'D' - Cannot Rate:

Pt.Loko	4.2 %
Mayola	2.9
Inverkeilor	0
Edinburgh	0
Frobisher B.	0
Pond Inlet	<u>0</u>
Average	1.1 %

e) Discussion and Conclusions

Hypothesis 1, that the samples would all tend to reproduce the outline forms assimilated to the culturally familiar, is accepted (see table 6:18). Assimilation has taken place to a large degree in an average 11.1 % (range from 38.4 % in Mayola to 1.2 % in Frobisher Bay) of all reproductions, and a moderate extent in an average 22.7 % (range from 37.5 % in Pt.Loko to 5.4 % in Frobisher Bay). The sum of these figures (33.8 %) plus those rated '0' (38.9 %, see table 6:19) and those eliminated as arbitrary reproductions (2.5 %) represents all reproductions rated 'A' (75.2 %, see table 6:21). Since the original data were comprised of ratings of drawings made by people of greatly varied backgrounds and artistic skill, it is considered that statistical tests of this hypothesis would only lend a false aura of precision to it. Hence the hypothesis is accepted solely on the basis of an average 33.8 % moderate or large degree of assimilation, opposed to an average 38.9 % no change at all.

Hypothesis 2 is more difficult to evaluate without the use of statistical tests. It is apparent, though, from an examination of tables 6:18, 6:19 and 6:20 that the Eskimo samples have produced the most number of '0' responses, on both 'A' and total ratings, and the least number of '1' and '2' responses. The Temne, on the other hand, have produced the least number of '0' responses, on both 'A' and total ratings, and the most number of '1' and '2' responses. On this basis, it is considered that the Temne have assimilated these outline forms to the culturally familiar more often than have the Eskimo, and have made more total alterations in their reproductions, whether assimilated or not.

The ability to discriminate fine detail was considered to contribute to this lower tendency to assimilate these forms, as well as to the availability of a suitable system of geometric concepts. But an examination of table 6:21 shows that the Eskimo have not used these terms very often in describing their drawings (2.4 % in Frobisher Bay, and not at all in Pond Inlet). But the large number of 'don't know' responses in both Eskimo samples suggests that the forms were apprehended as details rather than as familiar objects or geometric shapes. The primary role of the ability to discriminate fine detail is emphasized by the rank correlation between the results of the present test and the results of the Closure test for the six samples. The rankings of the samples are almost identical on both measures ($r = .89$, $df = 5$, $p < .01$).

5) Illusions

a) Introduction

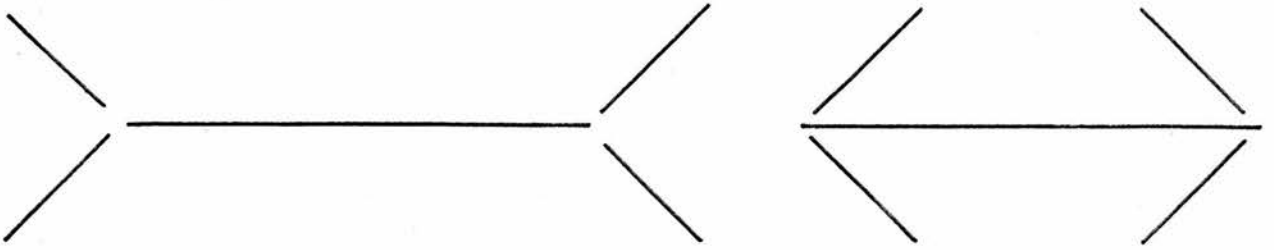
The study of visual illusions shares with the study of acuity, the longest history in cross-cultural psychological research. It was commonly accepted that 'primitive' peoples would exhibit a greater susceptibility to visual illusions than would the more 'civilized' Europeans. Rivers' first study (1901)

demonstrated that, although the Murray Islanders were more susceptible than Europeans to the Horizontal-Vertical illusion (see page 141 for examples of the illusions), they were less susceptible to the Müller-Lyer illusion. His second study, among the Todas (1905), confirmed these trends. Rivers suggested that the two illusions belonged to different categories, the Horizontal-Vertical belonging to the class of illusion which, "depends on physiological conditions and the effects of experience in civilized life, such experience, for instance, as is derived from the study of geometry and drawing, is to diminish the illusion". "The Müller-Lyer illusion, on the other hand, is one of those of which the explanation is probably more strictly psychological. The psychological factors upon which the illusion depends are, however, of a simple nature, and affect both savage and civilized man ...". The differential susceptibility, he suggested, was due to, "a difference in the direction of attention, the savage attending more strictly to the two lines he desired to make equal, while the civilized man allows the figure as a whole to exert its full influence on his mind". This suggestion of a different psychological process in 'primitive' man as an explanation of differential susceptibility to visual illusion drew attention away from the possible role of factors external to the individual.

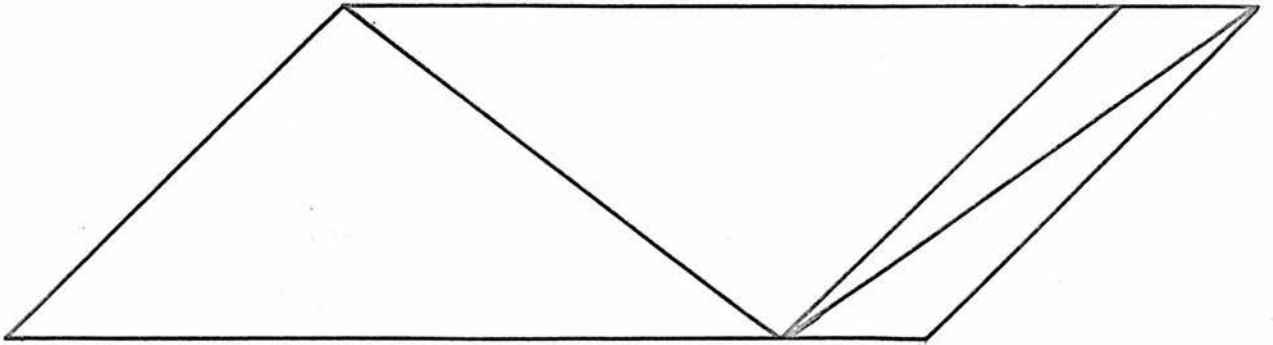
It was not until 1956 that the possible role of cultural and ecological factors in the determination of visual illusions was put forward by Herskovits, Campbell and Segall in a booklet of illusions intended to be issued to anthropologists going into the field.

If cross-cultural differences in extent of illusions are found, the initial explanatory effort would be focused on differences in the visual environment ... typical form of houses, the maximum distance at which objects are viewed, whether or not vistas over land or water occur...

The major cultural factor suggested was the degree of rectangularity in typical houses and furniture.



Müller-Lyer Illusion



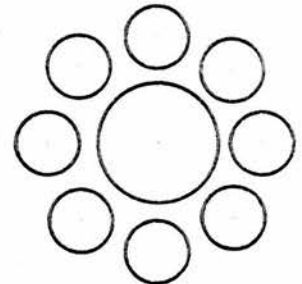
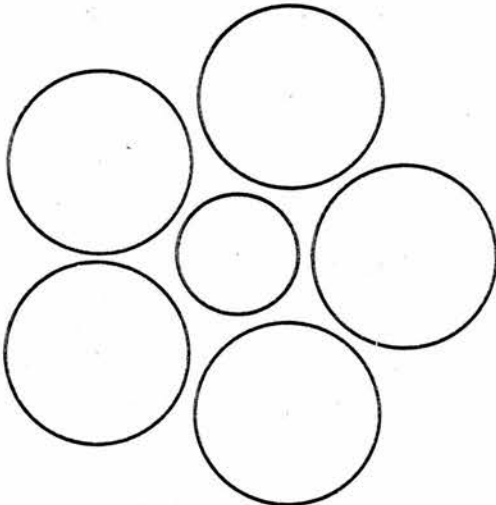
Sander Parallelogram Illusion



Horizontal-Vertical Illusion (Form a)



Horizontal-Vertical Illusion (Form b)



Titchener Circle Illusion

In the carpentered Western world, such a great proportion of artifacts are rectangular that the habit of interpreting obtuse and acute angles as rectangular surfaces extended into space is a very useful one.

By 1962, data from fifteen cultural groups (1878 subjects) had been collected, (Segall, Campbell and Herskovits, 1963).

Evidence seems to point to cross-cultural differences in visual inference systems learned in response to different ecological and cultural factors in the visual environment.

The 'Carpentered World' hypothesis was put forward to explain the significant differences found between the three European samples and the thirteen non-European samples in both Müller-Lyer and Sander Parallelogram illusions.

The tendency to interpret acute and obtuse angles on a two dimensional surface as representative of rectangular objects in three dimensional space ... is much more valid in highly carpentered, urban European environments, and could enhance or even produce the Müller-Lyer or Sander illusions.

The significant differences found between the European and non-European groups on the two forms of the Horizontal-Vertical illusion (a and b) were considered to be,

... the result of an inference habit of interpreting vertical lines as extensions away from one in the horizontal plane. Such an inference habit would have more validity for those living in an open, flat terrain than in rain forests or canyons.

The differential validity of these two types of cues (and the differential susceptibility to the illusions) can be related to the 'Assumptive World' of Ames (Ittleson and Cantril, 1954; Ittleson, 1960). In their terms, the 'weighted average' of an individual's past experience in different cultures and ecologies will necessarily be different. The 'Assumptive Worlds', on which present percepts are based therefore differ, and hence susceptibility to the illusions can be expected to differ in degrees in individuals inhabiting these different environments.

Four cross-cultural studies of visual illusion were published in the 1956 to 1963 interval. Heuse (1957) confirmed greater European susceptibility to the Müller-Lyer illusion when compared to Sudanese and Guinean male subjects, but found slightly more, rather than less European susceptibility to the Horizontal-Vertical illusion.

Morgan (1959), using the Herskovits, Campbell and Segall booklet, also confirmed greater European susceptibility to the Müller-Lyer illusion and the Sander Parallelogram, and confirmed the usual finding of greater non-European susceptibility to the Horizontal-Vertical illusion.

Bonte (1962) administered the Müller-Lyer illusion in two versions to Europeans in the Congo and to Congolese. The sliding board technique previously used by Rivers (1901) produced no significant differences between the groups, but the booklet version produced highly significant differences. She concluded that the method of presentation was very important in the production of the illusion.

Mundy-Castle and Nelson (1962), also using the booklet, in general confirmed the usual trends - greater susceptibility to Müller-Lyer and Sander by the Europeans, coupled with lesser susceptibility to the Horizontal-Vertical illusion.

Dawson (1963a) included the booklet in his battery of perceptual tests, and found Africans (mine employees in Sierra Leone) to be less susceptible to the Müller-Lyer illusion, but more susceptible to the Sander Parallelogram than Segall, Campbell and Herskovits' European samples. Dawson also analysed his illusion data to discover if the relationship between field-dependence and susceptibility to illusion found by Gardner (1957, 1961) held cross-culturally. The Horizontal-Vertical illusions correlated $-.36$ and $-.37$ (significant at the $.05$ level) with Kohs Blocks scores, but Müller-Lyer and Sander correlations with Kohs scores were not significant. Recent work by McGurk (1965) has tended to support Gardner's finding, but her results, like Dawson's, were equivocal.

b) Test Description

The four illusions which have been discussed so far (Müller-Lyer, Sander Parallelogram, and the two versions of the Horizontal-Vertical illusion) were administered to all subjects in the six samples, using the Herskovits, Campbell and Segall (1956) booklet. A fifth illusion, the Titchener Circle illusion, not included in the booklet, was also administered. Wapner and Werner (1957) have found the Titchener illusion to increase with age (from 6 to 19 years) while most other illusions decrease with age (Walters, 1942; Fraisse and Vautry, 1956; Wohlwill, 1960). It was considered that susceptibility to this illusion might be a good index of perceptual development, and those samples showing high Kohs Blocks scores would also show high susceptibility to the Titchener illusion, that is, a trend opposite to the one reported by Gardner (1957, 1961), by Dawson (1963a) and by McGurk (1965) for most other illusions.

Table 6:22 lists the specifications of the five illusions.

Table 6:22 Specifications of the Five Illusions:

<u>Illusion</u>	<u>Number of Presentations</u>	<u>Range of % Discrepancy Between the Segments to be Compared</u>
Müller-Lyer	12	- 8 % to +48 %
Sander Parallelogram	7	-14 % to +75 %
H-V (a)	9	-11 % to +35 %
H-V (b)	11	- 9 % to +53 %
Titchener	8	- 7 % to +23 %

For each illusion, the subject was required to indicate which of two segments (lines or circles) was the larger. In each case, the method of response was simplified; the subject merely had to say 'red' or 'black', 'left' or 'right', to indicate his choice. The '% Discrepancy' in the above table refers to the difference in length or size of the two segments which are being compared, divided by the length or size of the segment which is not typically overestimated. The score for each illusion is simply the number of times the subject chose the typically overestimated segment.

c) Hypotheses

The major reason for including a set of illusions in the present study was that no worker had tested the 'Carpentered World' and the 'Horizontal-Vertical Space' hypotheses using sub-samples from a single society. It was considered that if two sub-samples were administered the illusions, each with a different degree of 'carpentered' experience and familiarity with horizontal and vertical space, then most other inter-cultural variables might be eliminated. However, Gregor and McPherson have since made this sample split (1965) and their results will be discussed along with those of the present study.

Two forms of each hypothesis will therefore be presented; one to be tested across all six samples, and one to be tested between the two sub-samples of each culture.

1. Carpentered World Hypothesis

(i) Those samples which live in highly carpentered environments will be most susceptible to the Müller-Lyer and Sander Parallelogram illusions.

(ii) Within each culture, the urban, more highly carpentered sample will be more susceptible to these two illusions.

2. Horizontal-Vertical Space Hypothesis

(i) Those samples which live in predominantly 'horizontal' space will be most susceptible to both forms of the Horizontal-Vertical illusion.

(ii) Within each culture, the rural, more 'horizontal' sample will be more susceptible to these two illusions.

3. Perceptual Development Hypothesis

(i) Those samples with highest Kohs Blocks scores (as a measure of perceptual development or field-independence) will be most susceptible to the Titchener Circle illusion.

(ii) Within each culture, the rural, less perceptually developed sample will be less susceptible to this illusion.

d) Results

Before analysing the data, each of the six samples was assigned two ranks: one for the relative degree of 'carpenteredness', and one for the relative degree of open vistas, or 'horizontal' space. Table 6:23 lists these ranks.

Table 6:23 Ranks of Six Samples on 'Carpenteredness' and 'Horizontality':

<u>Carpenteredness</u>		<u>Horizontality</u>	
HIGH		HIGH	
1.	Edinburgh	1.	Pond Inlet
2.	Inverkeilor	2.	Inverkeilor
3.	Frobisher Bay	3.	Frobisher Bay
4.	Pt.Loko	4.	Mayola
5.	Pond Inlet	5.	Edinburgh
6.	Mayola	6.	Pt.Loko
LOW		LOW	

Before any score was included in the calculation of the mean for the sample, it was examined for internal consistency. Those scores which were found to be internally inconsistent (according to the criterion of Segall, Campbell and Herskovits, 1963) were eliminated; that is, if the subject's responses displayed more than one reversal (being susceptible to a lesser degree of illusion while not being susceptible to a greater degree of illusion), then his score was ignored. The numbers of responses eliminated for this reason are shown in table 6:24.

Table 6:24 Number of Responses Eliminated from Illusion Analysis:

Sample	Total	<u>Müller-Lyer</u>		<u>Sander</u>		<u>H-V a</u>		<u>H-V b</u>		<u>Titchener</u>	
	Number	<u>Elim.</u>	<u>Net.</u>	<u>Elim.</u>	<u>Net.</u>	<u>Elim.</u>	<u>Net.</u>	<u>Elim.</u>	<u>Net.</u>	<u>Elim.</u>	<u>Net.</u>
Inverkeilor	62	7	55	2	60	0	62	4	58	1	61
Edinburgh	60	5	55	2	58	2	58	1	59	1	59
Pt.Loko	32	8	24	1	31	0	32	1	31	3	29
Mayola	90	12	78	1	89	3	87	10	80	6	84
Frobisher Bay	31	2	29	1	30	0	31	1	30	0	31
Pond Inlet	91	2	89	4	87	0	91	0	91	0	91

Tables 6:25 to 6:29 list the means on the five illusions for the six samples.

Table 6:25 Results of the Müller-Lyer Illusion:

<u>Sample</u>	<u>Mean</u>	<u>S.D.</u>
Edinburgh	5.02	1.58
Inverkeilor	4.95	1.47
Frobisher Bay	4.21	1.21
Pond Inlet	4.18	1.43
Mayola	3.42	1.22
Pt.Loko	3.08	1.18

Table 6:26 Results of the Sander Parallelogram Illusion:

<u>Sample</u>	<u>Mean</u>	<u>S.D.</u>
Frobisher Bay	3.73	0.87
Edinburgh	3.70	1.21
Inverkeilor	3.40	1.42
Pond Inlet	3.16	0.97
Pt.Loko	2.97	1.28
Mayola	2.31	0.82

Table 6:27 Results of the Horizontal-Vertical Illusion: Form a:

<u>Sample</u>	<u>Mean</u>	<u>S.D.</u>
Pt.Loko	6.13	1.07
Mayola	6.10	1.16
Pond Inlet	5.86	0.99
Inverkeilor	5.52	1.14
Frobisher Bay	5.48	1.21
Edinburgh	5.12	1.11

Table 6:28 Results of the Horizontal-Vertical Illusion: Form b:

<u>Sample</u>	<u>Mean</u>	<u>S.D.</u>
Pond Inlet	7.05	0.96
Pt.Loko	6.45	1.15
Mayola	6.33	1.11
Frobisher Bay	6.23	1.36
Inverkeilor	5.84	1.06
Edinburgh	5.65	1.03

Table 6:29 Results of the Titchener Circle Illusion:

<u>Sample</u>	<u>Mean</u>	<u>S.D.</u>
Edinburgh	4.27	1.06
Inverkeilor	4.21	1.16
Pond Inlet	4.05	0.79
Frobisher Bay	3.81	0.65
Pt.Loko	3.45	1.21
Mayola	2.96	0.94

Test of the 'Carpentered World' Hypothesis

(i) <u>Across the six samples:</u>	<u>Rank r with 'carpenteredness'</u> <u>rating</u>	<u>t</u>	<u>p /</u>
Müller-Lyer	.83	2.99	.05
Sander	.78	2.50	.05

(ii) Within cultures:

<u>Müller-Lyer</u>	<u>t</u>	<u>p /</u>
Edinburgh - Inverkeilor	0.24	NS
Pt.Loko - Mayola	-1.22	NS
Frobisher Bay - Pond Inlet	0.11	NS
<u>Sander</u>		
Edinburgh - Inverkeilor	1.21	NS
Pt.Loko - Mayola	2.67	.01
Frobisher Bay - Pond Inlet	3.24	.01

Test of the Horizontal-Vertical Space Hypothesis

(i) <u>Across the six samples:</u>	<u>Rank r with 'horizontality'</u> <u>rating</u>	<u>t</u>	<u>p /</u>
H-V a	-.20	-0.42	NS
H-V b	+.20	0.42	NS

(ii) Within cultures:

<u>H-V a</u>	<u>t</u>	<u>p /</u>
Inverkeilor - Edinburgh	1.95	.05
Mayola - Pt.Loko	-0.13	NS
Pond Inlet - Frobisher Bay	1.58	NS
<u>H-V b</u>		
Inverkeilor - Edinburgh	0.99	NS
Mayola - Pt.Loko	-0.43	NS
Pond Inlet - Frobisher Bay	3.06	.01

Test of the Perceptual Development Hypothesis

(i) <u>Across the six samples:</u>	<u>Rank r with Kohs score</u>	<u>t</u>	<u>p /</u>
Titchener	.94	5.43	.01

(ii) Within cultures:

	<u>t</u>	<u>p /</u>
Edinburgh - Inverkeilor	0.03	NS
Pt.Loko - Mayola	1.98	.05
Frobisher Bay - Pond Inlet	-1.65	NS

e) Discussion

Carpentered World Hypothesis

Across the six samples this hypothesis is confirmed at the .05 level of confidence. Those samples which were rated high in degree of 'carpenteredness' tended to have high Müller-Lyer and Sander illusion scores.

Within each culture the differences between the urban, highly carpentered samples and the generally less carpentered rural samples are only significant on two of the six tests. No consistent trend appears in the Müller-Lyer tests, but with the Sander illusion all are in the predicted direction, two of them being significant at the .01 level of confidence.

It should be noted that the general ordering of the sample means is such that those samples with high Kohs Blocks scores also tend to have high Müller-Lyer and Sander illusion scores (rank r for Müller-Lyer = .97, and for Sander = .83). This apparent relationship, which is contrary to Gardner's (1957,1961), Dawson's (1963a) and McGurk's (1965) finding, is considered spurious; it has already been shown that the two Scottish samples and the urban, more westernized Temre and Eskimo samples had better Kohs scores (page 70), but it is precisely these samples which have incidentally been rated highest on degree of 'carpenteredness'. It is apparent that, for the samples in the present study, field-independence and a high degree of 'carpenteredness' inevitably vary together.

But even within each sample no support is found for their contention that field-dependence is positively related to susceptibility to illusions:

Table 6:30 Kohs Blocks Correlations with Müller-Lyer and Sander Scores:

<u>Sample</u>	<u>Müller-Lyer</u>	<u>Sander</u>
Inverkeilor	.12	-.22
Edinburgh	-.22	-.07
Pt.Loko	-.28	.44
Mayola	.32	-.06
Frebisher Bay	.32	.09
Pond Inlet	-.14	.21

Although some correlations reach the level of significance, there are no consistent trends for either illusion.

Horizontal-Vertical Space Hypothesis

This hypothesis is not accepted across the six samples of this study. Although H-V a and H-V b rank correlate with each other (+.78), neither form of the illusion correlates significantly with the criterion.

Within cultures the hypothesis seems to have been confirmed for the Scottish and Eskimo samples, but not for the Temne samples. In the Scottish samples, one test is significant at the .05 level and the other is in the predicted direction. In the Eskimo samples, one test is significant at the .01 level and the other is just short of significance at the .05 level. The Temne samples on the other hand, tend to reverse the prediction on both forms of the illusion, but only to a slight degree.

Contrary to the pattern with the Müller-Lyer and Sander illusions, H-V a and H-V b sample means rank correlate negatively with Kohs scores ($r = -.89$ for H-V a, and $-.83$ for H-V b). But again there is no consistent tendency for Kohs scores to be related to either form of the illusion within the six samples:

Table 6:31 Kohs Blocks Correlations with H-V a and H-V b:

<u>Sample</u>	<u>H-V a</u>	<u>H-V b</u>
Inverkeilor	0	-.05
Edinburgh	-.50	-.30
Pt. Loko	.02	.56
Mayola	.11	.37
Frobisher Bay	.21	.28
Pond Inlet	-.12	-.18

There is no consistent pattern in these correlations which could possibly be said to confirm Gardner's, Dawson's and McGurk's finding.

The recent report of Gregor and McPherson (1965) included data for four illusions (Müller-Lyer, Sander, and the two versions of the Horizontal-Vertical) which were administered to a traditional and a transitional group of Australian Aborigines. They were unable to find any significant differences between their samples on any of the four illusions, but the direction of the differences tended to support both the Carpentered World and Horizontal-Vertical Space hypotheses.

Perceptual Development Hypothesis

Across the six samples this hypothesis is confirmed at the .01 level of confidence. There is a strong relationship between the level of perceptual development (and field-independence) and susceptibility to the Titchener Circle illusion.

But this finding receives only moderate support from an examination of Kohs score correlations with Titchener scores within the six samples:

Table 6:32 Kohs Blocks Correlations with the Titchener Illusion:

<u>Sample</u>	<u>Titchener</u>	<u>p /</u>
Inverkeilor	.20	.05
Edinburgh	.11	NS
Pt.Loko	.20	NS
Mayola	.18	.05
Frobisher Bay	-.20	NS
Pond Inlet	0	NS

Although four of the correlations are in the predicted direction, only two of them are significant, and one of the others is in the opposite direction.

In two cases, the difference between the means of sub-samples tend to confirm the hypothesis. The difference between the Scots is not significant, but the size of the t value is consistent with the size of the difference in Kohs Blocks scores between the two samples (one decimal point). However, the almost significant difference (opposing the hypothesis) between Pond Inlet and Frobisher Bay serves to emphasize the negative correlation found between Kohs scores and susceptibility to the Titchener illusion in table 6:32.

f) Conclusions

None of the three hypotheses can be accepted without reservation. All of them have some evidence for their support, and all have some evidence against them.

Carpentered World Hypothesis

Of the two Herskovits, Campbell and Segall hypotheses, this one has received the most support. The hypothesis holds (at the .05 level of confidence) across the six samples for both the Muller-Lyer and Sander Parallelogram illusions, and also holds within the three cultures, strongly for the Sander illusion, but weakly for the Muller-Lyer illusion. No consistent developmental factors appear which might have affected the results.

Horizontal-Vertical Space Hypothesis

This hypothesis has received no support across the six samples, but within the three cultures (except in the Temne), it has been upheld to a moderate degree. No consistent developmental trends appear which might have affected the results.

Perceptual Development Hypothesis

Again, evidence is equivocal. Across the six samples there is strong support for the hypothesis, but within the three cultures little support can be found, except in the case of the Temne. However, within each sample a fairly consistent moderate trend appears in its favour.

Chapter 7. Summary: Patterns and Inter-relations.

1) Introduction

Three guiding hypotheses were set out at the beginning of the study (page 2). The first two hypotheses predicted that perceptual differences would exist between peoples with different cultural and ecological backgrounds, and that the nature and degree of these differences could be predicted from an analysis of these cultural and ecological factors. Evidence in support of these two hypotheses has been considered in chapters 5 and 6.

The third hypothesis suggested that these perceptual differences would tend to form contrasting patterns of abilities and characteristics which would contribute to the adjustment of the group to its particular environment, that is, that societies will possess those perceptual skills and characteristics which are best suited to meet the demands of their particular cultural and ecological conditions. This chapter will examine the evidence for this third hypothesis, firstly by summarizing the results of Studies 1 and 2 (chapters 5 and 6), and following the patterns and inter-relations within these results, and secondly by attempting to relate these patterns to the demands of the physical and social environments of the Temne and Eskimo peoples.

2) Summary of Findings

a) Acuity

It was essential to the design of the study that the samples be equivalent in both far and near visual acuity. If the Eskimo samples had been shown to have had better acuity than the Temne samples, then the findings of the studies of perceptual skills would have been open to doubt.

In general, though, the Temne had slightly better far acuity than the Eskimo (pages 25 and 26), while the Eskimo had slightly better near acuity than the Temne, but combined Temne - Eskimo differences were not significant. Within Temne society

the Pt.Loko sample had somewhat better far and near acuity than the Mayola sample; within Eskimo society the Frobisher Bay sample had somewhat worse far acuity than the Pond Inlet sample, but they were equivalent for near acuity.

It is apparent, then, that although slight differences do exist between the samples, there was no trend in the far or near acuity scores which was consistent with the observed differences in perceptual skills.

b) Discrimination Ability

The results of the two tests of discrimination ability were not entirely consistent with each other. The closure test results indicated that the Eskimo were significantly more aware of fine detail in their visual environment than were the Temne, but the results of the test of perceptual units did not demonstrate any difference between the two societies. It has already been suggested, though (page 94), that the test of closure has greater validity as a measure of awareness of minute variation in visual stimulation, and the Eskimo were in fact significantly more aware of small detail than were the Temne.

c) Spatial Ability

The results of the four tests of spatial ability leave no doubt that the Eskimo are more able to organize details in the space around them, and have a greater ability to handle shapes, dimensions and directions than the Temne. Eskimo performance on all four tests was significantly better than Temne performance, and almost matched the level attained by the Scottish samples.

d) Acquiescence

The results of the test of acquiescence also leave no doubt about Temne - Eskimo differences; the Temne have demonstrated their greater reliance upon and acceptance of the group norms than the Eskimo in a task requiring perceptual judgement.

e) Selection

Although all societies in the study selected their own material more often than the unfamiliar material, the Temne have demonstrated their greater selection of culturally familiar visual material than the Eskimo in a situation of binocular conflict.

f) Assimilation

Furthermore, the Temne have shown a greater tendency to assimilate outline drawings to the culturally familiar form of the object than have the Eskimo.

Table 7:1 summarizes these Temne and Eskimo differences.

Table 7:1 Temne and Eskimo Test Differences: a Summary:

<u>Characteristic</u>	<u>TEMNE</u>	<u>ESKIMO</u>
Acuity	- equal	-
Detail Discrimination:		
Closure	low awareness	high awareness
Unit	- equal	-
Spatial Ability	low ability	high ability
Acquiescence	high	low
Selection	high	low
Assimilation	high	low

3) Patterns and Inter-relations

It can be seen that a pattern of perceptual abilities and characteristics exists for both the Temne and the Eskimo societies. On the discrimination tests, the Temne tend to be passive and global, while the Eskimo are active and analytic in their approach to the material. On the spatial tests, the Temne are consistently field-dependent, while the Eskimo are field-independent, able to analyse, reconstruct and orient shapes and forms. On the tests of acquiescence, selection and assimilation, the Temne are very much dependent on social norms and their own culture material, while the Eskimo are relatively independent of both.

It can also be seen that the abilities and characteristics displayed by each society in the tests are not independent of each other. A fairly consistent tendency has already been demonstrated for the level of perceptual development (as measured by Kohs Blocks) to be related to awareness of fine detail (page 47), ability on the other three spatial tests (page 75), non-susceptibility to influence by the suggested group norm (page 112), that is, field-independence and group-independence), non-selection of the culturally familiar (page 123), non-assimilation of outline shapes to the culturally familiar (page 139), and in the illusion series, perceptual development seems to be related, at least, to susceptibility to the Titchener Circle illusion (page 151).

It is possible, therefore, to conclude that each society tends to produce a 'perceptual type' who has a characteristic approach to visual material. The Temne appear, from the results of these studies, to be passive, global and dependent perceivers, while the Eskimo are active, analytic and independent.

4) Relationship to the Physical and Social Environments

The third guiding hypothesis considered that these perceptual patterns would aid in the adjustment of the Temne and Eskimo peoples to their particular physical and social environmental needs.

As we have already seen, the physical settings of the Temne and Eskimo people are vastly different. Life at a subsistence level dictates certain approaches to everyday problems merely to ensure survival. For the Eskimo, survival depends on an accurate knowledge of the land around him and of the signs of the animals that feed and clothe him; and knowledge of these things depends on his ability to acquire information from his physical environment, mainly through the visual sense. An analytic, active and independent approach to visual material in this physical environment is a characteristic which surely promotes his continued existence. For the Temne, however, survival depends much less on visual skills. Knowledge of the area surrounding his village is not as important to a farmer as it is to a hunter; tracks and other traces of animals do not interest him. Long journeys are

rarely undertaken, and when they are, paths through the bush are available, and can be followed with ease.

We have also seen that the social lives of the Temne and Eskimo are vastly different. The Temne live in villages rarely containing less than two hundred people. Farmland surrounding the village is carefully divided (by family) so that all have a portion to work. Of necessity, then, cooperation is promoted by their social patterns and adherence to the rules is demanded. This lack of dependence on visual skills, coupled with the necessity for conformity and acceptance of group ways is best lived with by developing global, passive and dependent characteristics. The Eskimo, on the other hand, live in much smaller groups and can easily (and frequently do) solve any social problems which arise by moving to another area. As a result social organization is loose, and the need for conformity and acceptance of group norms is weak.

5) Conclusions

We have already seen (page 1) that, "through the medium of educational practices and other social pressures, a culture produces the kind of personalities that are adapted to its own requirements" (Piesheuvel, 1959). It appears, quite conclusively from the results summarized and discussed in this chapter, that to these 'personality characteristics', we may now add 'perceptual skills and characteristics'. So closely are these perceptual traits related to the Temne's and Eskimo's particular physical and social environmental needs that it is indeed difficult to imagine any others being developed and maintained under the circumstances; an analytic, independent and self-reliant Temne would soon be eliminated by his fellows, while a dependent and passive Eskimo would soon be eliminated by his environment.

As we have already noted (page 96), it is difficult, if not impossible, to unravel the respective strands contributed by ecological and social necessity. But for the purposes of this third hypothesis, it is not necessary to do so; it is an inescapable conclusion that the perceptual skills and characteristics possessed by a people form a pattern which effectively contributes to the adjustment of that people to its particular environment - people develop and maintain those skills and characteristics which they have to.

Chapter 8. Conclusions and Implications

1) Introduction

This chapter will serve to draw more closely together some of the threads which have been picked up from time to time in the body of the thesis. Cultural and ecological factors as determinants of perceptual differences will be examined, followed by a discussion of 'race' as a possible further factor. The implications of these conclusions for some aspects of perceptual theory will then be discussed.

2) Conclusions: Determinants of Perceptual Differences

It has been demonstrated that perceptual skills and characteristics vary predictably as ecological requirements and cultural practices vary. Differences in discrimination and spatial skills, as well as the differential tendency to acquiesce, select and assimilate were all predicted from an analysis of the differences between the Temne and the Eskimo in their respective typical visual environments, their economic systems, their linguistic and artistic skills, and their socialization practices.

It has not been possible (as noted on pages 96 and 157) to unravel the respective contributions of ecological requirements and cultural practices to the development and maintenance of these skills and characteristics, but it cannot be doubted that these perceptual differences do exist, and that differential cultural and ecological characteristics are determining factors.

But whether the factors considered in this thesis are the only ones involved in producing perceptual differences, or indeed whether these perceptual differences are the only ones produced by the noted cultural and ecological differences are two questions which cannot be answered from the present data.

It is apparent, then, that the study has a double defect; it has not been intensive - those determining ecological and cultural factors have not been

separated and their relative contributions examined; nor has it been exhaustive - more perceptual differences might be determined by the cultural and ecological factors examined, and more cultural and ecological factors might be needed to predict fully the perceptual differences noted.

The main conclusion must therefore be a double one; the Temne and Eskimo have both developed those perceptual skills and characteristics which are demanded by their respective ecological settings and which are aided and required by their respective cultural practices; but more work is certainly needed to comprehend the full range of perceptual differences which might be caused by numerous cultural and ecological factors.

The terms 'determinant' and 'causal factor' are meant in their weak rather than their strong forms. It was implied on page 2, and again above, that these determinants are not considered to be either necessary or sufficient for the production of the observed perceptual differences. It is, however, considered that these cultural and ecological factors have played a significant role in their determination.

It is useless to speculate about other possible determinants of perceptual differences, especially since evidence in this study could not aid the confirmation or rejection of such suggestions. But one factor on which we do have some evidence and which is commonly held to be important in determining psychological differences among peoples of the world is 'race'. As noted on pages 16 and 28, one reason for sampling from two culturally different but racially similar areas of a single society was to eliminate race as a comprehensive explanation of inter-group differences.

No serious racially oriented student of inter-group differences would today suggest that there is a causal relationship between psychological characteristics and the physical features usually held to define racial categories (eg. skin colour, hair texture, cranial index etc.). What they do suggest, however, (notably

Wehl and Possony,1964) is that there are definite genetic determiners of psychological (especially intellectual) differences between groups of people who display these superficial physical characteristics. But they offer no reasons why genetic factors need be invoked to explain these differences, nor do they suggest a mechanism by which genes might affect intelligence or other mental abilities.

'Race levellers' (a term used by Porteus,1937 to describe Klineberg,1935) have long denied the need to invoke genetic factors at all to explain intellectual differences between groups (cf. Littlejohn,1963 with respect to perceptual differences); in the absence of good reasons for genetic determination of psychological differences, and of a possible mechanism, they consider cultural factors to be sufficient.

Lately an intermediate point of view has emerged which suggests an interaction of genetic potentialities with environmental opportunity. Vernon (1962) has recorded his opinion that he, "accepts the possibility of some genetic differences" in intelligence, but since, "we have no reliable means of assessing innate psychological characteristics, it is more profitable to explore differences in upbringing and environment which probably have a greater influence on observed group differences in intelligence test performance than do innate factors".

What evidence is provided by this study to support or reject any of these three views? It is considered that, especially in view of the results of the spatial tests, a purely 'racial' explanation of perceptual differences is not acceptable. For the Kohs Blocks, EFT and Matrices tests, the Temne and Eskimo transitional communities scored significantly higher than their traditional counterparts (page 71) suggesting that social modification and cultural change in the form of westernization has significantly contributed to spatial test performance, despite constant race.

Beyond this, however, the present evidence will not take us; whether cultural and ecological differences are sufficient to explain all observed perceptual

differences, or whether race (genetic factors) places a 'floor and a ceiling' on perceptual test performance (within which cultural and ecological factors can operate) is a question which cannot be resolved by the present evidence or within the present methodological framework.

In summary, then, it is considered that the differential development of perceptual skills and characteristics is determined by cultural and ecological factors (either alone or in conjunction with genetic factors), and that genetic factors ('race') have been eliminated as a comprehensive explanation of this differential development. It is, of course, possible that genetic determination may one day be supported by evidence as direct as that found in support of cultural determination. But until then, the popular view (that, since 'races' differ psychologically, these differences must be genetic) is not considered a serious challenge to the conclusions of this thesis.

3) Implications for Perceptual Theory

a) Introduction

The findings of this study have implications for four aspects of current perceptual theory. In the following sections 'schematic' and 'literal' perception are examined, the role of 'ecology' is discussed, the relative accessibility of Temne and Eskimo spatial categories is noted, and the development of perceptual skills in the face of sensory deficit is examined.

b) Schematic and Literal Perception

Up till now we have discussed only the perceptual differences existing between the Temne and the Eskimo. But it is obvious that perceptual similarities exist as well, for the Temne and the Eskimo (and the Scots) were all able to produce scores on the same tests. To some extent, then, all samples experienced similar percepts.

In Study 1, Discrimination and Spatial Skills, the emphasis has been on what Gibson (1950,1959) has termed 'literal' perception. Although great differences were predicted and found between the Temne and the Eskimo in this study, the test material was designed to permit exact perception of the stimuli. But in Study 2, Perceptual Characteristics, the emphasis was placed on what Vernon (1937, 1952, 1955) has called 'schematic' perception, as well as on the role of motivational and emotional factors.

No attempt will be made to bring the evidence of these two studies to bear on any differences remaining between the advocates of 'literal' and 'schematic' perception, for it is obvious that both play an important role. The results of these studies, however, suggest that perception can be 'literal' or exact only within the limits of skill (ecologically and culturally determined) possessed by an individual perceiver, and that 'schemata' can operate only after 'literal' skills have been developed to some degree. It appears therefore, that the question of, "emphasis on stimulus domination or on selective programming" (as Bruner and Klein, 1960 have phrased the difference) is largely a pseudocontroversy - neither 'literal' nor 'schematic' perception appear to operate independently of the other.

c) Perception and Ecology

Perceptual differences existing between the Temne and the Eskimo have been related to the ecological and cultural characteristics of the two societies. The ecological demands, in particular, were related to the differential development of discrimination and spatial skills.

Brunswik (1956) has put forward a theory of perception which is intimately related to the concept of 'ecology'. For Brunswik, "stimulus variables are ecological rather than purely physical or geographic in character", where the term 'ecology', "designates the natural or customary habitat or surrounding universe of a species, culture or individual".

This theory of Probabilistic Functionalism suggests that, "where single cues lack trustworthiness, the organism effects a compromise between many of them on the basis of their respective probability weightings so as to ensure as accurate an object attainment as possible"(Allport,1955). It follows from this theory that members of societies with differing ecologies will acquire different sets of probabilities based on the previous validities of certain types of cues. This prediction appears to be confirmed by the results of the present study, for the ecological validity of minute and spatial cues are vastly different for the Temne and Eskimo societies.

d) Perception and Categories

Bruner (1957) has suggested that perception involves an act of categorization, and that categories are as much a feature of perception as the stimulation. The existence of perceptual differences between societies may therefore be partially due to the possession of different sets of perceptual categories.

If linguistic categories are any indication of the types, and accessibility, of perceptual categories (as is argued in the Temne-English language study in appendix 3), then it is reasonable to conclude that the linguistic evidence presented on pages 34 to 36, as well as the results of the spatial tests, demonstrate the greater accessibility of spatial categories for Scottish and Eskimo subjects than for the Temne subjects.

e) Sensory Deficit

Hebb (1948) and Piaget (1950) have both emphasized the necessity for an adequate early visual environment for normal perceptual development. More recently, Drever (1955) has pointed out that, in addition to early experience, a "long apprenticeship", over a period of years is also important, after which differential experience has no appreciable effect on perceptual skills. But even in later years, "the maintenance of normal, intelligent, adaptive behaviour probably requires a

continually varied sensory input", as Bexton, Heron and Scott (1954) have pointed out in their studies of short-term deprivation.

Differences between Temne and Eskimo typical visual stimulation have already been noted. It was suggested that the Temne normally have a wealth of visual detail available to them, while the Eskimo, to some extent, may be said to suffer from impoverished stimulation. But despite this difference, the Eskimo have been shown to have significantly greater skill in discriminating minute detail in their visual environment. Of relevance here are the studies on the perception of obstacles by blind persons (Worchel and Dallenbach, 1947; Worchel and Berry, 1952; Ammons, Worchel and Dallenbach, 1953), who have been shown to rely on the reflection of auditory signals to locate objects in the space around them. With a reduction in sensory input these people have been able to develop over the years a level of discrimination not normally possessed by fully sighted persons.

In a similar way, it is suggested, the Eskimo in the face of impoverished stimulation may have actively sought out sensory variation by making finer and finer distinctions. This attempt to maintain an optimum level of sensory input may therefore partially account for their enhanced ability to discriminate fine detail.

Postscript. Possible Applications

1) Introduction

Testing, training and education are by no means new activities in developing nations or in developing areas of industrialized nations. But only recently have psychologists begun to investigate the inter-relationships between indigenous culture, appropriate tests, industrial training, and the educational needs of the various societies. In this section, psychological testing, industrial training, and education in developing areas will be examined in the light of the findings of this study.

2) Testing

It has already been noted (page 27) that many workers have attempted to reduce the cultural bias of tests intended for use in cultural groups other than that in which they were designed. But Biesheuvel (1952) very early pointed out that, "the culture-free intelligence test is, in fact, a contradiction in terms, as intelligence itself is a culturally determined phenomenon".

The results of the present study support this view; since peoples with differing cultures and ecologies tend to develop and maintain different sets of skills and abilities, then the concept of intelligence (or its equivalent) is bound to be defined differently in each society. It follows, then, that the search for a culture-free test is futile insofar as it is hoped to find a universally valid test; although some tests might be used with fairness in a limited number of societies, this still leaves us with the problem of comparing the results between these various 'test-fair' units.

Nevertheless, when working with only one or two societies, it would always seem advisable, as Dawson (1963b) has argued, to construct tests in terms of the indigenous cultures. In this way comprehension and motivation, as well as a greater validity of measurement, may be encouraged.

On the basis of the present study, and on Doob's (1957) experience, it would further seem advisable to distinguish carefully between individual 'non-Western' cultures when discussing test results. Doob found that when the results of, "tests which seemed to concern the same area of behaviour were compared, some items but not others produced similar results in the same society, and the same test items yielded similar results in one society but not in another". The results of the present study point out the fallacy of assuming that members of 'non-Western' cultures, "inevitably ... tend to perform relatively poorly on Western tests" (Vernon,1965a), for it is apparent that some skills may be developed to almost the same extents by very divergent societies.

3) Education and Training

As more and more societies voluntarily choose to enter the mainstream of world economy, evidence is added to our conclusion that societies possess different sets of skills and abilities. A twofold programme is required in all developing areas, firstly to locate those skills emphasized and developed by the indigenous culture, and secondly to identify those areas of skill deficit. The first is advisable so that appropriate industries may be selected (where possible) which can make use of traditional skills, and the second is necessary so that the educational systems and industrial training programmes can train to overcome these areas of skill deficit.

Smith (1964) has recently emphasized the central role of spatial skills in modern industry. It is apparent that, if this is the case, the Temne might find it difficult to acquire the necessary level of ability to be useful to industry (cf. Dawson,1963a). It is equally apparent that the Eskimo might find it relatively easy to acquire industrial skills; in fact the usual stereotype of the Eskimo frequently includes reference to his 'innate mechanical genius'. However McPhee (1962), an Army technical instructor, has denied that, "the Eskimo have an uncanny aptitude for mechanics ... they are no better or no worse than any other mechanics

pupils ...". But this denial, in itself, is an attestation of Eskimo ability, for in no other case has another society been found to match the technical skills of Western man.

However, spatial skills are not the only ones required in the industrial setting; social skills seem to be equally important. It has already been noted (page 98) that the Eskimo have never been highly organized as a social group; compared to the Temne, the social skills possessed by the Eskimo are rudimentary indeed. Whereas the Temne have been able to maintain traditional, and to develop semi-traditional, societies to ease their transition to the industrial life, the Eskimo are experiencing great hardship during this period. Balikci (1959) has reported two failed attempts to establish a social structure in Eskimo transitional communities, both initiated by a non-Eskimo in the hope of smoother community functioning.

It is apparent that, just as the Temne in transition could profit from schoolroom and industrial perceptual training, the Eskimo might benefit from training in social skills. Both these areas of skill deficit are potentially ruinous for the smooth transition to Western life.

4) Conclusions

The simple conclusion follows that, since societies develop toward different goals, and in response to different needs, different sets of individual skills and characteristics are developed and maintained. If these societies are to successfully adapt to industrial life, psychological testing, educational and industrial training must all be oriented toward the needs of the individual indigenous cultures.

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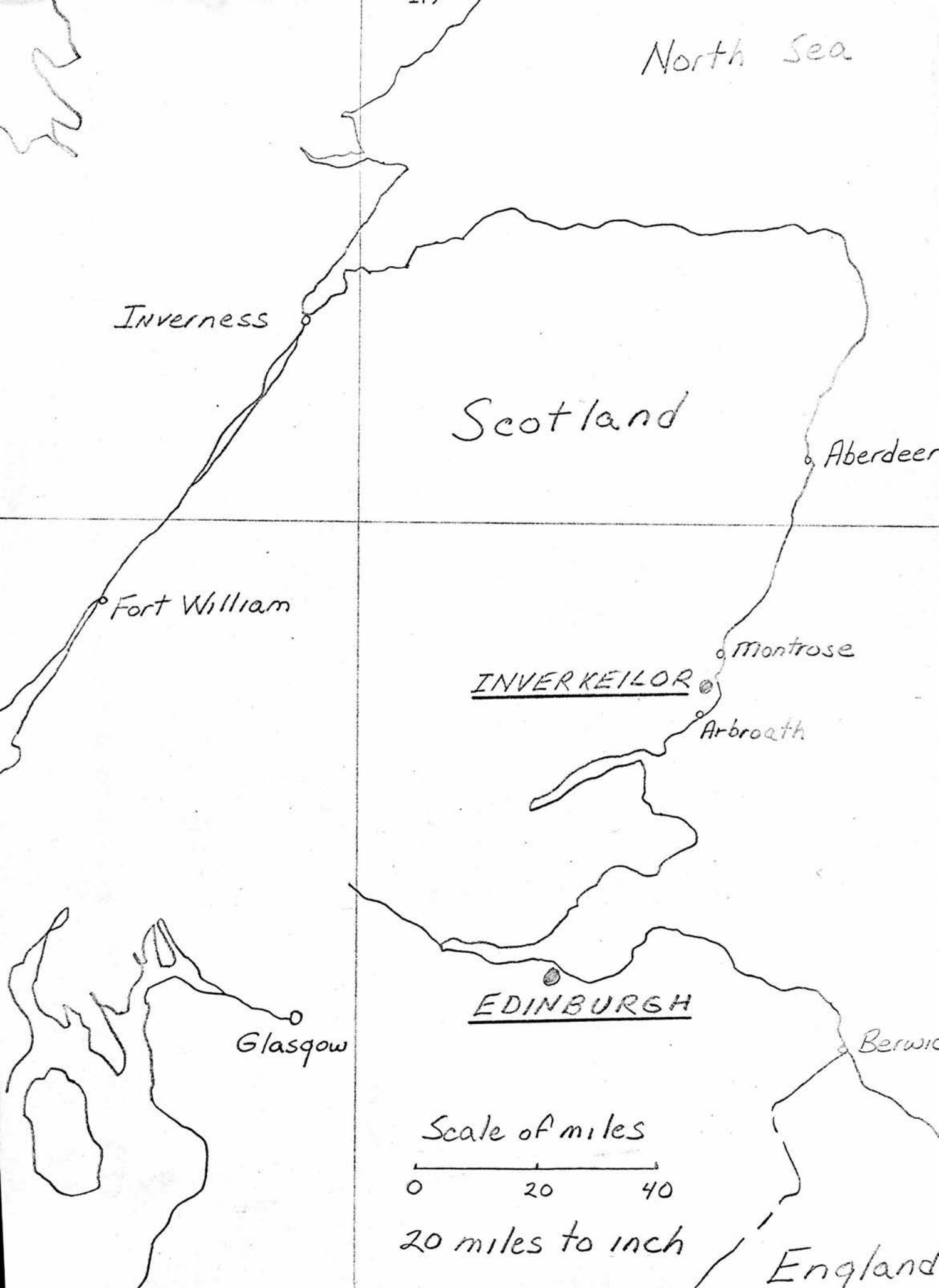
Appendix 1

Maps and Photographs

This appendix includes a diary of the testing programme in the various societies, a series of four maps showing the location of the communities from which the samples were drawn, and a group of photographs which provide further evidence for the differing Temne and Eskimo visual environments.

Diary of Testing

<u>Sample</u>	<u>N</u>	<u>Dates</u>
Pilot testing, Edinburgh		March, April, 1964.
Inverkeilor	62	May, June, 1964.
Pt.Loko	32	July, August, 1964.
Mayola	90	August, September, October, 1964.
Kotia	30	October, 1964.
Edinburgh	60	November, 1964 to February, 1965.
Frobisher Bay	31	March and June, 1965.
Pond Inlet area	91	March, April, May, 1965.



North Sea

Inverness

Scotland

Aberdeen

Fort William

Montrose

INVERKEILOR

Arbroath

Glasgow

EDINBURGH

Berwick

Scale of miles
0 20 40

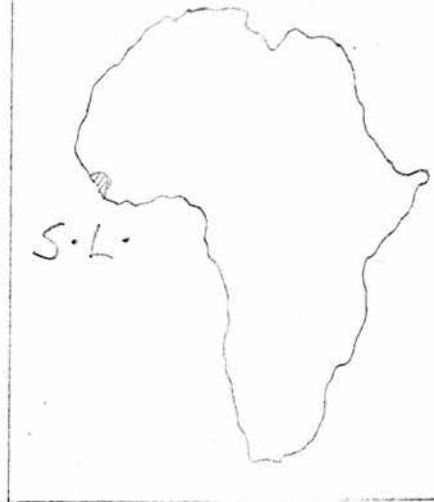
20 miles to inch

England

-180-

Guinea

Sierra Leone



PORT LOKO

marampa

MAYOLA

Freetown

TEMNE
MENDE

KOTIA

N'Jala

8°N

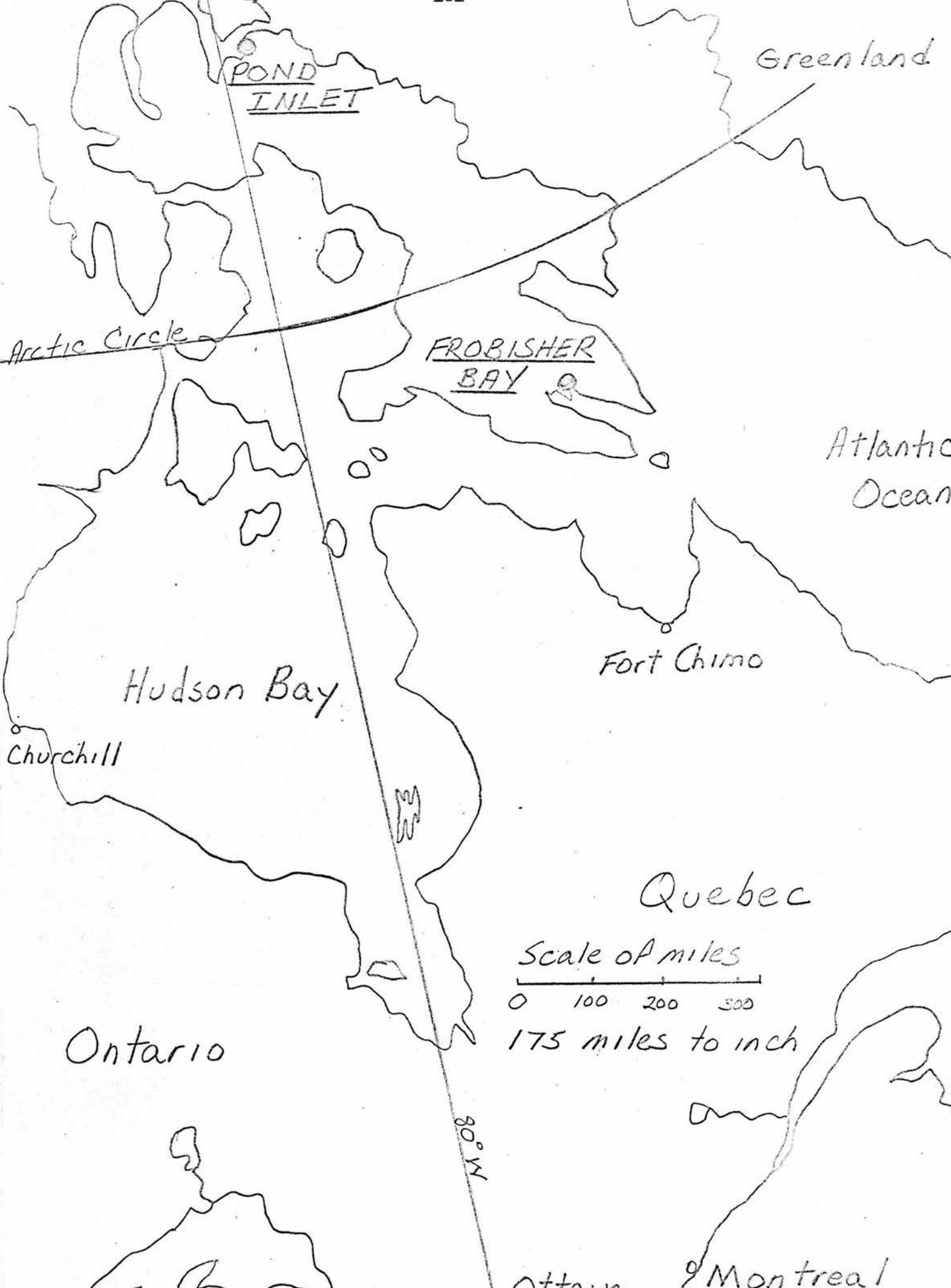
13°W

Atlantic
Ocean

Scale of miles



16 miles to inch



POND
INLET

Greenland

Arctic Circle

FROBISHER
BAY

Atlantic
Ocean

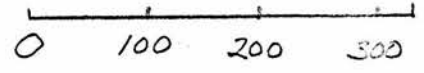
Hudson Bay

Fort Chimo

Churchill

Quebec

Scale of miles



175 miles to inch

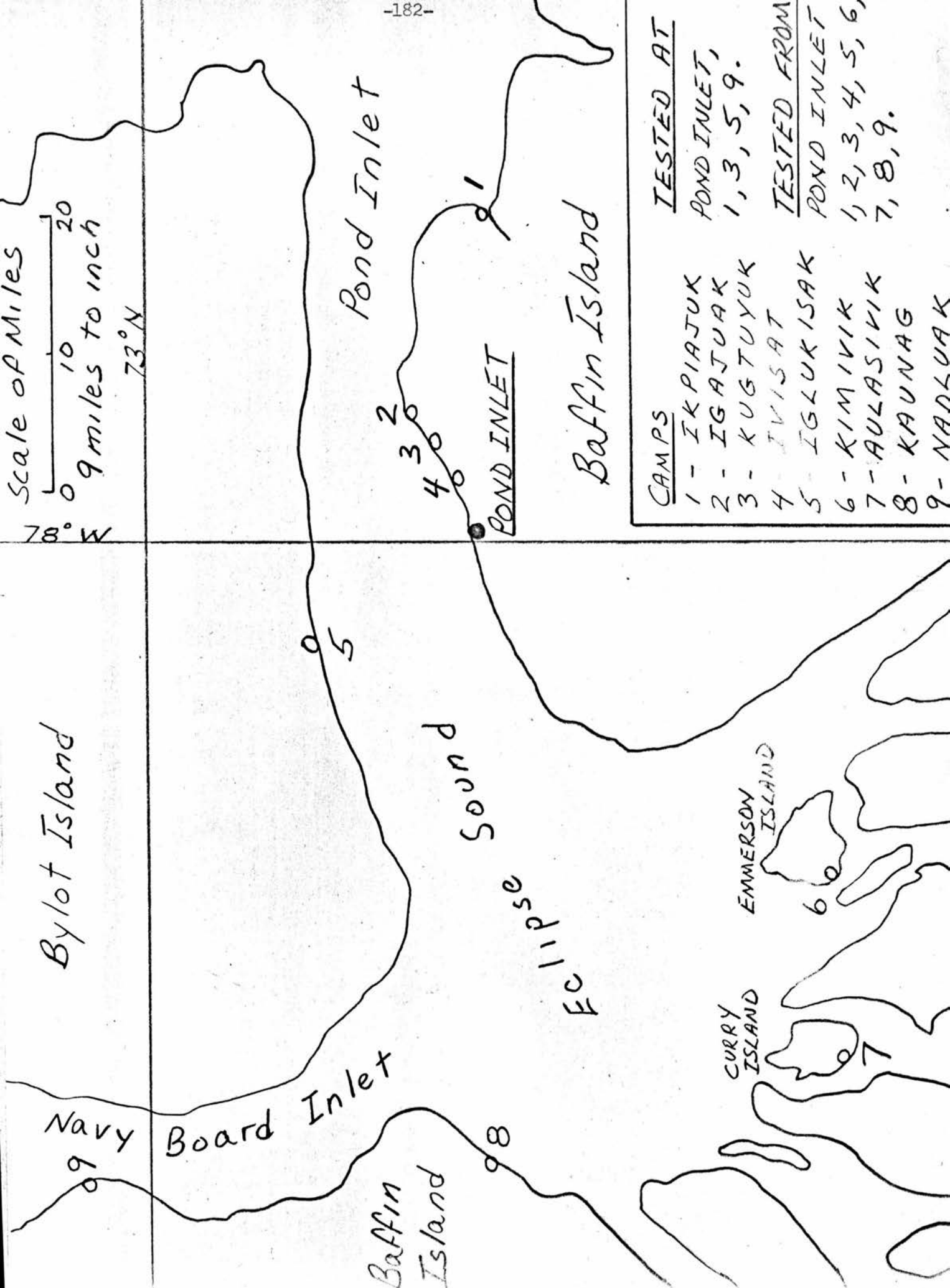
Ontario

80°W

Ottawa

Montreal

Scale of Miles
 0 10 20
 9 miles to inch
 73° N
 78° W



<u>CAMPS</u>	<u>TESTED AT</u>	<u>TESTED FROM</u>
1 - IKPIAJUK	POND INLET,	POND INLET
2 - IGATJUK	1, 3, 5, 9.	1, 2, 3, 4, 5, 6,
3 - KUGTUYUK		7, 8, 9.
4 - IVISAT		
5 - IGLUKISAK		
6 - KIMIVIK		
7 - AULASIVIK		
8 - KAUNAG		
9 - NANLUAK		



A typical view near Mayola showing the upland rice farm of subject T-59. Note the raised thatched platform from which birds, who are eating the rice, are stoned with a sling. Note also the witchcraft symbol (for the protection of the farm) to the left of the platform, and the kabanka (farm hut) which is used while working the farm and later for rice storage, to the right of the platform.



A view in spring in the Pond Inlet area taken from the beach at Igajuak camp looking north to Bylot Island. Note the barren appearance of both the ice and land, even though the spring ice has begun to heave providing somewhat more than usual visual detail along the shoreline.



A typical traditional-style house in Mayola owned by the family of subject T-63. Note the circular shape, the high thatched roof, and the porch along the front wall; a similar opening at the back serves as the kitchen. Note also the luxuriant growth surrounding the house.



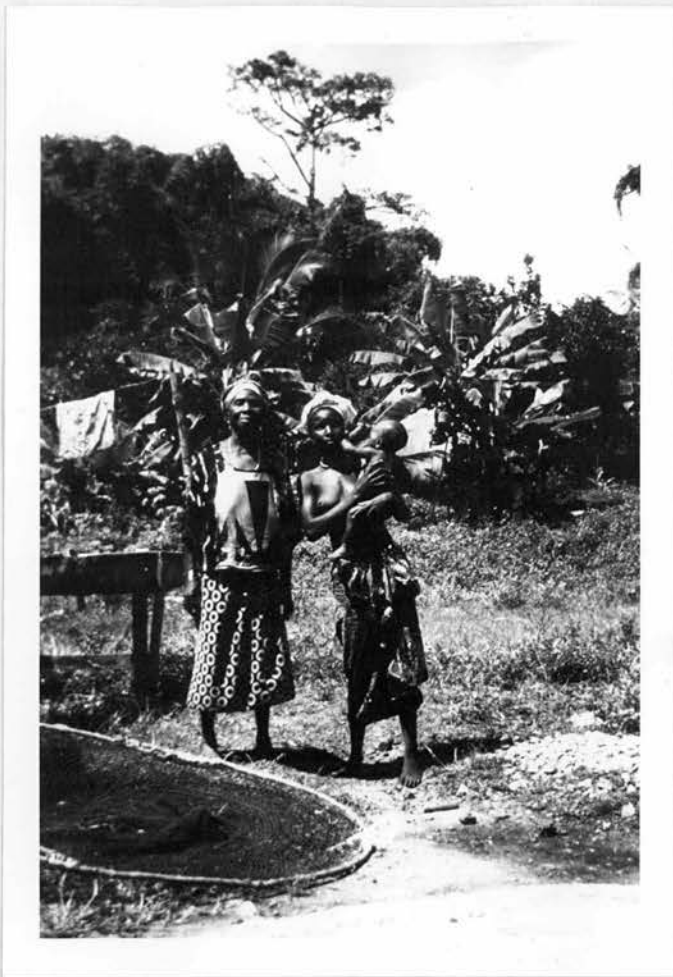
A typical house in the Iglukisak camp on Bylot Island. Note the seal skin stretched on the frame and the sled piled with skins, and raised on blocks, to the right of the house. Beyond the sled is a snowhouse and a tent, where some testing was done. Note again the barrenness of the surrounding countryside, land to the left and ice to the right.



A typical view in Pt. Loko showing the market on the right and the 'pan' or tin-roofed rectangular houses on the left. Note the tables in the market which are let to individual traders and are piled with their wares.



A typical view in Frobisher Bay showing the plywood bungalows used by most of the Eskimo. Note subject E-104 standing with his motorized toboggan, and a lone young sled dog which has been superseded by the 'skidoo'. Note again the barren background.



Subjects T-66 and T-83 in Mayola. Note the casual design of the clothing, the fish net in the left foreground and the curved edge of a rice and groundnut-drying platform in the right foreground. In the distance is the local Poro Bush, controlled by the secret society.



Subject T-103 (Mayola), outside her kabanka, shown husking rice in the mortar and pestle. A few stalks of maize grow behind her, scattered among the rice.



Subject E-7, shown outside her house (a new style bungalow) in Frobisher Bay. Note the intricate ornamentation on the parka, which, in this case, is a fairly new type of floral pattern, introduced by the western Eskimo.



Subject E-81 at Kugtuyuk camp near Pond Inlet. Ice in the bucket has been chopped from a stray berg and will be melted for water. Note the ornamentation on the parka, the tops of the duffle socks, and the pattern sewn into the seal skin boots. Note again the lack of visual detail in the background.

Appendix 2

Apparatus

1) Tachistoscope

A tachistoscope was required for three of the tests: closure, assimilation and the Eskimo-English language study to be reported in appendix 3. Standard models were too cumbersome to be readily portable, and required mains electricity. Portability and independence of electric mains were essential, so a suitable tachistoscope had to be designed and constructed.

An aluminium shell was made, with a hinged lid, a removable bottom, and a removable light source unit. This allowed the same shell to be quickly modified for use as a stereoscope.

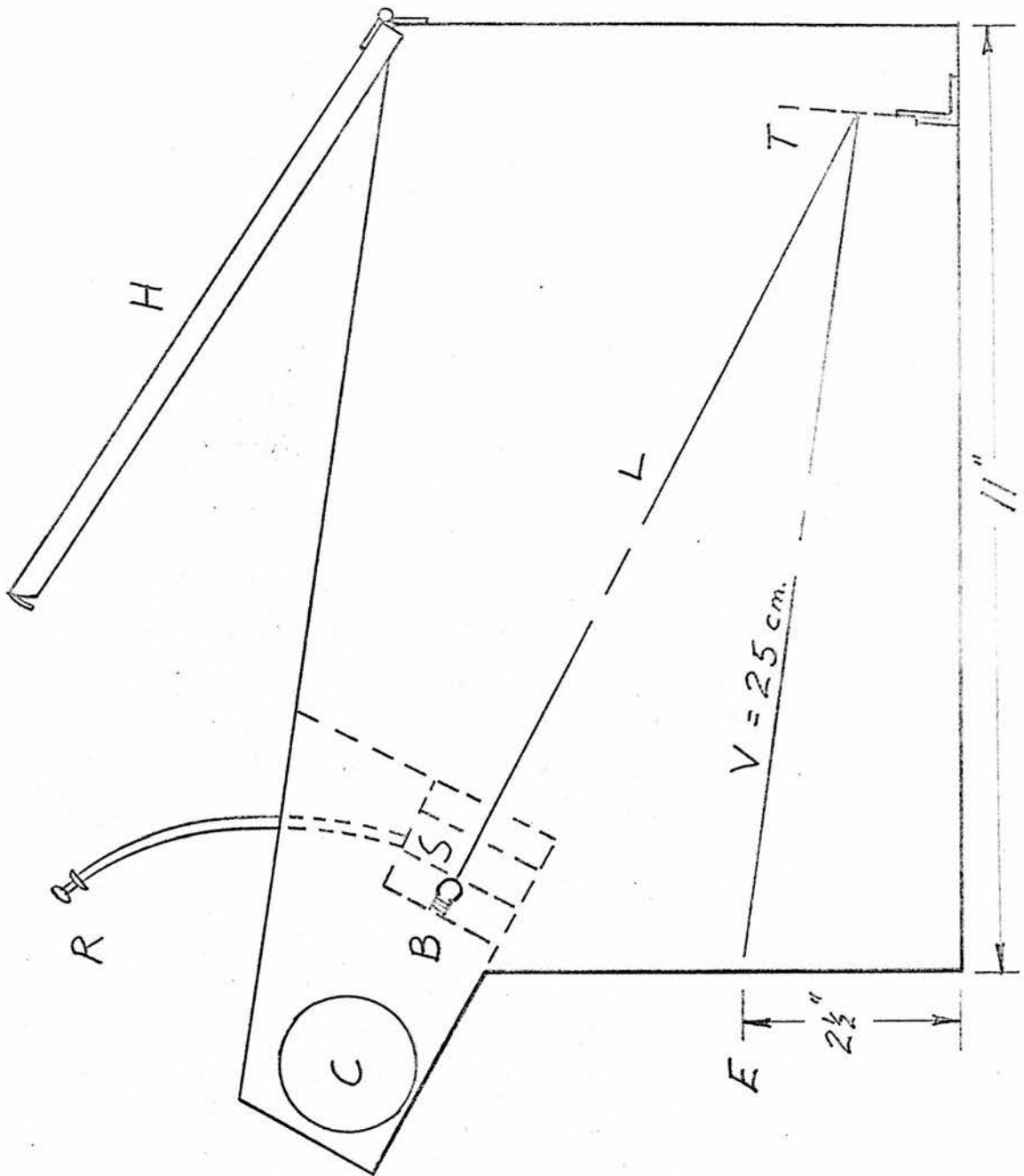
The shell was 11 inches long at the bottom (see page 190 for diagram), $12\frac{1}{2}$ inches long at the top, and $6\frac{1}{2}$ inches wide. In testing, the shell was placed on a wooden or cardboard box on a table, so that the eye holes were at the subject's eye level. A light-proof black cloth was placed over the subject's head and the viewing end of the machine. In order to further eliminate stray light, the interior of the shell was painted matt black, and the tachistoscope was placed so that there was no direct light behind the subject's head.

The light source unit was made of aluminium and was fitted in a slot above the subject's head. A camera shutter was mounted in the unit, with an Everready 2.2 volt, 0.25 amp. lens bulb inside it. The bulb was powered by a 2.5 volt Mallory mercury cell (type TR-132H). The shutter speed was set at $1/50$ th. of a second for all tests, and a flexible cable was used to release it.

A slotted holder was mounted on the removable bottom to hold the target pictures normal to the line of view, and 25 cm. distant from the eyes.

The operating instructions were as follows:

- Subject looks at lap (to avoid a view of the inside of the tachistoscope while the lid is open.
- Lift hinged lid.



PORTABLE TACHISTOSCOPE

- V - line of view
- L - line of light
- E - eye position
- T - target position
- C - dry cell
- B - bulb
- S - camera shutter
- R - shutter release
- H - hinged lid

- Place picture in slot.
- Close lid.
- Place cloth over subject's head as he moves his head up to the machine.
- Cock shutter and switch on light.
- Release shutter.
- Remove black cloth.
- Switch off light.
- Lift hinged lid (while subject draws what he saw).

The main drawback in the design of this tachistoscope is that the inside is totally dark prior to the 20 millisecond flash of light on the target; adaptation and focus were therefore impossible. However, this was standard for all subjects tested, and hence is not a variable when considering inter-group differences.

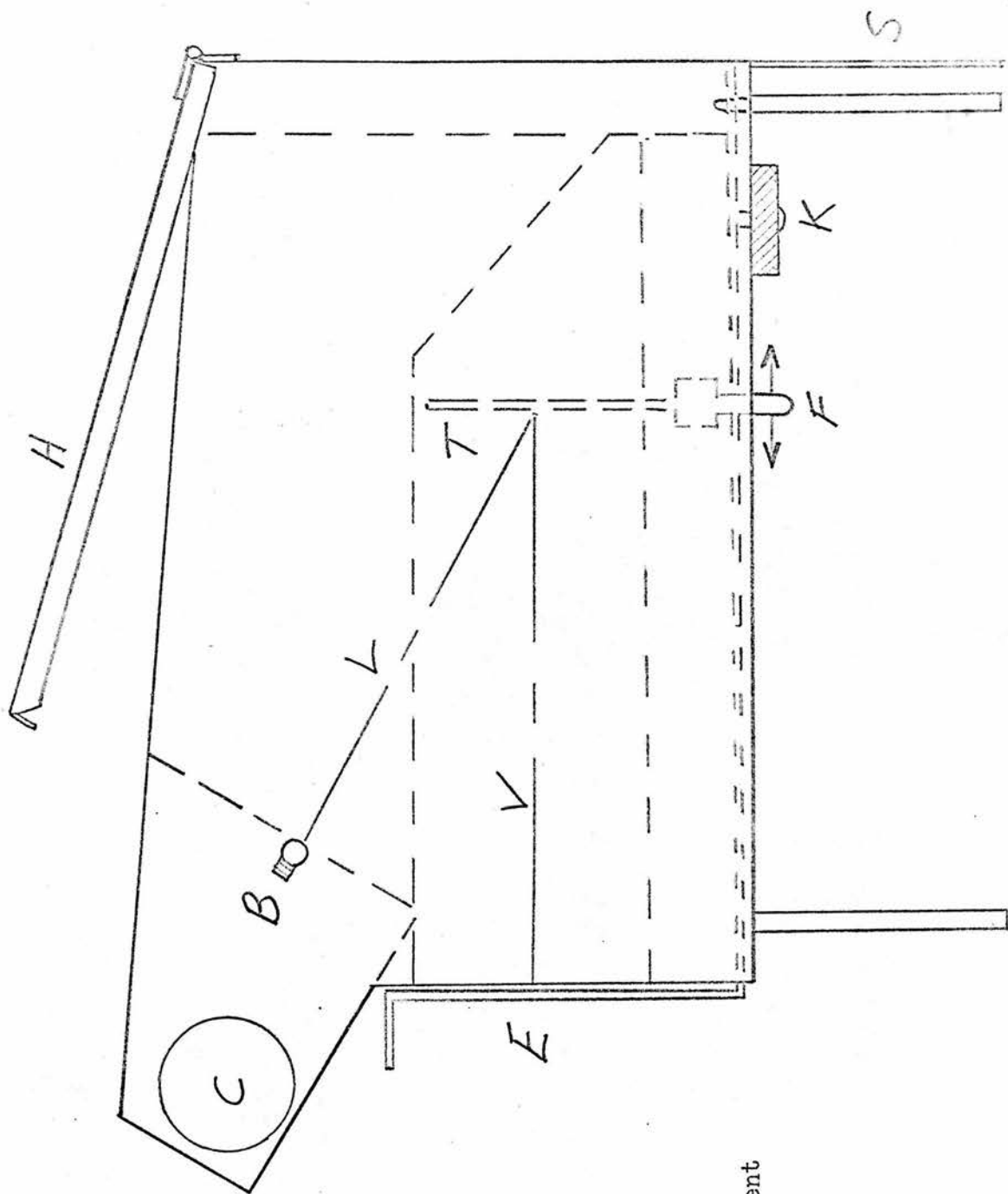
2) Stereoscope

A stereoscope was required for the binocular rivalry test. As in the case of the tachistoscope, portability and independence of mains electricity were essential. An Asher-Law hand stereoscope was located and modified so that it could be inserted into the same shell as the tachistoscope. Since the controls for focusing and fusing the targets were on the bottom of the stereoscope insert, it was necessary to mount the shell on 3 inch legs (see page 192 for diagram).

A removable light source unit was designed using cells and bulbs of the same specifications as in the tachistoscope. Each side of the septum was independently lit, and the direction of aim of the bulbs could be adjusted to suit the focus and fusion requirements of each subject.

The operating instructions were as follows:

- Subject looks at lap.
- Lift hinged lid.
- Pictures are inserted.
- Close lid.
- Switch on lights.



PORTABLE STEREOSCOPE

Asher-Law Unit inserted.

- V - line of view
- L - line of light
- E - eye position
- T - target position
- C - dry cell
- B - bulb
- S - shield
- H - hinged lid
- K - knob, fusion adjustment
- F - focus adjustment

- Subject looks in and reports.
- Switch off lights.
- Subject looks at lap.

The use of two independent light sources has the drawback of potential inequality in the illumination of the two pictures. To avoid this, pairs of cells were started together and used as a pair for their life (100 minutes). The cells were also alternated, left to right, between subjects.

3) V - Scope

An aluminium V-Scope was made to diagnose eye dominance. Its overall length was 9 inches, the diameter of the small end was $\frac{1}{2}$ inch, and of the large end, 5 inches. A cut-out was made so that the scope could fit over the nose and cheeks.

The subject was instructed to hold the scope in both hands at waist level, and to bring it up to the eyes while looking at E's finger tip (which was held 2 inches in front of E's nose). E moved his position between the three trials, requiring reorientation of the subject.

4) Stand

In order to standardize the angle and distance of presentation of the Acquiescence and Illusion tests, a small aluminium stand was made. It was placed on a table, normal to the subject's line of vision, and at a distance of 4 feet.

Appendix 3

Language Studies

1) Introduction

a) Early Theorists

The Sapir-Whorf Hypothesis, that there is an intimate relationship between the language one uses and one's cognitive life, arose long before either Sapir or Whorf began their work, but these two linguists have contributed most to modern formulations and promotion of the hypothesis. The essence of their views is contained in the two following quotations, the first written by Sapir (1929), and the second by Whorf (1940).

Human beings ... are very much at the mercy of the particular language which has become the medium of expression of their society. It is quite an illusion to imagine that one adjusts to reality essentially without the use of language ... The fact of the matter is that the 'real world' is to a large extent unconsciously built up on the language habits of the group... We see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation. (Sapir,1929)

... users of markedly different grammars are pointed by their grammars toward different types of observations and different evaluations of externally similar acts of observation, and hence are not equivalent as observers, but must arrive at somewhat different views of the world.(Whorf,1940)

Neither of these views was based on behavioural evidence; rather they were the result of linguistic analysis. Both workers examined the structure and content of various languages and concluded (above) that cognitive and perceptual differences must inevitably follow from these linguistic differences. Since the early 1950's, however, there has been a marked interest in experimental tests of the hypothesis, all studies attempting to break out of the circle, by making observations on behaviour which have been independent of language.

b) Experimental Studies

The first of these studies, by Brown and Lenneberg (1954) attempted to relate the perception of colour to the 'codability' or ease of coding the names of colours

using monolingual English speaking American subjects. A further study by Brown and Lenneberg (1958) investigated the relationship between the length of the vowel sound in English and Navaho and colour classification using native speakers of those languages.

Garroll and Casagrande (1958) also used the cross-cultural method in a study with Hopi and English speakers. They found that the verbs normally used by speakers of the respective languages were related to their classifications of activities and material articles.

Flavell (1958) reverted to a test of the hypothesis within a single language (English). He found that the degree of activity attributed to pictures was related to whether they were labelled by a verb (dynamic word) or by a noun (static word).

McClay (1958), using English and Navaho speakers as subjects, predicted that in a sorting task, Navaho speakers would make more distinctions on the basis of form than English speakers, because the Navaho language requires the use of different verbs, depending on the formal characteristics of the object referred to. But he concluded that, "given a known linguistic category, it cannot be reliably predicted that non-linguistic behaviour will correlate with it", and thus rejected his hypothesis. He suggested that the failure of the study arose from the fact that a language can classify any two objects in many different ways in addition to the one being investigated.

It is apparent, then, that although some experimental evidence favours the Sapir-Whorf Hypothesis, it is by no means conclusive.

c) Reformulations

Paralleling the interest in experimental tests of the hypothesis, has been a concern for analysing and reformulating the original views of both Sapir and Whorf, partly to clarify the meaning of the hypothesis and partly to make it more amenable to experimental examination.

Hoijer (1953) and Lenneberg (1953) both made early attempts to clarify aspects of the hypothesis. These papers were quickly followed by two conferences, one psychologically (Osgood, 1954) and one anthropologically (Hoijer, 1954) oriented.

Brown (1956, 1958) further developed the concept of language categories and their role in cognition and perception, while Henle (1958) devoted a chapter to the relationship between language and perception.

Carroll (1958) has been a leading thinker on the implications of linguistic relativity (as he prefers to call the Sapir-Whorf ideas). He has distinguished between two forms of the hypothesis, one strong and one weak:

1. Mold Theory: percepts and concepts are only possible within the mold provided by our language structure (cf. Murphy's (1960) position, noted on pages 1 and 2).
2. Lattice Theory: language is merely, "a lattice or screen through which we see the world of our experience".

Three papers appeared in 1959-1960 which attempted to 'systematize' the Sapir-Whorf Hypothesis (Gastil, 1959; Trager, 1959; and Fishman, 1960) after which Kluckhohn (1961) presented a mature and cautious summary of the whole field. He concluded that:

There is at least some influence of the formal structure of a language upon perception and cognition ... it is not that linguistic patterns inescapably limit sensory perceptions and thought, but rather that together with other cultural patterns, they direct perception and thinking into certain habitual channels.

A further paper by Carroll (1963) asserted that by acquiring a language, an individual's system of categories may be modified to match the linguistic system, but can scarcely be said to be entirely molded by it.

The reviews and modern reformulations of the hypothesis have all tended to reduce the strength of the original statement. Nevertheless, all have agreed that the hypothesis is a reasonable one, even though experimental evidence to date has

been equivocal. More experimental work, then, is required if we are to untangle the many divergent views.

In the following sections, two cross-cultural experimental investigations of the Sapir-Whorf Hypothesis are reported. The first is concerned with category differences between Temne and English, and the second with adjective-noun sequence differences between English and Eskimo.

2) Temne-English Study

a) Introduction

With an almost infinite number of objects in the world, man finds it difficult to perceive each as a unique entity. Instead, he groups them into categories which he can respond to more efficiently in terms of the categories' common characteristics. These common characteristics, or bases upon which categories are made, are varied, comprising such attributes as function, form, colour, size and texture.

Perception, according to Bruner (1957), "involves an act of categorization". The placing of an object into a category is an inherent part of the perceptual process; the investigation of these categories, therefore, forms an inherent part of the study of perception.

Categories exist in all languages. It is reasonable, then, according to the Sapir-Whorf Hypothesis, to expect to find similarities between these linguistic categories and the perceptual categories used by the speakers of a particular language. Moreover, if Sapir and Whorf are correct, then it should be possible to predict the nature of perceptual categories from an examination of the linguistic categories. The following test was therefore devised to investigate the possible relationship between linguistic and perceptual categories.

b) Test Description

Nouns, in the Temne language, carry an inseparable article-prefix which varies for different categories of nouns. Scott (1956) lists some of them:

<u>Class</u>	<u>Used for</u>	<u>Example</u>
o -	mainly for human beings	o-kas, 'the father'
ang -	mainly for inanimate objects	ang-seth, 'the house'
ma -	mainly for liquids and conglomerates	ma-tir, 'the blood'

A sorting task was designed using the following seven materials:

	<u>'ma- class'</u>		<u>'non-ma- class'</u>
gold (brass)	ma-bongo	paper	ang-reka
water	manɛ	box	ku-ma
oil	ma-ro	rope	ra-benga
soap	ma-soi		

which were prepared in the following shapes, sizes and colours:

<u>No.</u>	<u>Object Material</u>	<u>Shape</u>	<u>Size</u>	<u>Colour</u>
1	plate brass (gold)	rectangle	2" X 3"	brass
2	"	rectangle	3" X 4"	brass
3	water in plastic container	square	3" X 3" X 1"	clear
4	"	round	3½" dia. X 1"	clear
5	"	square	3" X 3" X 1"	red
6	"	round	3½" dia. X 1"	blue
7	groundnut oil in plas.cont.	square	3" x 3" X 1"	yellow
8	"	round	3½" dia. X 1"	yellow
9	soap	rectangle	2¼" X 3¾" X 1"	white
10	"	rectangle	2" X 3" X 1"	white
11	"	rectangle	2" X 3" X 1"	blue
12	paper (cardboard)	rectangle	3" X 4"	white
13	"	square	3½" X 3½"	white
14	"	rectangle	2" X 3"	red
15	"	round	3½" dia.	blue
16	box	rectangle	2" X 3" X 1"	white
17	"	rectangle	3" X 4" X 1"	white
18	rope	length	5" long X ½" dia.	natural
19	"	length	5" long X ½" dia.	blue

The articles were placed on a table and the subject was told:

Please look at these and tell me what they are (answers were corrected if in error). I am going to put three of these objects in front of you at a time. One will be right in front of you, one a little on the left and one a little on the right. I would like you to look at the three objects and tell me, left or right, which one looks best with the one in the middle. Right or left, which one looks best with the one in the middle?

There were ten presentations of three objects each. In each case there was an object from the 'ma- class' in the middle, and one each of a 'ma- class' object and a 'non-ma- class' object on either side, randomized as follows:

<u>Presentation No.</u>	<u>Object No.</u>		
	<u>Left</u>	<u>Middle</u>	<u>Right</u>
1	3	1	16
2	18	10	8
3	11	2	12
4	15	11	4
5	2	9	17
6	19	6	7
7	13	7	4
8	14	5	1
9	1	8	18
10	12	2	8

The subject's choice, left or right, was recorded. If he had not responded after five seconds, he was encouraged to 'choose quickly', so that opportunity for thought and aesthetic judgement would be minimal.

c) Hypotheses

Two hypotheses were set out:

1. Native speakers of Temne will choose significantly more (left or right) 'ma- class' objects than non-Temne speakers.
2. The Pt.Loko sample, which has been exposed to the English and Krio languages, will choose significantly fewer 'ma- class' objects than the Mayola sample.

d) Subjects

The following subjects were used in the study:

<u>Sample</u>	<u>N</u>
Maycla	89
Pt.Loko	32
Scotland	122
Kotia (Mende)	30

The Mende sample was included in the study to meet the criticism of Dr. David Dalby, a Temne specialist in the School of Oriental and African Studies in London (personal communication, 1964), who wrote the following:

Different languages certainly involve different attitudes and different 'perception patterns', but they do not necessarily give rise to them. Language is the servant of culture, not its master. Krio, for example, has come to reflect more African attitudes and values than English. In other words the 'perception patterns' of a particular group may have given rise to the peculiarities of their language, rather than vice-versa. To ascertain the influence of language in the reverse direction, it is surely necessary to compare groups with different languages, but with similar cultural and geographic backgrounds ... say the Temne and the Mende ...

e) Results

The number of (left or right) 'ma- class' objects chosen (out of a possible maximum of ten) is listed below for each of the samples.

<u>Sample</u>	<u>Language</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>
Scotland	English	122	3.50	1.6
Kotia	Mende	30	3.43	2.0
Mayola	Temne	89	9.04	1.1
Pt.Loko	Temne	32	7.91	1.4
Total Temne	Temne	121	8.74	1.3

Test of hypothesis 1:

	<u>t</u>	<u>p</u> /
English-Temne speakers	28.0	.01
Mende-Temne speakers	13.9	.01

Test of hypothesis 2:

Pt.Loko - Mayola	4.12	.01
------------------	------	-----

f) Discussion

It is apparent that the Temne speakers on one hand, and the English and Mende speakers on the other, have responded very differently to items on this test. But in a later communication, Dalby questioned whether the, "Temne subjects were in fact guided in their responses by the fact that they associated the relevant words (with the relevant prefixes) rather than the relevant objects". However, a number of controls had been built into the test to reduce the possibility that Temne (or other subjects) might respond to the words themselves, or to the sound of the words, rather than to the objects:

1. The names of the objects were not used in the experiment after the initial identification of the objects. Subject's choices were merely pointed to, rather than named, in response. Hence the name, or the sound of the name, could have little effect on the choice.
2. Three of the four 'ma- class' words were frequently spoken in altered form by the subjects during the identification, to ease pronunciation, as follows:

	'a-mant'	rather than	'mant',	for water,
	'a-maró'	rather than	'ma-ro',	for oil,
and	'am-bongo'	rather than	'ma-bongo',	for gold.

As a result, their initial letters and sounds were no longer the same, despite their still being in the 'ma- class'.

3. The three 'non-ma- class' words had been chosen so that they all had the sound 'ma' or 'a' included in the word: ra-benga; é-kuma; ang-reka.
4. Presentation number 2 included 'soap' and 'rope', but despite their similar sounds in English, Scottish subjects chose the 'ma- class' object more often on this particular item than on the average during the rest of the test.

These four factors suggest, then, that subjects, Temne or Scottish, were not responding to the names, or the sounds of the names, of the objects, but to the objects themselves.

g) Conclusions

It seems safe to conclude that a definite relationship exists between linguistic categories and perceptual categories among Temne speakers, and that this finding supports the hypothesis of Sapir and Whorf.

The non-Temne speakers (in effect a control group of random sorters) both of Scottish and Mende background, chose significantly fewer 'ma- class' objects than did the Temne samples. Furthermore, within the Temne linguistic group, that sample more exposed to English and Krio has chosen significantly fewer 'ma- class' objects than the monolingual sample.

3) Eskimo-English Study

a) Introduction

Most languages have rules governing the sequence of words within a sentence. In English, we normally place the adjective before the noun (eg, wooden house), but do, on occasion, place it after (eg. house of wood). In the Eskimo language, however, the order is rigid and does not vary - the adjective must always follow the noun.

Brown (1958) has defined a category as, "a class, a grouping of objects or events", and an attribute as, "any dimension on which objects and events can differ". In the Eskimo language, attributes take the form of infixes; Thibert (1958), in his Eskimo-English dictionary, has described the use of these infixes:

An infix is a partical inserted in the body of a word to modify its meaning. In Eskimo the infixes are of the utmost importance. One may say that the meaning of each and every word is liable to be modified by one or several infixes. So that, even though the Eskimo vocabulary may seem somewhat restricted, it is in fact surprisingly enriched by the use of infixes to create new words or express new shades of meaning.

Infixes are governed by very definite rules. First of all, an infix is never taken as a noun or verb, for it signifies only a quality of the being, or a modification of the action And here is what might be called the golden rule: infixes always affect those parts of the word preceding it only.

Thus, in Eskimo, the word order is always category - attribute, as these examples from Stefansson (1913) demonstrate:

<u>Eskimo</u>	<u>English</u>
iglu	house
iglupuk	a large house
iglorak	a wooden house
iglukuk	a ruined house
iglunguak	a make-believe house
igluliak	a house that someone built
iglulianga	the house that he built
igluliakpuk	the house that two of us built

b) Test Description

A test was designed (for presentation in the tachistoscope) to investigate the possible relationship between the language order and the perceptual order, of categories and attributes. The test consisted of twelve pairs of figures, drawn side by side, on pieces of cardboard 5 cm. by 7 cm. (see page 205 for examples). The test was preceded by two demonstration pairs, shown on the table, and one trial pair, shown in the tachistoscope. The instructions were as follows:

(Dem.1) Please look at this picture. What do you see?

(Dem.2) And what do you see here?

(Dem.1) Now how is this similar to this (referring to the left and right members of the pair)? And how is this different from this?

(Dem.2) How is this similar to this? And how is this different from this?

In each case, members of the pairs were either similar in colour and size, while different in shape, or similar in shape, while different in colour and size.

Following the two demonstration pairs, where subjects learned to say how pairs were similar and how they differed, a trial pair was presented in the tachistoscope. The following instructions were given:

Now I am going to show you some more pictures, like these, in this box. When I flash the light, I want you to tell me immediately which you noticed first, the similarity or the difference. Do you understand?

Three categories of objects were used as members of the pairs:

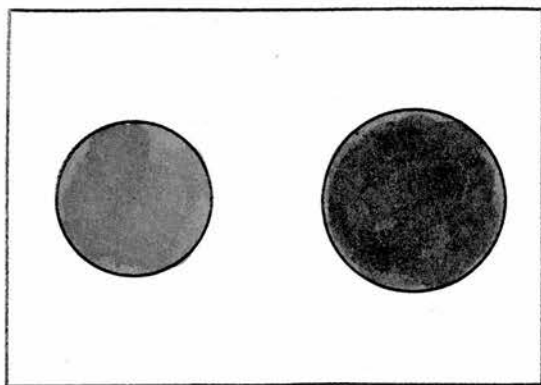
1. Circle, called 'moon' by some.
2. Square, called 'hut' or 'box' by some.
3. Triangle, called 'tent' by some.

Two attributes of objects were used:

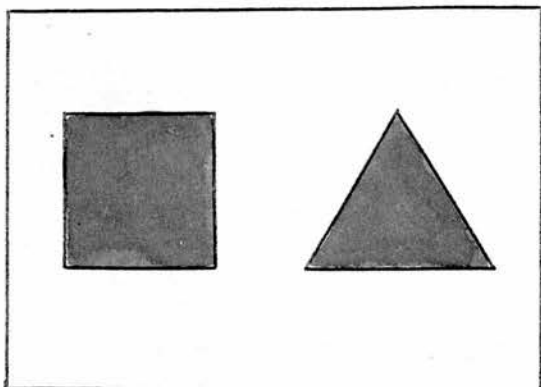
1. Colour, which could be: 1 - red, or 2 - green.
2. Size, which could be: 1 - large, or 2 - small.

The sequence of presentation of the pairs is given below. The numbers refer to the categories and attributes listed above. Numbers on the left or right indicate their relative position in the pair; the + sign indicates similarity while the - sign indicates difference.

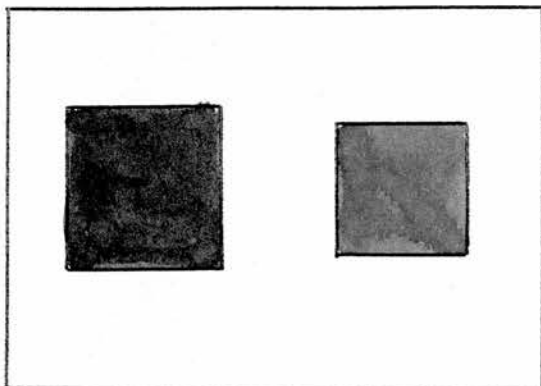
Eskimo-English Card Samples:



Demonstration 1.



Trial



Test Card 11.

<u>Pair</u>	<u>Category</u>		<u>Attribute</u>		<u>Category</u>	<u>Attribute</u>			
			<u>Colour</u>	<u>Size</u>		<u>Colour</u>	<u>Size</u>		
Dem. 1	1	1	1	2	2	1	+	-	-
Dem. 2	1	2	2	2	1	1	-	+	+
Trial	2	3	1	1	1	1	-	+	+
1	3	1	2	2	2	2	-	+	+
2	2	2	1	2	1	2	+	-	-
3	1	3	1	1	1	1	-	+	+
4	3	3	2	1	2	1	+	-	-
5	1	2	1	1	2	2	-	+	+
6	1	1	1	2	1	2	+	-	-
7	3	3	1	2	2	1	-	-	-
8	1	1	2	1	2	1	+	-	-
9	2	3	1	1	2	2	-	+	+
10	2	1	2	2	1	1	-	+	+
11	2	2	2	1	1	2	+	-	-
12	3	2	2	2	1	1	-	+	+

It can be seen that, of the twelve test cards, six had similar categories with different attributes, while six had different categories with similar attributes.

Responses were recorded as + or -, similar or different, and these were later scored as 'perceiving category first' or 'perceiving attribute first'. Each subject was then assigned a 'category' score which could range from 0 to 12. The test was administered to all those who were not colour defectives, and could do the closure and assimilation tests on the tachistoscope.

c) Hypotheses

Two hypotheses were set out:

1. Eskimo speakers will perceive category prior to attribute (in accordance with their linguistic order) more often than will non-Eskimo (English) speakers.
2. The Frobisher Bay sample, which has been more exposed to the English language, will perceive category prior to attribute less often than the Pond Inlet sample.

d) Results

The mean 'category' scores (perceived category prior to attribute) are as follows.

<u>Sample</u>	<u>Language</u>	<u>N</u>	<u>Mean</u>	<u>S.D.</u>
Scotland	English	113	5.66	3.9
Pond Inlet	Eskimo	85	2.64	5.4
Frobisher Bay	Eskimo	28	6.25	4.6
Total Eskimo	Eskimo	113	3.53	5.4

<u>Test of hypothesis 1:</u>	t	p /
English - Eskimo	-3.40	.01
<u>Test of hypothesis 2:</u>		
Frobisher Bay - Pond Inlet	-3.44	.01

e) Discussion

No obvious reason can be seen for the reversal of both predictions. A tentative suggestion can be made however, about the relative effectiveness of colour in gaining the attention of Eskimo and Scottish subjects.

The Pond Inlet sample was tested after their long and colourless winter, and before any colouring appeared on the land. People deprived of colour stimulation for seven or eight months prior to testing might reasonably be expected to notice colour before anything else. However the Frobisher Bay sample has the opportunity, throughout the winter, to watch colour movies and peruse magazines; their colour stimulation prior to testing was probably on a par with both Scottish samples.

This suggestion corresponds quite well to the observed differences between the samples; the Frobisher Bay and Scottish samples do not differ significantly from each other in 'category' score, while the Pond Inlet score is significantly lower than both.

f) Conclusions

Both predictions have been significantly reversed, and the suggestion has been made that the relative effectiveness of colour in gaining attention might be responsible. It can only be concluded that if the sequence of processing visual material is influenced by the language one speaks, then the effect can be easily masked by other factors not considered in the original hypothesis.

4) General Conclusions: the Sapir-Whorf Hypothesis

These two studies add to the growing mass of equivocal findings pertaining to the Sapir-Whorf Hypothesis. The first study appears to uphold the Hypothesis, while the second does not confirm it. It is apparent that, as it stands, the Hypothesis is too vague; an almost infinite number of specific testable hypotheses may be derived from the present formulation, and on the basis of chance alone, one might expect some results to favour it. More precise reformulations are therefore necessary to make the Hypothesis amenable to valid experimental investigation.

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Appendix 4

Forms

SUBJECT INFORMATION FORM

SUBJECT NO.

PERSONAL DATA

NAME LOCATION

AGE SEX MARITAL STATUS NO.

OCCUPATION CHILDREN M..... F..... AGES

RELIGION PRACTICE 5 4 3 2 1 MAGIC/WITCH PRACTICE 5 4 3 2

LITERATE EDUCATION PENCIL LANGUAGE OTHER ...

GENERAL HEALTH

EYE TROUBLE

EAR TROUBLE INCAPACITIES

COLOUR VISION ACUITY F.....N.....

VISUAL ENVIRONMENT

WHERE BORN R V U RAISED R V U

HOUSE TYPE FURNISHINGS

VIEWS FROM HILLS 2 1 0 BUSH 2 1 0 FIELDS 2 1 0 EXPANSE OF WATER 2 1 0

TRAVELLED MUCH 2 1 0 WHERE DESCRIBE

WORK: INDOORS 2 1 0 1 2 OUTDOORS RECREATION: 2 1 0 1 2 LEISURE: 2 1 0 1 2

CHILDHOOD

B. OR D. BO BY SO SY. MORE INFLUENCED BY: FATHER 2 1 0 1 2 MOTHER

DOMINANT: FATHER 2 1 0 1 2 MOTHER PARENTS RELATIONS

COMMENTS ON: MOTHER

FATHER

FAMILY DISCIPLINE

VALUES

WHAT ARE YOUR PEOPLE LIKE

WHAT IS GOOD ABOUT YOUR PEOPLE

WHAT IS BAD ABOUT YOUR PEOPLE

WHAT IS IMPORTANT IN LIFE TO YOUR PEOPLE

WHAT IS IMPORTANT IN LIFE TO YOU

WHY ARE YOU ANSWERING THESE QUESTIONS

ORGANIZATION

	1	2	3	4	5	6	7	8	9	10	11	TOT
W												
W/2												
U												
U/2												
12												
13												
14												
15												
16												
17												

REMARKS

SHAPES

	1	2	3	4	5	6	7	8	9	10		
A	3	2	1	3	3	2	3	2	3	2	1	2
B	1	2	3	2	2	3	1	3	2	1	2	2
C	3	2	3	1	1	3	2	3	1	3	2	2
D	2	1	3	3	1	2	1	2	1	3	2	1
E	3	2	2	3	1	3	1	2	2	3	1	1
F	2	3	1	3	2	3	2	1	3	2	1	2

RIGHTS WRONGS SCORE

REMARKS

TEMNE-ENGLISH

	1	2	3	4	5	6	7	8	9	10	11	12
CHOICE												
TIME												

SCORE: T E REMARKS

0

2

3

4

5

6

7

8

NAME LOC. NO.

SCORE: 0 1 2 3 4 5 6 7 8

REMARKS

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1

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6
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	1	2	3	4	5	6	TOTAL
CHANGE							
PREDICTION							

NAME LOC. NO.

REMARKS
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