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A Study of the Relationship between Perspective Ability and Map Conceptualization in Elementary School Children

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A STUDY OF THE RELATIONSHIP BETWEEN PERSPECTIVE ABILITY AND MAP CONCEPTUALIZATION IN ELEMENTARY SCHOOL CHILDREN

by

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CHAPTER I

REVIEW OF THE LITERATURE

Spatial concepts comprise an important segment of the ideas involved in geography. As a dynamic and analytical tool, the concept of scale generates continued interest at all levels of geographic research and instruction (Stone, 1968, 1972). Other spatial concepts, namely distance, direction, reference systems and perspective, have not commanded similar attention and concern from geographers. Such concepts, basic to the understanding of spatial phenomena, are among those generally acquired by children during an age range coextensive with the elementary school years.

Piaget's and Inhelder's studies (1963) suggest that children's spatial concepts affect the ability to comprehend geometry, trigonometry, general science and geography. There is a noticeable lack of research relating children's learning of spatial concepts to curricular sequence. At present the majority of elementary grade curriculum materials which deal with spatial concepts are for the most part based only on assumptions as to when a concept can best be learned by children.

Concepts develop in children from experiences provided by the school and home. Listening to a speech, role-

playing a simulation activity, reading a map, manipulating data and watching a movie provide the percepts from which many basic concepts develop. An omnipresent research problem for curriculum designers is to determine when specific concepts can best be taught, i.e., when particular stimuli should be provided the student. The sequence of learning experiences provided a child is important not only to the formation of a specific concept, but also to the development of other concepts which depend on prior, more fundamental abstractions.

Little is currently known about sequential learning in geography and conflicting viewpoints are expressed in the literature regarding children's spatial perceptions as they relate to elementary classroom instruction (Rushdoony, 1968, 1971). Almy (1967) suggests that geographers should "attempt a dual analysis involving on the one hand, the ideas involved in geography, and on the other, the mental operations needed to grasp them [p. 38]." The relationships between spatial concepts and the mental operations necessary to cognize them are basic to selecting geographic concepts for inclusion in the social studies/geography curriculum.

Since Almy's suggestion, relatively little research has investigated the cognitive foundations of spatial concepts. When it has occurred, it has normally been carried out by people in disciplines other than geography, namely

psychology and educational psychology.

Existing research literature on the formation of spatial concepts reflects the studies of Piaget and Inhelder (1963). This Swiss team has investigated the development of numerous spatial concepts in children and identified a sequential emergence which they have labeled as stages. Each stage depends upon the maturation of the preceding stage and is likewise transitional to the following stage. Although the sequence of stages appears to remain invariate, the chronological age at which each stage develops may vary among individuals or groups of individuals.

Of particular interest to geographic educators is Piaget's and Inhelder's investigation (1963) of children's ability to coordinate perspectives. The American educator, Jack Miller, (1968) has replicated the Swiss studies and states that the ability to coordinate perspectives involves:

> "an understanding that objects and groups of objects will appear different from different vantage points; plus the ability to, in effect, superimpose a mental grid system on an area and thereby predict what would be seen from a variety of viewpoints other than the one currently occupied [p. 1]."

It is evident from Miller's statement that a child's perspective ability may have extenuating effects in areas other than geography. The affective development of the child may be influenced by his ability to coordinate a

variety of relationships. A child's inability to conceive the world from the viewpoint of others may affect the socialization process. As perspective ability develops, the child is freed from his intellectual and social egocentrism and begins to understand other peoples' viewpoints and behaviors (Towler, 1969). Past studies of this sort suggest, if only covertly, that a decrease in egocentrism is accompanied by the child's affective consideration of the well being of other individuals or groups of individuals.

The most widely recognized study of perspective ability was carried out by Piaget (1963) in Geneva. Piaget's study is frequently cited for theoretical constructs and research methodology. Piaget's study used three questioning strategies involving a paper mache model of three mountains, each a different color, size and shape. First, using flat cardboard shapes similar to the mountains, the child was asked to reconstruct the view as seen by a doll placed at various positions around the three-dimensional model. In the second strategy, ten different pictures of the model were shown to the child. From these ten pictures the child was asked to select the view as seen by the doll when placed at various positions around the model. The third task, the converse of the second, required the child to place the doll on the model so its view would coincide with that shown in one particular picture selected by the researcher.

One hundred Swiss children between 4 and 12 years of age constituted the study sample. As usual, Piaget reported very little about the characteristics of the sample. The children were subjected to the tasks of perspective ability and the researchers identified three distinct, sequential stages of development. The following sequence of stages identifies the progressive development of children's perspective ability (Piaget & Inhelder, 1963). Although Piaget and Inhelder have not included such an elaboration in their reports, the author has interpolated ages within the various stages for the purposes of the study. It should also be noted that such a procedure is common in the literature involving replication studies and tests of Piaget's theory.

Stage I:	(4 to 5 years) At this stage children do not understand the questions and are unable to participate in the tasks.
Stage II:	(6 to 8 years) Children at this stage find difficulty in recognizing any viewpoint other than their own.
Substage IIA:	(6 to 7 years) In this stage children regard their point of view as the only one possible and are therefore unable to represent any viewpoint other than their own. They are unable to handle left-right and before-behind relationships. In reconstructing the three mountains from different views, the child may go to considerable efforts to represent the view seen by the doll, but the view recon-

structed always coincides with his own.

Substage IIB: (7 to 8 years) At this stage, transitional to Stage III, children sense that some of the relationships are relative to others and attempt to discriminate between viewpoints. The child commits errors of reasoning rather than errors of perception.

Stage III: (8 to 10 years) Children show progressive discrimination and coordination of perspectives.

Substage IIIA: (8 to 9 years) Discrimination becomes more frequent but there does not yet exist a comprehensive coordination of perspectives. The child discovers that left-right and before-behind relationships are entirely relative to the observer, but is unable to use both relations simultaneously. Piaget views this stage as transitional between egocentrism and completely objective grouping.

Substage IIIB: (9 to 10 years) Mastery of coordination of perspectives is complete. The child has conceptualized the complete relativity of perspectives.

The Swiss researchers explain their findings by theorizing that the coordination of perspectives depends not upon familiarity and experience, but upon operational concepts and acts of intelligence which link a particular viewpoint to all possible viewpoints. Piaget (1963) explains that:

> "a system of projective relations or perspective viewpoints consists essentially of operations which do not merely assemble perceptual data, but co-ordinate it in terms of reciprocal relationships. Hence the function of projective space is not to link up the various parts of the object, but to link together all the innumerable projections of it. Consequently, the perceptions to which these different projections or perspectives correspond are not like fragmentary pictures that have to be assembled, but each one of them complete views taken from different angles that have to be reconciled [p. 244]."

The totality of the various perspectives or views can be grasped only by mental operations which link together all the possible perceptions. Hence, Piaget claims the perspective system is conceptual rather than perceptual in nature (Piaget & Inhelder, 1963).

Other research studies have investigated the development of perspective ability among elementary school children. Interesting to note that among those studies, with one exception (Beilin, 1970), none of the researchers investigated the relationship between perspective ability and map reading skills. The researchers generally assumed that the ability to coordinate perspectives is a factor in the ability to read and interpret maps, but they did not test their assumption. There is little evidence to substantiate a past premise by researchers that the ability to coordinate perspectives influences a child's map reading skills.

Miller (1967, 1968), in a study employing strategies similar to Piaget's, observed among American children between $5\frac{1}{2}$ and 13 years of age, a similar sequential development of perspective ability. Miller commented on the relation of the ability to coordinate perspectives to map reading skills but did not test the relationship directly. Consequently, a limitation of Miller's study is the necessity for making inferences concerning the relationship of perspective ability to map reading skills without adequate research data.

Similarly, a study by Eliot (1966) attempted to determine the effects of training upon children's skills in the projective representation of space. Eliot based his study on the premise that a child must have developed perspective ability in order to represent objects on a map. Eliot hypothesized that providing practice in predicting the arrangement of objects from different points of view would improve the ability of children to perform perspective tasks such as drawing a map. The results of the study were inconclusive and the patterns of performance by the subjects were inconsistent. No empirical evidence substantiated Eliot's premise that perspective ability is necessary in order to draw a map.

A study by Towler (1969, 1970) replaced the three mountains of the Swiss model with three buildings in order to retain familiarity of the landscape as a factor. Towler

(1969) observed a sequential pattern in the development of children's abilities to coordinate perspectives and concluded that:

> "there is a direct relationship between degree of egocentrism and the child's ability to develop accurate perceptions about his world. It follows that the more egocentric a child is, the more difficult it must be for him to understand maps and mapping [p. 14]."

Towler's study does not, however, provide empirical evidence to support the premise that perspective ability is related to the understanding of maps and mapping.

One researcher (Beilin, 1970) looked at the relation of spatial concepts and map skills by correlating the achievement of children on a series of six Piagetian spatial tasks to their achievement on a series of six map reading tasks. The findings generally confirmed the hypothesized relationship between spatial tasks and map reading skills. An unexpected finding, however, was a lack of confirmation of the premise of Miller's, Eliot's and Towler's studies that the ability to coordinate perspectives is highly related to map reading skills. Although Beilin's tasks did not include "drawing a map" as suggested by Eliot's study, perspective ability was nevertheless not significantly related to any of the six map reading skills tested.

Summary

Miller, Eliot and Towler state arguments for the logical relation between Piaget's sequential development of the ability to coordinate perspectives and map reading skills. However, none empirically examines the relationship between children's ability to deal with spatial concepts and their ability to complete map tasks. Beilin's research, while not including a map drawing task, indicates that the ability to complete map tasks may not be related to perspective ability.

Each of the studies suggests that curricular sequences for developing map skills in children must take account of the cognitive capacity to deal with fundamental spatial concepts. The implication that map instruction in the elementary grades may be futile until perspective ability has developed is not substantiated by the research. In fact, Beilin's study may be interpreted as suggesting that, due to the absence of a significant correlation between perspective ability and map tasks, the ability to coordinate perspectives should not be considered when planning sequences in map instruction.

CHAPTER II

STATEMENT OF THE PROBLEM

Rationale

The research literature does not discuss the relationship between perspective ability and the ability to understand maps and mapping. The principal problem underlying the present study is to investigate the relationship between the development of children's ability to coordinate perspectives and their ability to conceptualize the spatial relations represented on a map.

Replication studies investigating the development of perspective ability have resulted in findings very similar to those of Piaget and Inhelder (1963). Therefore, the author suggests that further replication of their experiment for test of theory is unnecessary. Its empirical validation does, however, make it a desirable criterion task from which to gauge other select developmental sequences in children. Piaget's perspective ability task is used in such a manner in the present study.

Most prior research on perspective ability is based on the assumption that the ability to coordinate perspectives is in someway related to map reading or map drawing skills. Therefore, the present investigation examines the

relationship between perspective ability and a map drawing skill rather than attempting to investigate the learning theory involved in spatial visualization.

Many map tasks given to elementary school children develop only perceptual behaviors. For example, tracing an outline map requires the coordination of the actions of visual perception and motor skills, but does not entail the mental abstraction of spatial relations. Similarly, tasks designed to instruct children in the symbolic conventions of mapping do not necessarily develop the ability to reason in terms of those conventions. The ability to visualize the spatial arrangement of objects represented on a map requires more complex mental operations than are carried out with perceptual activities. In this study, the map drawing task design involves a conceptualizing ability and is not restricted to a perceptual or visual-motor activity.

Spatial visualization is concerned not only with the perception of the changes in the apparent size and shape of objects, but also with the conceptualization of the relative positions of the objects from different points of view (Eliot, 1966). The distinction between perceptual and conceptual behavior is apparent in a child's efforts to represent, as in the drawing of a map, objects which are perceptually separated in space. To represent objects on a map requires a child to perceive more than one object at a

time. More importantly, the child must conceptualize simultaneously several variations in the spatial relationships of those objects (Eliot, 1966). By making judgements about the position, location or changed appearances of objects, the child is necessarily engaged in a level of reasoning beyond that required by perception alone (Eliot, 1970). As stated earlier, coordinating all of the various views or perspectives requires mental operations which link together all the possible perceptions. Hence, the conceptualization of the spatial relations represented on a map requires acts of intelligence beyond those involved in visual perception.

If these theoretical assumptions are valid, the mental operations required for accurately representing on a map objects perceptually separated in space appear to be similar to those required for the coordination of perspectives. Therefore, a positive relationship between perspective ability and a conceptual map drawing task is anticipated. The purpose of the present study is to investigate that relationship.

Research Hypotheses

The mental operations involved in coordinating perspectives and replicating the spatial arrangement of objects on a map appear to be similar. Success on one task should therefore be related to success on the other task. However,

Beilin (1970) correlated children's achievement on perspective tasks and map reading tasks and found no significant relationship. Therefore, the following hypothesis tests the relationship between perspective ability and map conceptualization.

H_1. There is no significant relationship between the ability to coordinate perspectives and the ability to conceptualize the spatial arrangement of objects on a map.

Research by Almy (1966) indicates that children of lower socioeconomic status attain certain levels of concept development at later ages than do children of higher socioeconomic status. Towler (1969) did not find a significant difference between the perspective abilities of high and low socioeconomic groups when adjusted for the effects of intelligence. The present study further investigates socioeconomic status as it relates to perspective ability and a map drawing task by testing the following hypotheses:

H_2. There is no significant relationship between socioeconomic status and the ability to coordinate perspectives.

H_3. There is no significant relationship between socioeconomic status and the ability to conceptualize spatial relations on a map.

Conflicting research evidence pervades the literature concerning the ability of boys to outperform girls on spatial tasks in general (Eliot, 1970). The studies of Miller,

Eliot, Towler and Beilin investigating children's ability to coordinate perspectives did not analyse differences between the sexes. Without further evidence it is difficult to make inferences concerning the relation of sex and performance on perspective and map drawing tasks. The following hypotheses examine those relationships:

H_4. There is no significant difference between the abilities of boys and girls to coordinate perspectives.

H_5. There is no significant difference between the abilities of boys and girls to conceptualize spatial relations on a map.

The relationship between perspective ability and map conceptualization lends itself to testing through Pearson product-moment correlation. Multivariate analysis of covariance is a suitable technique for testing for differences between socioeconomic groups on the ability to complete the perspective and map conceptualization tasks. Differences between the sexes in ability to perform the tasks is tested using the analysis of variance technique. A significance level of five per cent or less ($p < .05$) is used for rejection of the null hypotheses.

CHAPTER III

INSTRUMENTS INCORPORATED AND SCORING CRITERIA

The procedures followed in this study involved the administration of tests of ability to coordinate perspectives and ability to represent the spatial relations of objects on a map. The principal component of the study prior to data collection was the design of a task suitable for assessing map conceptualization.

The Instruments

Test I: Test of Coordination of Perspectives

The Test of Coordination of Perspectives is patterned after Towler's (1969) modification of the three-mountain task of Piaget and Inhelder (1963). The test is individually administered to each child and is composed of three subtests designed to assess the child's understanding that objects and groups of objects will appear differently from different points of view. For example, the objects in a model village are seen differently by persons on opposite sides of the model. Not only are different sides of the buildings seen by the two people, but the relative positions of the buildings change. What is near one person is distant to the other; what is on the right hand side of

one is on the left hand side of the other.

Subtest A

The subtest is designed to measure children's ability to replicate different perspectives using a three dimensional model. Two circular boards thirty inches in diameter with plastic buildings of model railroad HO gauge size are the props used in the task. Each board is divided into equal quadrants by the intersection of two roads. A church, house, barn and trees occupy the quadrants (Fig. 1).

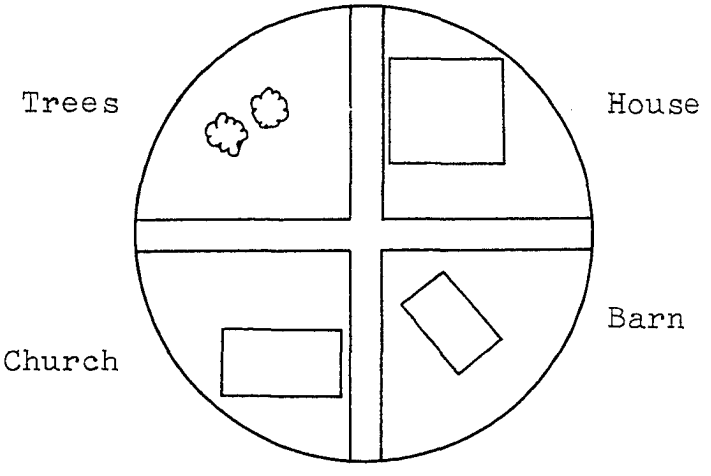
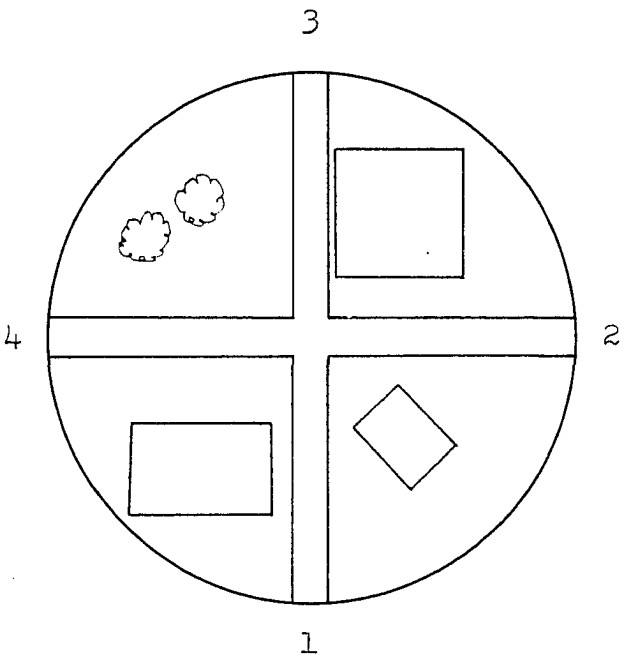


Fig. 1.--Diagram of model for Subtest A

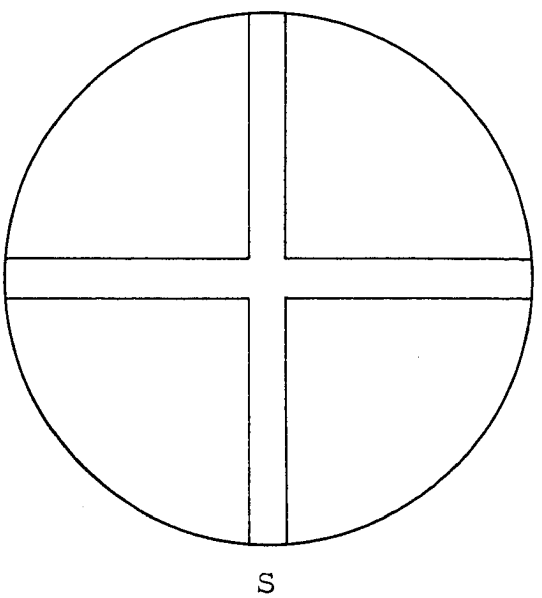
While Piaget and Inhelder used mountains rather than buildings, the contemporary settlement scene employed in this task retains familiarity with the landscape, a factor which Towler (1969) suggests may affect performance on the test. A small doll four inches high is also used.

Each subject is shown the two models (Fig. 2). Model A is complete with the buildings and trees in place; model B is void of buildings and trees, but it does contain the crossroads. The subject is instructed to sit in front of model A at position 1. The doll is placed at position 1 and the subject is instructed to place his eyes at the height of the doll and study the positions of the buildings. It is explained to the child that he will be asked to reconstruct the view, as seen by the doll, on the other board using identical buildings and trees. Although standard instructions (Appendix A) are given each subject, the examiner is permitted to supplement the instructions to insure that each subject understands the task requirements.

After the examiner is satisfied that the subject understands the task, the subject is told to stand in front of model B at position S (Fig. 2) and reconstruct the village exactly as the doll sees it. The subject is permitted to return to the completed model as often as necessary, but only to position 1. After the subject has completed the model, the doll is moved to position 3 and the subject repeats the task. Again, the subject may return to the completed model as often as necessary, but only to position 1. This procedure is repeated with the doll at position 2. The subject is then moved to position 2 and asked to reconstruct the view as seen from there.



Model A



Model B

Fig. 2.--Diagram of arrangement of models for Subtest A

Similarily, the child is asked to reconstruct the view from positions 1 and 4. After the child has completed each reconstruction, he is asked to explain how he knew where to place the objects.

Scoring for this subtest is based on the placement of the object in the correct quadrant and the correct orientation of the object within the quadrant. In the case of the orientation of the object, credit is awarded as long as the prop faces in the same general direction within the quadrant as it does on model A. A score of one is assigned for placement in the correct quadrant and for correct orientation of each object. Therefore, a score of twenty-four for the correct quadrant placement and a score of twenty-four for the correct orientation is possible on the six items of the subtest.

Egocentrism is measured by awarding a separate score each time the subject reconstructs his own viewpoint. Only quadrant placement is considered for this score. Therefore, a subject who reconstructs his own viewpoint on all items accumulates twenty-four points for egocentrism.

The examiner gives the instructions to each subject and an assistant records the scores on a score sheet (Appendix B). The assistant records observations of the subject's verbal responses and performance during the test.

Subtest B

This subtest contains five items using the completed circular model with trees and buildings in place. Eight color photoprints, each 5 by $9\frac{1}{2}$ inches and showing different perspectives of the model are also used. The photographs are taken with the camera $2\frac{1}{2}$ inches above the base of the circular model. The positions from which the pictures are taken divide the circular model into equal segments (Fig. 3). The eight photographs are mounted on a 32 by 40 inches board in a four by two matrix (Fig. 4).

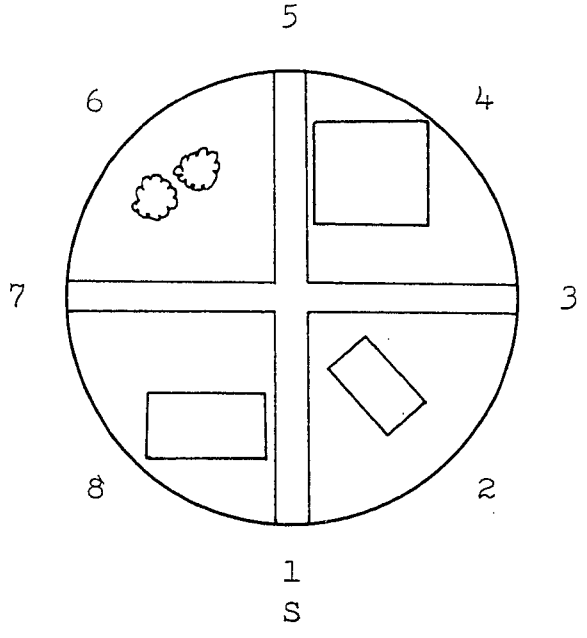


Fig. 3.--Diagram of camera locations

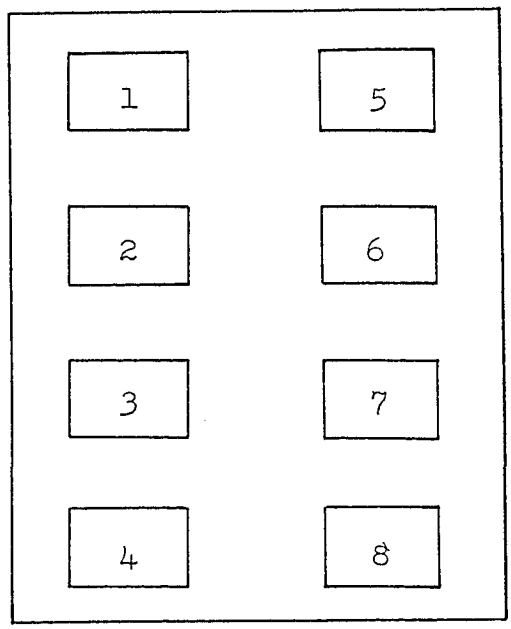


Fig. 4.--Diagram of matrix board

For this test the subject is seated in front of the completed model at position S (Fig. 3). The matrix board with the eight photographs is located directly behind the model. The examiner places the doll on the model and tells the child to imagine that the doll has a camera and is taking a picture. The subject is requested to select from among the eight photographs the one which the doll would take from his position. Although a standard set of instructions is given each child (Appendix C), the examiner is permitted to supplement them to insure understanding of the task. The subject is not permitted to move around the model while selecting the picture. The purpose of the restriction is to insure the use of the child's perspective ability rather than his memory. The test requires the

subject to select views 3, 5, 7, 8 and 4 in that order. After the child has made each selection, he is asked to explain how he knows his choice is correct.

For each correct selection the subject receives a score of one; for each incorrect selection, a score of zero. An assistant records the scores on a score sheet (Appendix D) and makes notations of the subject's verbal responses to the explanation questions.

Subtest C

Subtest C is designed to be the converse of Subtest B and uses the same instruments. One of the color photographs is selected and the subject is requested to place the doll in the correct position for taking that photograph. Standard instructions (Appendix E) are given each subject. All other procedures are similar to those in Subtest B. The subject is required to identify pictures 7, 5, 3, 2 and 6 in that order. Scoring and recording of responses follows the pattern used in Subtest B.

Test II: Test of Map Conceptualization

Test II, the Test of Map Conceptualization, is designed to measure children's abilities to represent objects on a map. The rationale for this test is predicated on the theoretical assumption that the mental operations required for drawing a map are the same as those required

for understanding maps and mapping. The task, therefore, is based on the assumption that understanding a map involves more than the perception of symbols separated in space. As stated earlier, it also requires the conceptualization of the positions of symbols relative to one another from different points of view. To represent objects on a map requires not only that a person perceive more than one object at a time, but that he also conceptualize several variations in their relationships at the same time (Eliot, 1966).

The map drawing task uses props similar to those used in the test of perspective ability. A circular board is divided into quadrants by the intersection of two roads. A church and tree, house and tree, and a factory are placed in separate quadrants, leaving one quadrant empty (Fig. 5). An $8\frac{1}{2}$ by 11 inches sheet of paper

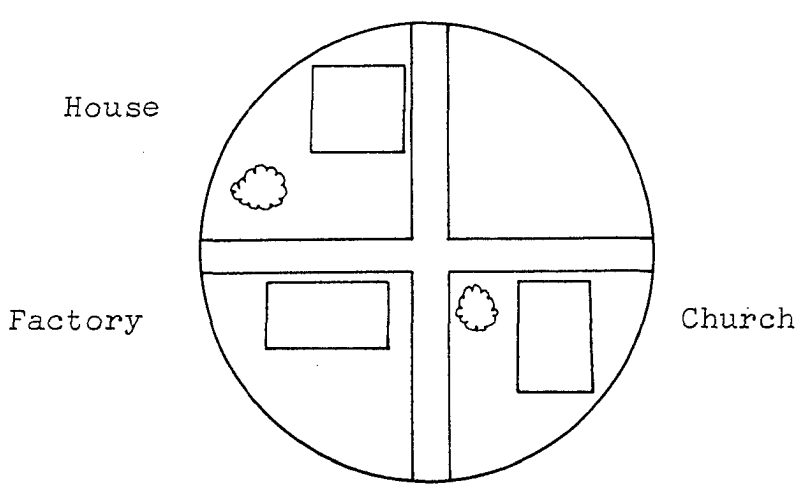


Fig. 5.--Diagram of model for Test II

is given each subject. A circle seven inches in diameter is drawn on the paper. The examiner instructs the subject to study the model and then draw a map of the model on the sheet of paper. The subject is permitted to move around the model and study it from any position. Again, standard instructions (Appendix F) are given each child, supplemented as necessary to assure understanding of the task.

Scoring of the Test of Map Conceptualization does not reflect upon the child's artistic ability or proficiency with map symbolization. Scores are assigned only for those elements of the task requiring the conceptualization of the positions of the objects relative to one another and to the axes formed by the intersecting roads (Appendix G).

Although no mention by the examiner is made of their presence, a straight edge and an eraser are on the table for use by the subject.

Pilot Trial of Instruments

A limited pilot trial of Test I and Test II was conducted. Minor modifications were made to correct apparent ambiguities in verbal instructions, response forms and scoring procedures. At the completion of the pilot administration the instruments were judged by the author to be suitable for data collection in the designed study.

CHAPTER IV

DATA COLLECTION AND ANALYSIS

The Test of Coordination of Perspectives and the Test of Map Conceptualization were administered to 104 elementary school children from grades K through 6 inclusive. Data were collected between April 11 and May 4, 1973. All data collection was carried out in Grand Rapids, Michigan, an urbanized area of 350,000 people. Such a city provided the researcher with a population of children which would permit the attainment of the research objectives of the study.

Sample Selection

Subjects were randomly selected from four schools in Grand Rapids. The schools, Ottawa Hills Elementary, Palmer Elementary, Sheldon Elementary and Beckwith Elementary, were selected because they included children from a wide range of socioeconomic communities. The number of subjects selected from grades K through 6 included: fifteen from each of grades K, 2, 4 and 6; fourteen from each of grades 1 and 3; and sixteen from grade 5. As expected, the chronological age of the subjects corresponded closely to grade level, ranging from 5 years 5 months to 14 years 5 months. An equal number of males and females

were included. Forty-one of the subjects were black.

The four schools from which the subjects came were judged to be dissimilar in socioeconomic status due to location in the urban area. An SES rating was assigned to each school by applying a modified Hollingshead Two Factor Index of Social Position (1957). The Hollingshead Index rates socioeconomic status on the basis of an individual's education and occupation. The Index ranges from 11 (high socioeconomic status) to 77 (low socioeconomic status).

The information required to apply the Hollingshead Index to individual subjects was not available. However, information based on school principals' estimates of the educational levels and occupational categories of the children's parents was available for each school. Applying weighted means to the pertinent data from a Principal's Questionnaire (Appendix H) and calculating a Hollingshead Index of Social Position, a generalized socioeconomic index was assigned to the subjects of each school. School 1 (SES index = 25) included subjects from a predominately white upper-middle class community. School 2 (SES index = 32) represented a white middle class community with the exception that approximately thirty per cent of the students attended from a fringe attendence area which was predominately black. School 3 (SES index = 60), drawing from an all white neighborhood, was judged to be of low socioeconomic status.

School 4 (SES index = 70), ninety-eight per cent black, represented a lower class community.

Reading scores from the Metropolitan Achievement Test (MAT) were obtained for all but nine of the subjects in grades 1 through 6. Scores from the Test of Basic Experiences (TOBE) were obtained for all of the grade K subjects. The reading scores of each grade level were converted to z-scores and were applied in analysis as surrogate indicators of general academic achievement. The positive relationship existing between reading achievement and general intelligence has been traditionally supported by researchers (Bruininks & Lucker, 1970; Michaels, Smith & Lee, 1971).

Statistical Analysis

General patterns and trends in the subjects' performances on Tests I and II were analysed using descriptive statistics. The significance of the relationship between perspective ability and map conceptualization was tested using the Pearson product-moment correlations technique. The procedure for testing for the effects of socioeconomic status and achievement on Tests I and II was analysis of covariance. Covariates were age and reading ability.

For each statistical test applied in this study, the .05 level of significance was used for rejection of the null hypothesis.

Instrument Analysis

Instrument Reliability

Instrument and scoring reliability was assessed by computing odd-even coefficients of reliability for each component of Tests I and II (Table 1). The coefficients of reliability were attenuated for length using the Spearman-Brown Prophecy Formula. Separate coefficients for each subtest of Test I are included as well as a coefficient based on the composite scores of Test I.

TABLE 1

COEFFICIENTS OF RELIABILITY(OE)

Test	Coefficient of Reliability
Subtest A	.96
Subtest B	.86
Subtest C	.93
Test I (Composite)	.95
Test II	.90

Correlations of Subtests

To substantiate the independence of the tasks in Test I, Pearson product-moment correlations were computed for the scores of the subtests (Table 2). The correlation coefficients suggest that Subtest A measures a dif-

ferent aspect of perspective ability than Subtests B and C. The relatively high relationship (r = .71) between Subtests B and C is expected since Subtest C is the converse of Subtest B.

TABLE 2

CORRELATIONS OF SUBTEST AND COMPOSITE TEST I SCORES

Subtest	A	B	C	Composite
A	1.00			
B	.59	1.00		
C	.52	.71	1.00	
Composite	.91	.80	.76	1.00

Results of Test I: Test of Coordination of Perspectives

Subtest A

Subtest A requires the subject to replicate a model village as seen by a doll from different points of view. The sample subjects' accuracy in replicating the model generally improves as they advance in age (Table 3). The frequency of correct quadrant placement tends to increase as the subjects become older. Egocentrism, measured by the frequency with which the subjects construct the model according to their own view, shows a parallel decrease among the older subjects.

TABLE 3

MEAN SCORES FOR SUBTEST A

Grade	Mean Age[a]	Quadrant[b]	Orientation[b]	Own View[b]
K	5.9	7.80	15.00	21.93
1	7.1	8.14	16.28	22.85
2	7.11	8.33	16.73	22.13
3	9.2	10.17	11.93	18.00
4	10.4	10.07	14.80	18.13
5	11.0	12.50	15.81	14.63
6	12.4	14.73	16.13	13.93

[a]5.9 refers to 5 years 9 months of age

[b]Highest score possible = 24

Although the mean score for correct orientation within the quadrant is higher for the grade 6 subjects than for the grade K subjects, inconsistencies appear among the scores for grades 1 through 5. The discrepancies result from the subjects in grades K, 1 and 2 constructing the model according to their own view. Although the subjects place the buildings in the incorrect quadrant, i.e., the quadrant as seen from their own point of view, they orient the buildings correctly within the quadrant. Not until grade 3 do the subjects begin demonstrating an awareness of the relativity of positions. Although the grade 3 subjects generally improve their quadrant score, correct orientation within the quadrant remains a difficult task to complete. When the grade 3 subjects select the correct quadrant, they frequently orient the props according to their own view rather than from the

doll's point of view, thereby depressing the score for orientation. At grade 4 subjects begin to grasp the relativity of both location and orientation. Discrepancies in the general pattern of improvement similar to those in Table 3 were observed by Towler (1969).

Subtest B

In Subtest B, a doll is placed on the completed model and the subject is requested to select from among eight photographs the view seen by the doll. Similar to the trend in Subtest A, the scores improve with increases in chronological age (Table 4). The number of egocentric responses generally decreases with age. Inconsistencies in the pattern again appear as the subjects are confused by the realization that points of view are relative.

TABLE 4

MEAN SCORES FOR SUBTEST B

Grade	Score[a]	Own View[a]
K	.53	.47
1	.86	1.00
2	1.33	.47
3	2.14	.79
4	1.60	.93
5	2.94	.75
6	3.00	.33

[a]Highest score possible = 5

Subtest C

Subtest C, the converse of Subtest B, requires the subject to place the doll on the model such that its view will coincide with that seen on one of the photographs. As the mean scores indicate, the test appears to be the easiest task for the subjects (Table 5). More frequent correct responses and fewer egocentric responses occur at

TABLE 5

MEAN SCORES FOR SUBTEST C

Grade	Score[a]	Own View[a]
K	.40	.20
1	1.50	.64
2	2.27	.33
3	2.07	.36
4	2.27	.33
5	3.44	.13
6	3.93	.06

[a]Highest score possible = 5

all grade levels. The general pattern of higher score with increasing age is clearly evident.

Composite Scores of Test of Coordination of Perspectives

The scores of the subtests of the Test of Coordination of Perspectives were combined to derive a single measure of a subject's perspective ability. In calculating this composite score, only the score for the correct quad-

rant placement is included from Subtest A. Egocentric responses are not considered. Combining the scores in this manner is consistent with the procedures followed by Piaget and Inhelder (1963) and Towler (1969). The trend of improved scores with advancing age further substantiates the patterns evident in the scores for the separate subtests (Table 6).

TABLE 6

MEAN COMPOSITE SCORES OF SUBTESTS OF TEST I

Grade	Score[a]
K	8.73
1	10.50
2	11.93
3	14.92
4	15.20
5	18.27
6	21.67

[a]Highest score possible=34

On the basis of the composite scores for Test I and the researcher's observations, each subject was classified according to Piaget's stages of development (Table 7). An examination of the data (Table 7) indicates that the older subjects are more proficient in coordinating perspectives. The sequence of development is evident. The younger subjects are unable to recognize any viewpoint other than their own. As the children become older they progress through a realization of the relativity of some spatial relations to the conceptualization of the complete rela-

tivity of perspectives. The modal ages for stages and substages approximate those which are suggested in Piaget's and Inhelder's initial investigation of perspective ability (1963).

TABLE 7

NUMBER OF SUBJECTS AT EACH STAGE IN THE DEVELOPMENT OF PERSPECTIVE ABILITY

Grade	Stage I	Stage II		Stage III	
		IIA	IIB	IIIA	IIIB
6		1	4	5	5
5		4	4	5	3
4	1	3	6	5	1
3		2	8	4	1
2		8	5	1	
1		11	3		
K	1	13			

N = 104

Minor differences are evident between the age ranges for each stage suggested by Piaget's research and the age ranges identified in this study. Five year old children in the Swiss sample were generally unable to understand and participate in the tasks. Those children were therefore classified as being at Stage I in the development of perspective ability. In the present study, subjects as young as 5 years 5 months were able to successfully complete the tasks. Only one grade K subject (6 years, 0 months) was considered to be at Stage I. One other subject (9 years, 11 months) was classified as being in Stage I. However, the researcher obtained evidence from the

classroom teacher that factors other than undeveloped perspective ability may have accounted for the subject's poor performance. Generally, subjects in this sample developed perspective ability between one and two years later than Piaget's subjects.

Piaget's research suggests that perspective ability is a developmental concept. One component of Piaget's theory of the development of perspective ability is that, while the sequence of stages remains invariate, the chronological age at which each stage develops may vary among individuals. The dispersion of ages within each stage and substage (Table 7) supports Piaget's contention that the ages for each stage vary among individuals. Children obviously make the transition from the egocentrism of Substage IIA to the complete mastery of perspectives of Substage IIIB at different ages and different rates of progress. If perspective were other than a developmental concept, the ages at which it appears would be more consistent among all individuals.

Results of Test II: Test of Map Conceptualization

The Test of Map Conceptualization requires the subject to draw a map of a model village. The data from the test suggest that the ability to accurately represent spatial relations on a map increases with age (Table 8).

TABLE 8

MEAN SCORES FOR TEST II

Grade	Score[a]
K	6.20
1	10.50
2	11.33
3	14.93
4	14.00
5	16.93
6	19.00

[a]Highest score possible=20

Within the general pattern of improvement the researcher observed several distinct stages of development in the child's ability to accurately represent the arrangement of objects on a map. The following sequence, identified by the author, demonstrates the progressive development of children's map conceptualization.

Stage I: (5 to 7 years) At this stage the child does not understand the concept of a map. Drawings show no attempt to represent the spatial distribution of objects. Cross-roads are not drawn and frequently the objects represented in the drawing are unrelated to those in the model.

Stage II: (7 to 11 years) Children at this stage comprehend the spatial function of maps.

Substage IIA: (7 to 9 years) In this stage the concept of a map is understood, but the child is unable to coordinate his perceptions of spatial distributions. Cross-roads and buildings are depicted on the map but their arrangement is

disorganized. Buildings may be located on the roads or outside of the map itself.

Substage IIB: (8 to 11 years) The concept of a map as a picture of reality is complete. Objects now appear in quadrants rather than on the road or outside of the map boundaries. However, the child views each object separately or at the most in relation to only one other object, rather than to all other objects simultaneously. Therefore, objects are located in the wrong quadrants relative to other objects. Within the quadrant the child does not consider the location of the object relative to the sides of the quadrant.

Stage III: (9 to 12 years) The child in this stage perceives all the objects at one time and accurately represents their relative positions.

Substage IIIA: (9 to 12 years) In this stage the child has conceptualized the relative positions of the objects from different points of view. All objects are in the correct quadrants relative to all other objects. However, placement within the quadrant relative to the quadrant sides continues to be a problem for the child.

Substage IIIB: (10 to 12 years) At this stage the development of the concept of relative positions of objects from different points of view is complete. The child draws all objects correctly in relation to all other objects and to the sides of the quadrants. The child has mastered the ability to conceptualize simultaneously several

variations in the relationships of objects and transfer those relationships to a two-dimensional surface.

The development of the ability to conceptualize simultaneously, on a map, the relative positions of objects from different points of view is central to the study. Similar to Piaget's developmental stages of perspective ability, the ages at which each stage develops vary among individuals (Table 9). Although the variability of ages within each stage is greater than the variability

TABLE 9

NUMBER OF SUBJECTS AT EACH STAGE IN THE DEVELOPMENT OF MAP CONCEPTUALIZATION

Grade	Stage I	Stage II		Stage III	
		IIA	IIB	IIIA	IIIB
6				10	5
5		1	3	8	4
4			9	6	2
3		3	6	2	1
2	2		9	4	1
1	3	4	2	4	
K	6	2	4	3	

N = 104

observed for perspective ability, the modal ages for stages and substages are more distinct. The sequence of stages of map conceptualization seems to be invariate with the appearance of each stage being dependent on the development of a prior stage.

Testing of Hypotheses

Hypothesis One is designed to assess the relationship between the ability to coordinate perspectives and the ability to conceptualize the spatial relations of objects on a map. The relationship is tested by calculating a Pearson product-moment correlation coefficient. The results indicate that subjects' performances on the two tests are significantly related ($p < .05$). Therefore, the null hypothesis is rejected. The strength of the relationship ($r = .56$) suggests that the mental operations involved in manipulating both concepts are similar.

Throughout the data collection, the researcher noted that those subjects who had difficulty coordinating perspectives also tended to draw the map as if they perceived only one object at a time. Subjects appeared to draw objects on the map as if they were unconcerned about their location relative to the other objects. Those subjects who master the Test of Coordination of Perspectives transfer their awareness of relative position to the map drawing exercise. The data suggest that the cognitive operations necessary to visualize the spatial arrangement of objects on a map are closely related to those mental operations required for the coordination of perspectives.

Hypothesis Two investigates the relationship between socioeconomic status and perspective ability. The effects

of SES on perspective ability are tested using an analysis of covariance procedure. The subjects are grouped by school as an indicator of socioeconomic status. Eight black subjects from School 1 (a high SES school) are grouped with the subjects of School 4 (a low SES school). The researcher justifies the adjustment based on known student transfer patterns in the urban area. The eight subjects resided in a socioeconomic neighborhood similar to that of School 4.

The effects of socioeconomic status, as indicated earlier, are inconclusively reported. An examination of the effects of SES on the study sample's performance of tasks is a major component of the study. Since age and reading achievement vary widely across SES categories, both are incorporated as covariates in the analysis of covariance technique. Analysis of covariance allows the comparison of two variables while removing the effects of other variables (covariates) which could not be controlled in the experimental condition. The analysis "equalizes" the groups for chance differences in ability or age (Table 10). In short, the researcher, through analysis of covariance, is attempting to eliminate independent variables other than SES for analysis purposes. The covariance technique reveals a significant difference ($p < .01$) between high and low to middle SES groups. Therefore, the null hypothesis is rejected.

TABLE 10

MEAN VALUES IN ANALYSIS OF COVARIANCE: TEST I

School	Age[a]	Reading z-Score	Test I Score	Adjusted Score
1	118.80	0.671	20.95	19.15
2	110.07	0.165	13.33	13.11
3	107.33	-0.434	12.81	13.39
4	103.07	-0.324	12.07	13.12

[a]Age in months

The data suggest that a difference exists between the perspective ability of children of relatively high SES and those of middle to low SES. The difference between the performances of children from the middle SES group (School 2) and those of low SES (Schools 3 and 4) are insignificant. A significant difference between scores appears only when the high SES group (School 1) is considered. This suggests that children of middle and low SES have similar exposure to the experiences which promote development of perspective ability. Children of relatively high SES, on the other hand, appear to have greater contact with those developmental experiences and therefore attain perspective ability at earlier ages.

Hypothesis Three investigates differences between abilities of socioeconomic groups to conceptualize spatial relations on a map. The hypothesis is tested using an analysis of covariance procedure adjusting for the effects of age and reading ability. No significant difference

in the map conceptualization abilities of the four groups ($p > .05$) is observed. Therefore, the null hypothesis is accepted.

The results of the analysis suggest that the subjects of the four SES groups have encountered similar experiences which promote map conceptualization (Table 11).

TABLE 11

MEAN VALUES IN ANALYSIS OF COVARIANCE: TEST II

School	Age[a]	Reading z-Score	Test II Score	Adjusted Score
1	118.80	0.671	16.20	14.08
2	110.07	0.165	13.04	12.77
3	107.33	-0.434	11.86	12.57
4	103.07	-0.324	8.59	9.88

[a]Age in months

The exposure to maps which most social studies curriculums provide children may be a factor in the similar performances observed for the different groups on the map conceptualization task.

Hypotheses Four and Five are designed to assess the differences between the abilities of boys and girls to complete the perspective and map tasks. Both hypotheses are tested using a one-way analysis of variance technique. Because boys and girls were comparable on the major independent variables, no adjustment for age and reading differences was deemed necessary by the researcher. The performances of the two groups were almost identical on each

test (Table 12). Differences between the abilities of

TABLE 12

MEAN SCORES FOR BOYS AND GIRLS ON TESTS I AND II

	Test I	Test II
Boys	14.9	12.2
Girls	14.3	12.9

boys and girls on both tasks were not significant ($p > .05$). Hence, both Hypotheses Four and Five are accepted. These results are in disagreement with the findings of studies cited by Eliot (1970) which generally report that boys outperform girls on spatial tasks. However, those investigations did not involve the Piagetian perspective tasks.

CHAPTER V

SUMMARY AND CONCLUSIONS

The present study was designed to empirically examine children's conceptualization of the spatial arrangement of objects on a map and the coordination of perspectives. An *a priori* assumption of the study was that development of the ability to accurately represent the spatial arrangment of objects on a map parallels development of the ability to coordinate perspectives. The effects of chronological age, socioeconomic status, academic ability and sex on perspective and mapping abilities were investigated.

The data suggest that the ability to coordinate perspectives and the ability to conceptualize the spatial function of maps are related. Performance of tasks by subjects in the sample support the theory that children progress through a series of stages in the development of their understanding that objects and groups of objects appear differently from different points of view. Children progress through a similar sequence of stages in the development of their ability to simultaneously conceptualize several variations in the relationships of objects on a three-dimensional model and transfer those relationships to a two-dimensional map. Both skills evolve

through a rather definite sequence. Children develop proficiency in dealing with various components of the perspective and mapping tasks at general ages until all parts can be coordinated simultaneously and the abilities are complete. Such developmental skills are in contrast to maturational skills which tend to appear when the child attains a certain level of physical development.

The differences in performances of the four socioeconomic groups on the perspective tasks suggest that perspective ability is not dealt with by the school curricula. Differences in home experiences of the SES groups are not equalized by school experiences. The data suggest, however, that experiences promoting map conceptualization are similar for all socioeconomic groups. Presumably those experiences are provided by social studies curricula rather than the home.

The difficulties demonstrated by children as late as grade 4 in conceptualizing spatial relations of objects suggest that the school curriculum is not providing necessary experiences for children to understand maps and mapping. Map instruction in the first years of school frequently involves levels of abstraction beyond the capabilities of children. Results of this study suggest that young children have difficulty conceptualizing spatial relations from a two-dimensional surface. Curriculum researchers should investigate the effects of introducing

map concepts with three-dimensional models to facilitate development of children's map conceptualization.

The data suggest that socioeconomic status affects development of perspective ability. Children of high SES tend to perform better on perspective tasks than do children of middle and low SES. Significant differences do not exist between the middle SES and low SES groups. This suggests that the range of socioeconomic status must be substantial for significant differences to appear in perspective ability. Differences also occur when blacks and whites are compared on the perspective and map tasks. White children performed with significantly higher scores ($p < .05$) than black children after adjustment for the effects of age and reading ability. However, the relationship between race and socioeconomic status must be taken into account. School 4, the lowest SES group, is ninety-eight per cent black. School 1, the highest SES group, is eighty-nine per cent white. The author suggests that extending conclusions on the basis of data comparing racial groups is inappropriate due to the close association of race and socioeconomic status.

The researcher cautions against the overinterpretation of SES effects. Socioeconomic status in this study was generalized by school. The complexities in assessing the effects of socioeconomic status on performance are noted throughout the literature. As in most instances,

only very generalized conclusions may be posited on the basis of SES data.

Differences on task performance based on sex were insignificant. Although prior researchers investigating performance on spatial tasks suggest that boys outperform girls, researchers replicating Piaget's perspective tasks have not considered sex as a variable. The pattern of development of perspective ability and map conceptualization is similar for both sexes of the study sample.

Suggestions for Further Research

This study has led to new problems and questions which might profitably be investigated by other researchers. Some of these questions are:

1. What is the exact nature of the mental operations common to both the perspective task and the map conceptualization task?

2. What is the relationship between the map conceptualization task and other map tasks dealing with spatial concepts such as scale, distance, direction and reference systems?

3. Can the cognitive operations necessary for coordination of perspectives and map conceptualization be developed through a training program?

4. Will a program of training in one of the concepts affect the development of the other concept?

5. Do these concepts develop at different rates among children of different cultures?

6. How are the findings of this study best incorporated in curricular sequences?

The communication of spatial relations is the basic function of maps. The relativity of spatial relations requires of the map user an understanding that each position on a map is spatially related to all other positions simultaneously. If the variety of spatial relations on a map is not comprehended by the user, the map has not fulfilled its function. This study suggests that children who have difficulty coordinating perspectives also have difficulty conceptualizing the variations in the relationships of objects on a map. The untested premise of prior studies that a direct relation exists between the ability to coordinate perspectives and the ability to understand maps and mapping has been supported by the present study.

The educational implications of the relationship of perspective and mapping abilities have not been investigated in this study. For curriculum researchers, the findings of the study provide few answers but many problems. Information from this study alone is insufficient to implement changes in the sequences of elementary school map instruction. Substantiation of the hypothesized relation of perspective and mapping abilities and the identification of stages in the development of map conceptualization pro-

vide a base for investigating curricular sequences. Before curriculum designers incorporate the findings of this investigation into social studies programs, several of the research suggestions listed above should be considered.

APPENDIX A

INSTRUCTIONS

Subtest A
(Model Reconstruction)

1. Here, _____, is a model of a little village. See, there is a cross-roads right in the middle of the village. What does this look like? That's right, a barn. There are some trees and here is a church with a rooster on the steeple. And here is a white house with a red roof. Let's put this little man--his name is Mr. Jones--right here (position 1) and find out what he sees. Go ahead, place your eyes right behind Mr. Jones' head and look at what he sees. Now study it carefully, because I'm going to ask you to make a model of exactly what Mr. Jones sees. OK? Let's go to this board (place subject at position S) and make a model of the village just as Mr. Jones sees it. You can go back to look over his head if you want to. But be sure to make the village just as he sees it.

2. Good! How did you know where to place the buildings and trees?

3. OK! Let's do it again. Sit here again (position 1). I'll put Mr. Jones over here (position 3). Now pretend you're Mr. Jones and imagine what he sees. Now, let's build another model of the village just as

Mr. Jones sees it. You can come back to this spot if you want to think of what he sees.

4. Good! How did you know where to place the buildings and trees?

5. Repeat paragraphs 2 and 3 with subject at position 1 and the doll at position 2

6. Repeat paragraphs 2 and 3 with subject at position 2 and the doll at position 2.

7. Repeat paragraphs 2 and 3 with subject at position 2 and the doll at position 1.

8. Repeat paragraphs 2 and 3 with subject at position 2 and the doll at position 4.

APPENDIX B

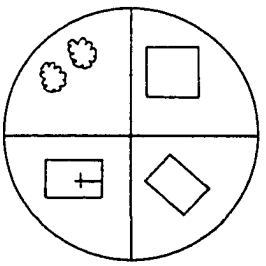
SCORE SHEET FOR SUBTEST A

Subject_____ School_____

Room_____ Grade_____ CA_____ SES_____ M F B W

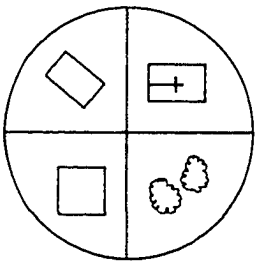
Correct Arrangements For:

Subject at Position 1



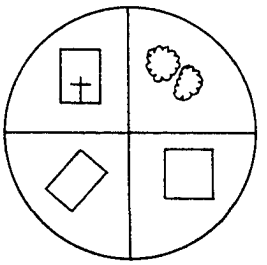
Doll at 1

	Score
Quadrant	
Orientation	
Own View	



Doll at 3

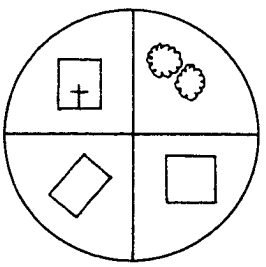
	Score
Quadrant	
Orientation	
Own View	



Doll at 2

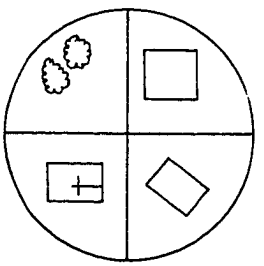
	Score
Quadrant	
Orientation	
Own View	

Subject at Position 2



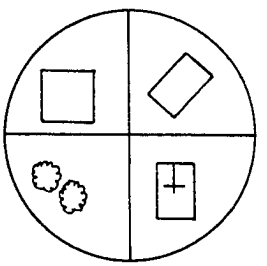
Doll at 2

	Score
Quadrant	
Orientation	
Own View	



Doll at 1

	Score
Quadrant	
Orientation	
Own View	



Doll at 4

	Score
Quadrant	
Orientation	
Own View	

TOTAL SCORE

Quadrant	
Orientation	
Own View	

APPENDIX C

INSTRUCTIONS

Subtest B
(Selection of Photograph)

1. Now, _____, let's do something a little different. Sit here (position 1) so you can see these pictures of the little village. See, here's the barn and church, and the house and trees. But look, each picture was taken from a different place around the model. It's just as if Mr. Jones walked around the model and took different photographs with a camera. Let's imagine he has a camera with him. If he stops here (position 3), which picture do you think he would take? Good! Why did you select that one?

2. If he stops here (position 5), which picture do you think he would take? Good! Why did you select that one?

3. Repeat paragraph 2 for positions 7, 8 and 4.

APPENDIX D

SCORE SHEET FOR SUBTESTS B & C

Subject_____

Subtest B

Examiner places doll, subject selects picture.

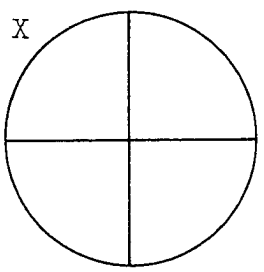
1.___(3)___ 2.___(5)___ 3.___(7)___ 4.___(8)___ 5.___(4)___

TOTAL SCORE ☐ OWN VIEW ☐

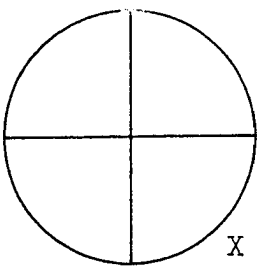
Subtest C

Examiner selects picture, subject places doll.

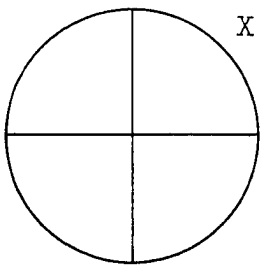
1.



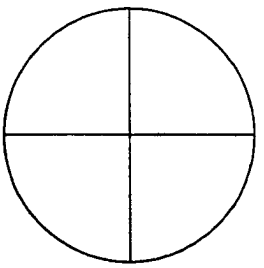
2.



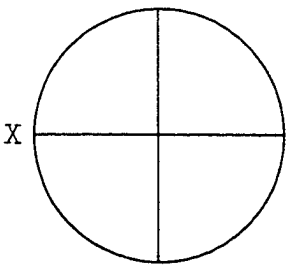
3.



4.



5.



TOTAL SCORE ☐ OWN VIEW ☐

APPENDIX E

INSTRUCTIONS

Subtest C
(Place Doll from Picture)

1. OK,_____ let's imagine Mr. Jones forgot where he was standing when he took his pictures. I'll point to one of his photographs and you place him on the model where he was when he took the picture. Let's start with this one (6). Where was he when he took this picture? Good! Why do you think he was standing there?

2. Where was he standing when he took this picture (2)? Good! Why do you think he was standing there?

3. Repeat paragraph 2 for positions 4, 5 and 7.

APPENDIX F

INSTRUCTIONS

TEST II
(Map Conceptualization)

OK,_____, let's come over here to this other little village. See, there are the trees and church. But look, the house is different. And over here is a small factory. Now Mr. Jones has never been to this little village, but he wants to know what is here. Let's draw a map so Mr. Jones can tell what buildings and things are in this town. This circle represents the board. Go ahead and draw a map for Mr. Jones. Move around the village if you want to.

Good! How do you know that's right?

APPENDIX G

SCORING PROCEDURES FOR TEST II

A score of one is assigned for each of the following correct relationships:

I. Intersection of two roads. The score is assigned for an intersection without regard for placement of the roads within the circle.

Possible scores: 0, 1

II. Placement of object in correct quadrant relative to object in opposite quadrant. A score of one is assigned for each object which is correctly opposite another object, even though they may be reversed in positions.

Possible scores: 0, 4

III. Placement of object in correct quadrant relative to object in adjacent quadrant. A score of one is assigned for each object which is correctly adjacent to another object, even though the objects may be reversed in positions.

Possible scores: 4, 8

IV. Placement of factory in correct quadrant relative to both church and house. A score of two is assigned for the correct placement of the church on the right of the factory and the house on the left of the factory.

Possible scores: 0, 2

V. Placement of object in quadrant relative to edges of quadrant (50% of symbol within area of overlay symbol). A score of one is assigned for each symbol (excluding trees), 50% of which is within area of overlay symbol. No consideration is given for quality of symbolization, placement in correct quadrant, or orientation within the quadrant.

Possible scores: 0, 1, 2, 3

VI. Placement of trees in quadrant relative to house and church. A score of one is assigned for each tree correctly adjacent to the house (right rear) and the church (left front).

Possible scores: 0, 1, 2

Note that the quadrant void of props is treated as a prop itself; i.e., the empty quadrant must be correctly located in relation to the other props.

APPENDIX H

PRINCIPAL'S QUESTIONNAIRE

1. Estimate the percent of the fathers of your students who:

   A. Attended college (whether or not they graduated) . . . . . (_____)
   B. Are high school graduates (but did not attend college) . . . . . (_____)
   C. Attended high school (but did not graduate) . . . . . (_____)
   D. Finished 8th grade (but did not attend high school) . . . . . (_____)
   E. Did not finish 8th grade . . . . . (_____)

   Percentages should total 100%

2. Estimate the percent of the mothers of your students who:

   A. Attended college (whether or not they graduated) . . . . . (_____)
   B. Are high school graduates (but did not attend college) . . . . . (_____)
   C. Attended high school (but did not graduate) . . . . . (_____)
   D. Finished 8th grade (but did not attend high school) . . . . . (_____)
   E. Did not finish 8th grade . . . . . (_____)

   Percentages should total 100%

Listed below are six groups of employment types and and a seventh group for unemployed or welfare recipients. Please examine the seven groups and select the <u>one</u> group which is descriptive of the employment status of the largest number of parents of children in your school. The word "parent" should be interpreted as the main person in the family who supports the child. In the row of letters below, circle the letter of the group you select. Then, in the space that precedes the word "percent," write the approximate <u>percent</u> of families included in this category.

GROUP EMPLOYMENT TYPES

Workman or Laborer: Such as car washer, fisherman, gardener, gas station attendent, laborer, longshoreman, lumberman, warehouseman.

A Household Worker in Private Home: Such as cook, housekeeper, maid.

Farm Worker: Such as farm foreman, farm laborer, migrant worker.

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Operator or Semiskilled Worker: Such as apprentice, assembler, bus driver, delivery man, factory machine operator, miner, packer, train conductor, truck driver, weaver, welder.

Fireman, Guard, or Policeman: Such as detective,
B fireman, guard, policeman, sheriff, watchman.

Personal Service Worker: Such as barber, bartender, elevator operator, hairdresser, hospital attendent, hotel maid, janitor, restaurant cook, usher, waiter.

Farm or Ranch Owner

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Draftsman or Skilled Worker: Such as baker, boilermaker, bricklayer, carpenter, electrician, engraver, locomotive engineer, mechanic, member of armed
C forces, plasterer, plumber, printer, roofer, sheet metal worker, stone-cutter, tailor, tool and die maker, upholsterer.

Foreman: Such as factory foreman, mine foreman.

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Office Worker: Such as bank teller, bookkeeper, cashier, dispatcher, messenger, office clerk, secretary, shipping clerk, telephone operator, ticket
D agent, typist.

Salesman: Such as demonstrator, insurance salesman, real estate salesman, sales clerk in store.

GROUP EMPLOYMENT TYPES

Manager or Official: Such as buyer in store, executive in large company, government official, office manager, sales manager, store manager.

E

Business Owner: Such as contractor, restaurant owner, store owner, wholesaler.

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Technician: Such as dental technician, designer, dietitian, draftsman, medical technician, photographer, radio operator, surveyor.

F Professional Man: Such as accountant, actor, architect, artist, dentist, doctor, druggist, engineer, lawyer, librarian, minister, musician, nurse, reporter, scientist, social worker, teacher, veterinarian.

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G Unemployed: Presently out of work, recipients of welfare, etc.

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EXAMPLE: If group C is descriptive of the occupation of the largest number of parents providing support, then circle the "C" in the row of letters following the heading "Largest Occupational Group." If you estimate that this accounts for 30% of the families, then in the space that precedes the word "percent," write the figure "30."

3. Largest Occupational Group (Cirle one) A B C D E F G

What percent of parents are included in this largest occupational group? _____percent.

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Repeat the procedure described above for the second largest group of families. Circle the letter of the group you select in the row labeled "Second Largest Occupational Group." Select an occupational group and estimate the percent of families included.

4. Second Largest Occupational Group: A B C D E F G

   What percent of parents are included in this second largest occupational group? _____percent.

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   Repeat the procedure for the third largest group of families.

5. Third Largest Occupational Group: A B C D E F G
   _____percent.

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