DOCUMENT RESUME

ED 048 154 24 SP 007 026

TITLE Activities for Building Concepts of Logical Thinking. Developmental Skills Series, Booklet III.
INSTITUTION University City School District, Mo.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO BR-6-1328
PUB DATE Oct 68
CONTRACT OEC-3-7-061328-0322
NOTE 150p.

EDRS PRICE EDRS Price MF-$0.65 HC-$6.58
DESCRIPTORS Classification, *Concept Formation, Conservation (Concept), *Curriculum Guides, *Fundamental Concepts, *Kindergarten, *Preschool Curriculum, Serial Ordering, Symbolic Learning

ABSTRACT

GRADES OR AGES: Four-, five-, and six-year olds. SUBJECT MATTER: Cognitive areas of symbolism, classification, conservation, seriation, spatial relationship, and temporal relationships. ORGANIZATION AND PHYSICAL APPEARANCE: The guide is divided into six sections, one for each of the above cognitive areas. Each section lists materials and describes activities; illustrations are interspersed. The guide is mimeographed and spiral bound with a soft cover. OBJECTIVES AND ACTIVITIES: A short list of general activities is given for each cognitive area, followed by detailed instructions for numerous specific activities--over 100 in all. A class inventory lists activities a child should be able to do at different ages. INSTRUCTIONAL MATERIALS: A list of materials accompanies each list of general activities and each description of a specific activity. STUDENT ASSESSMENT: No provision other than the class inventory is made. OPTIONS: The guide is suggestive only. It makes no mention of timing or means of incorporating the activities into a total program. (RT)

Activities for Building Concepts of Logical Thinking

Booklet III

Developmental Skills Series

Office of
Prekindergarten-Kindergarten Research Center

SCHOOL DISTRICT OF UNIVERSITY CITY
University City, Missouri

March 1967
(Revised October 1968)

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Foreword

Jean Piaget's persistent interest in the area of intelligence, perception, and education has resulted in a developmental sequence of learning that could suggest untold implications for curriculum research and planning. It provides a coherent body of specific knowledge concerning the sequence of intellectual development from birth to maturity. Basically, his theory states that cognitive abilities develop sequentially from externalized, mostly observable actions to increasingly complex internalized, and highly integrated operational systems, and that unless a child has a foundation for absorbing new material, cognitive growth is not possible.

Piaget suggests three main developmental periods of intellectual development, which with their appropriate sub-stages are listed below:

1. Period of sensory-motor intelligence (0-2yrs.)

2. Period of preparation for an organization of concrete operations (2-11 yrs.)
   - A. Pre-operational stage (2-7 yrs.)
     - a. Beginnings of representational thought (2-4 yrs.)
     - b. Simple representations or intuitions (4-5½ yrs.)
     - c. Articulated representations or intuitions (5½-7 yrs.)
   - B. Concrete operations (7-11 yrs.)

3. Period of formal operations (11-15 yrs.)

Intelligence, according to Piaget, reaches the level of concrete operations when it is capable of
1. combinativity
2. identity

3. reversibility
4. associativity

Piaget feels that there is a continuity of development from the sensory-motor stage on up through the period of formal operations.

The activities in this booklet are designed for four, five, and six year old children. At these ages they are basically in the pre-operational stage. To aid in developing a foundation for logical thinking, activities are needed ranging in progression from concrete manipulative materials to pictorial representation and verbalization allowing for the self-discovery of basic concepts. The thinking of 4's, 5's and 6's is rigid because it is perception-bound. They do not perform operations upon the perceptual data; they judge in terms of perceptions, in terms of how things look to them, and are overwhelmed by visual imagery. Children of this age recognize only one variable, centering on the one that stands out visually. They give egocentric animistic explanations as well as multiple or contradictory ones. They do not perceive space purged of the objects in that space. These children can make single, graphic collections, but have difficulty in forming hierarchical classification. For a check list to help in determining lags, see page 140.

The purpose of this booklet is to offer suggested activities for the discovery and development of cognitive concepts in symbolization, classification, conservation, seriation, spatial, temporal and causal relationships, which help form the foundation for a wide variety of tasks in later education. Providing these, and other experiences, should help children develop the ability to recognize more than one variable, to be able to keep more than one variable in mind, and see that a change in one causes a change in the other; to see the whole as made up of the sum of its parts and, therefore, as greater than any single part; and to be able to reverse a process to prove a point.

The activities identified by the initials C.E.S. have been suggested by Dr. Celia Stendler of the University of Illinois, who has studied under Piaget, and served as Kindergarten Consultant for the University City Public Schools for two years.

Mrs. Florence Redler, Teacher, Prekindergarten Research Center and Mrs. Marion W. Green, Principal, McKnight School, University City Schools, were responsible for the compilation of the booklet. Thanks are extended to Mrs. Jeanne J. Prentice, Consultant, for her help with the Classification segment of the booklet. Appreciation is expressed to the Aides, Mrs. Betty Yaffe, the illustrator, and to Mrs. Shirley Berman for typing the manuscript. Mrs. Redler has been responsible for the revised edition.

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ACTIVITIES EMPHASIZING SYMBOLISM

Introduction

Symbolism or representation is the ability to relate attributes of an object to another object which resembles it not at all, slightly, or to only a part of it. This can be accomplished only after the child has become thoroughly familiar with the object in its three dimensional form.

As can readily be seen, all activities which deal with role playing, pantomime, riddles, dramatization and finger plays can be utilized here. Most of the Creative Motor Activities can be utilized.

MATERIALS

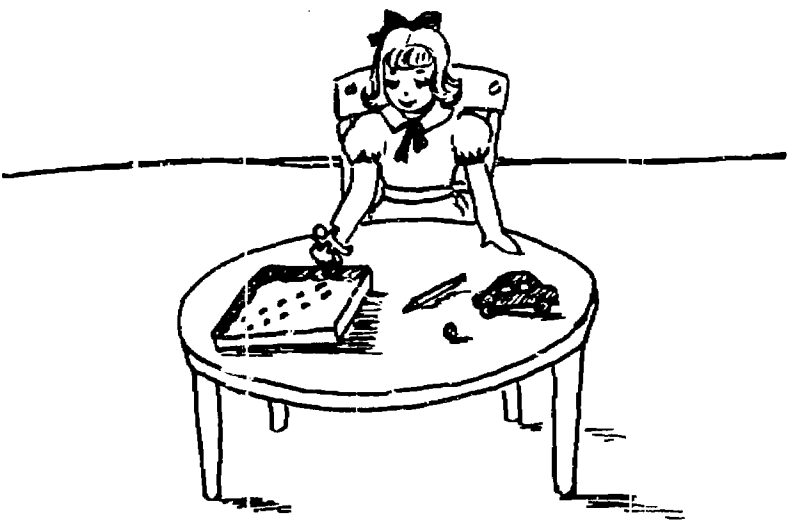
Blocks
Objects in Housekeeping Corner
All Furniture in Room
Dress-Up Clothes
Beads
Play Equipment
Any Three Dimensional Objects related to the program
Puzzles (cut-out forms)

ACTIVITIES

Tracks

Materials: Sand table or small pan filled with damp sand for making tracks
toy car
small ball
crayon
cookie cutters

Procedure: Children close eyes and teacher or other child make tracks in the sand. Children open eyes and try to decide which object made the tracks. Child who discovers it first becomes next "track" maker.



Sym

Fishing

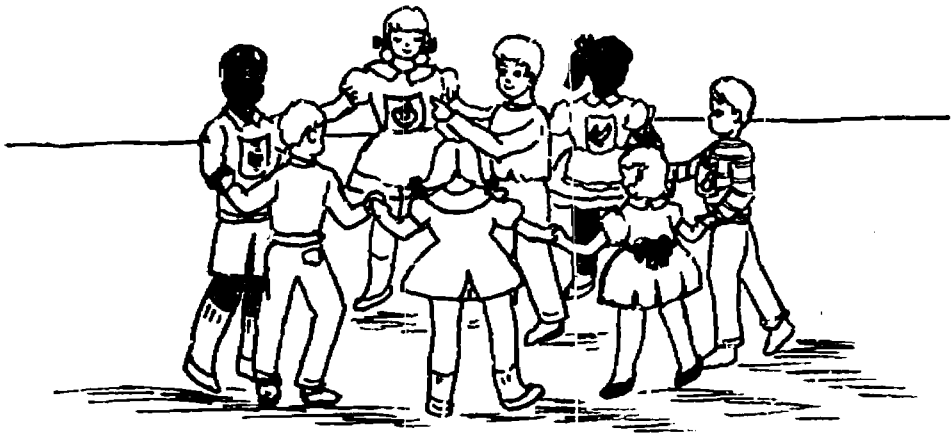
Materials: Several cords and beads from bead set to symbolize fishing lines and fish.

Procedure: Children climb into boat to go fishing. Conversation may be about different fish and uses of fish. Divide group into teams and give a point for each fish named.

Farmer In The Dell

Materials: None

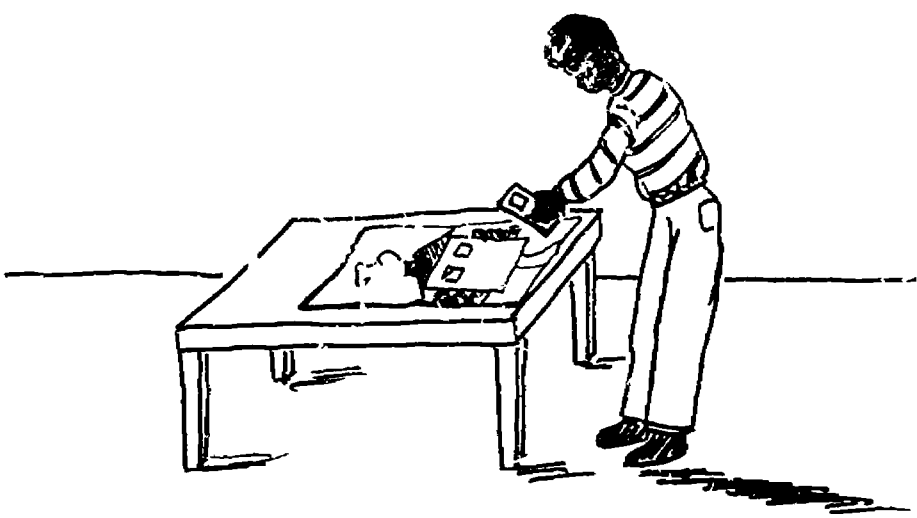
Procedure: The group may decide from what classification the farmer would choose: i.e. fruit, vegetables, dairy products, animals, cereals, etc.



Make Me Look Right

Materials: Mimeographed sheet with only partially completed pictures on it such as;
1. house with door missing
2. a hand with a finger missing, etc.

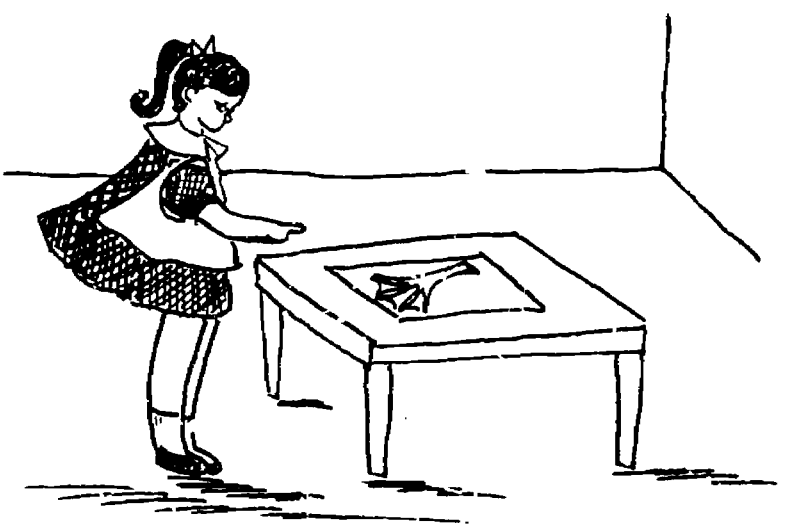
Procedure: Discuss the objects. Have the children put in the missing part.



Who Am I?

Materials: A mimeographed sheet with characteristic part of animals on it as:
1. webbed foot for a duck
2. turkey tail for turkey
3. snout for pig
4. long tail for cat, etc.

Procedure: Have each child name animal and give characteristic sound. Work in small groups and cut out picture and pin on each child as he names animal.



Sym

Supermarket

Materials: Cards: pictures of products found in supermarket. (Children can find pictures in magazines.)

Signs: several for different departments: Bakery, Meat, Dairy, Vegetable, etc. Signs should have label plus picture.

Tokens: about five for each child.

Procedure: Areas are designated in the room to represent various departments of the supermarket. A child is chosen to be a clerk for each department and signs are placed beside each clerk. The other children decide what they would like to buy with their money (tokens). If a child goes to the correct department for his choice, he exchanges his money (token) for the product (card with picture). If he goes to the wrong department, he is told to try another department. The child who has the most cards wins.

Lotto

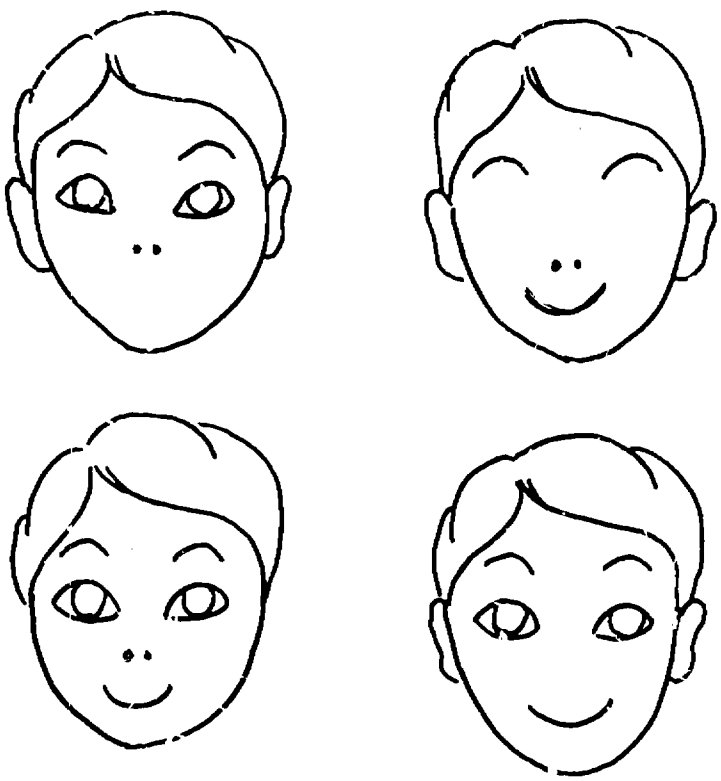
Materials: Mimeographed sheet with silhouettes of four or more items familiar to children.
Mimeographed sheet containing nine squares equal in size to the squares containing the pictures on the first sheet.
Disks to cover the pictures.

Procedure: The child will cut out the pictures and paste them as he wishes in the squares of the second sheet. He will need at least two sheets with pictures on them. Each Lotto card will be different as the child pastes the pictures in whatever square he desires. The middle square may be a Free square. When the Lotto cards are ready, the teacher reads a riddle pertaining to each object pictured. When a row of objects has been covered, the child calls, "Lotto."

Finish Me!

Materials: Mimeographed sheet with partially finished face.

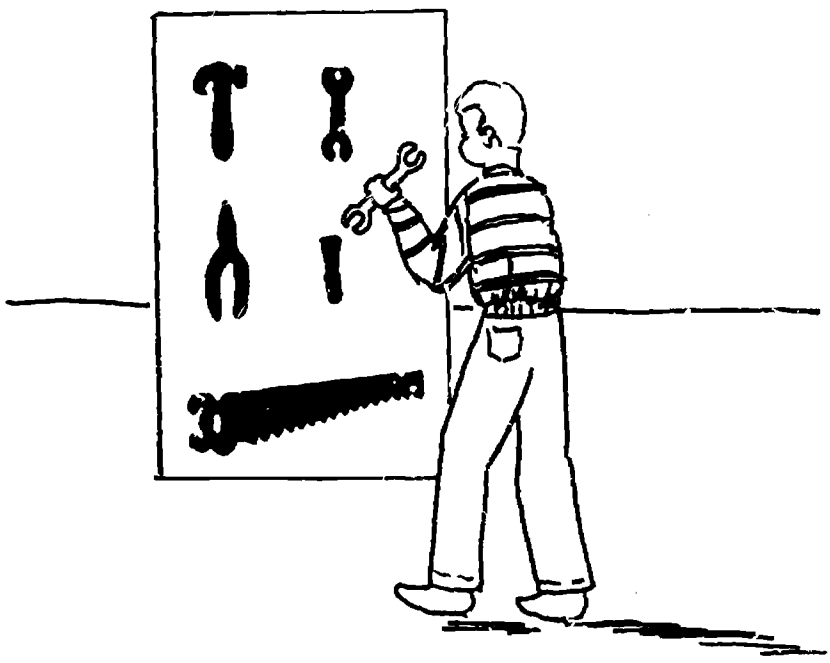
Procedure: Give each child a sheet. Have them put in the missing part or parts.



Henry's Hardware Store

Materials: Paper representing a wall area with silhouettes of tools, cut-outs of tools matching silhouettes

Procedure: Child matches picture of tool to silhouette of tool.



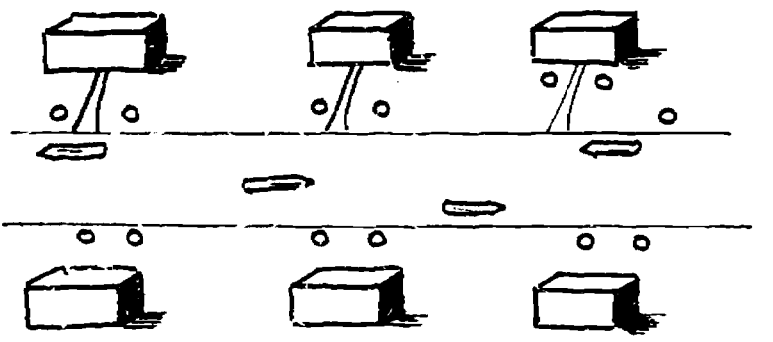
Shadow House

Materials: 16 blocks of wood (houses), 32 beads (trees), 32 crayons (cars), 8 pieces of manila paper with plan of street.

Procedure: This task is done in three steps:

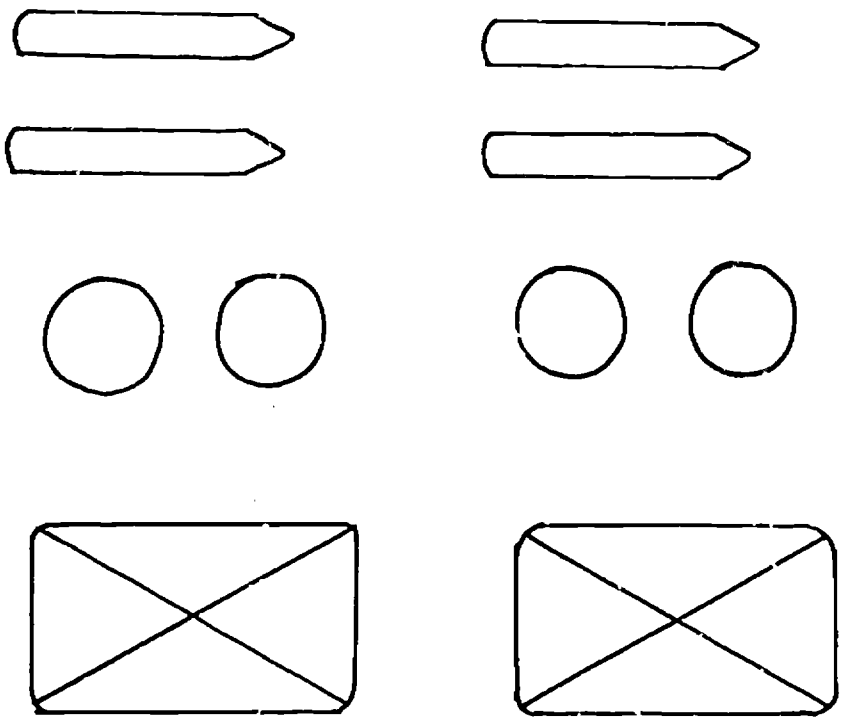
1. Show children 3 dimensional objects. Designate block house; bead tree; and crayons cars. Place each object on plan of street...then ask children to do likewise. Add interest for brighter children by selecting certain color "cars." Can tell story looking for a place to build house with trees or without. Or start with house, plant trees, etc.

2. Place 2 dimensional cardboard shapes on street plan. Tell children...now we are going to put the shadows on the street plan. (See drawing below)

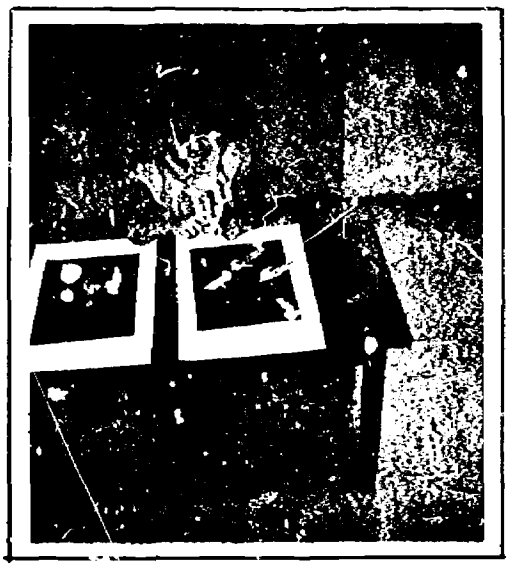


Sym

3. Place construction paper cutouts of shapes on street plan. Check each child's work before they paste. (See drawing below)



ACTIVITIES EMPHASIZING CLASSIFICATION



Introduction

Classification is the systematic arrangement of objects into groups based on some definite scheme. To the young child, things often go together because of the color or shape, sound or feel. In other words, he may group objects perceptually, or he may establish a collection upon belonging. Houses and people are grouped together because people live in houses.

The child may be attracted to one particular aspect of an object and categorize by what appears to adults as incidental detail rather than the essential property. He may place together only

some of the objects before him. When he groups consistently according to a single property, he has reached a relatively high level of classification, although, because not all relationships are well understood, (true class-inclusion) is not always achieved.

When feasible, classification skills training begins with real objects and progresses from three-dimensions to two-dimensions (pictures) to symbols (as words). The number of items used should be controlled in the initial experiences.

Classifications may follow single characteristics or multiple ones, i.e. blocks may be sorted into red ones and white ones, or tall and red ones, or short and white ones, etc.

Classifications may be arranged in both vertical and horizontal dimensions, i.e. "cats," "dogs," "horses," etc. are all included in the larger groups of "mammals" and "animals", but cats may also be subdivided into groups of wild or domesticated cats, striped, or spotted or solid color cats, etc.

In addition to these aspects, the groupings may be mutually exclusive or not. This dimension of inclusiveness-exclusiveness presents other problems. 'Cardinals' and 'robins' are both "birds", but only if the sub-group to group relationship is understood can the child deal with such questions as, "If all the cardinals flew away, would there be any birds left?"

Another essential in classification is the ability to reclassify an assortment of objects using other criteria, for example, after selecting items for "tools," "furniture" and "musical instruments," regroup these items into things made of metal or wood, etc.

Most children at this age level are inclined to group objects in the "here and now," in terms of

very recent and very concrete experiences, having little resemblance to adult logic. Children should be presented with many opportunities to make groupings of their own. In following through such activities, a most important aspect is the reasoning behind the classification; the child's answer to the question, "Why did you put them together?" or "Why didn't you put this one in the group?"

MATERIALS

Chalk, pencils, crayons, erasers, etc.
Toys in the room
Furniture in the room
Children in the class
Various art materials
Any representation of animals, birds, fruits, etc.
Puzzles
Play household equipment
Geometric figures
Beads
Mimeographed sheets (several items same, one different)
Riddles
Analogies
Tapes
"Silly Stories"
Gum

GENERAL ACTIVITIES

Present small boxes each of which contains two varieties of one type of item (black or white beads, long or short sticks, etc.) and have the child sort them. This can gradually be increased to include several varieties within one dimension, such as;

a. colors (red, green yellow, etc.)
b. shapes (round, square)
c. sizes (big, little)
d. texture (rough, smooth)
e. composition (glass, metal, wood)
f. age (old, young)
g. function

Place before the child three objects, familiar to him, which are members of a common class, (i.e. toys, animals, or foods) and elicit a response showing commonality: "toys" or "things we play with," etc. Other basic categories for young children are:

clothing, furniture, tools, things that go, etc.

Place together two or three members of a common class (i.e. animals) and one item which does not belong (i.e. chair) and ask the child to tell which one does not belong with the others. Child should give reason for choice.

Group together three or four items from different common classes which have one element in common (i.e. the color yellow) and ask in what way these things are the same.

SUGGESTED CLASSIFICATION ACTIVITIES

1. Sorting along a single dimension
   a. color
   c. shape
   c. size
   d. texture
   e. age
   f. composition
   g. function
2. Identifying members of common classes
   a. toys
   b. animals
   c. food
   d. clothing, etc.
3. Grouping together items related through characteristic functions
   a. things that make noise
   b. things used for measuring
4. Grouping together items because of where they are located
   a. in the laundry
   b. in the kitchen
   c. in the garage, etc.
5. Grouping items associated with the user
   a. policemen-badge, whistle, etc.
   b. firemen-hat, ladder, etc.
6. Grouping items which have isolated elements in common
   a. things with wheels, etc.
7. Learning categorizations of abstract and semi-abstract qualities
   a. imaginery--real
   b. pretty-ugly

SPECIFIC ACTIVITIES

Three-Dimensional

Materials: Miniature toys: people: mother, father, boy, girl, baby

animals: horse, cow, pig, lamb, duck

Procedure: "Here is a box of toys. This is a mother (hold up one of the objects) and this is a horse (hold up another.) Here are 2 sheets of paper. I want you to put on each sheet of paper whatever goes together. Let's put this (animal) on this sheet of paper. Now choose whatever goes with it." (As the child chooses): "Are they alike? Are they all the same? Why did you put that one there?)

(If child has not used all of the objects, continue the inquiry as follows): "What else will you put on this piece of paper?"

Collection

Materials: A collection of colorful pictures from magazines and other sources

Procedure: The teacher may place the pictures in a variety of ways and the children are told to select pictures of animals which fit the following classifications:

animals which have claws,
animals that are covered with fur,
animals who live on farms,
animals that make good pets,
animals that might give rides to children,
animals that can climb.

Group the Objects

Materials: 4 blackboard erasers, 4 pieces of chalk, 4 crayons, 4 play forks, 3 pieces of paper, each a different color.

Procedure: Place materials in front of a small group of children. Give the following directions:

1. Place all the things you use at the blackboard on the green paper.

2. Place all the things you use for drawing on the blue piece of paper.

3. Place all the things you use for setting the table on the red piece of paper.

Have child tell why he made the groups as he did.

Changing Criteria

Materials: Geometric figures cut out of construction paper:
24 circles, diameter 1", 12 red, 12 blue
24 circles, diameter 2", 12 red, 12 blue

24 squares, side 1", 12 red, 12 blue
24 squares, side 2", 12 red 12 blue.

Procedure: Place the figures on the table, in front of the child, without putting them into any special order. "Tell me what this is."

Part I: Spontaneous Classification:

"Can you put into piles the things that go together?"

"Put everything that is very much the same into the same piles."

"Can you separate the things that are different?"

Part II: Dichotomy:

"Now can you make just two piles and then put the things from the piles into these two boxes?"

Justification: "How did you separate them? Why?"

Part II:

"Can you arrange the things differently and put them in two piles?"

If the child reverts to his first criterion:

"But you have already done that, can you find another way of putting the things together?"

Justification: "How did you separate them? Why?"

Part IV:

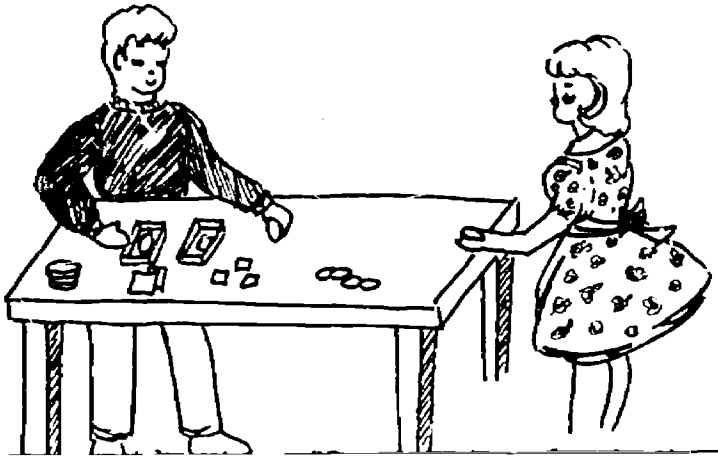
"Is there still another way? Could you arrange these things in another way?"

If the child does not find the solution, the experimenter starts a classification by one of the two criterions that the child has not used in Part II.

"Could you continue like this? Why did I put these together in this box and the other ones in that box?"

Once the child has finished the classification:

Justification: "Why did you arrange them like this? What would you call these?"



Group the Objects in the Room

Materials: Objects in room

Procedure: Define a general class for the children, i.e.:

Show me all the objects we use for writing.

Show me all the objects we sit on.

Show me all the objects that are square, etc.

Sort the Beads

Materials: Beads of three different colors with different shapes in each color.

Procedure: Give these directions to a small group:

Give me: all the blue beads
all the red beads
all the green beads.

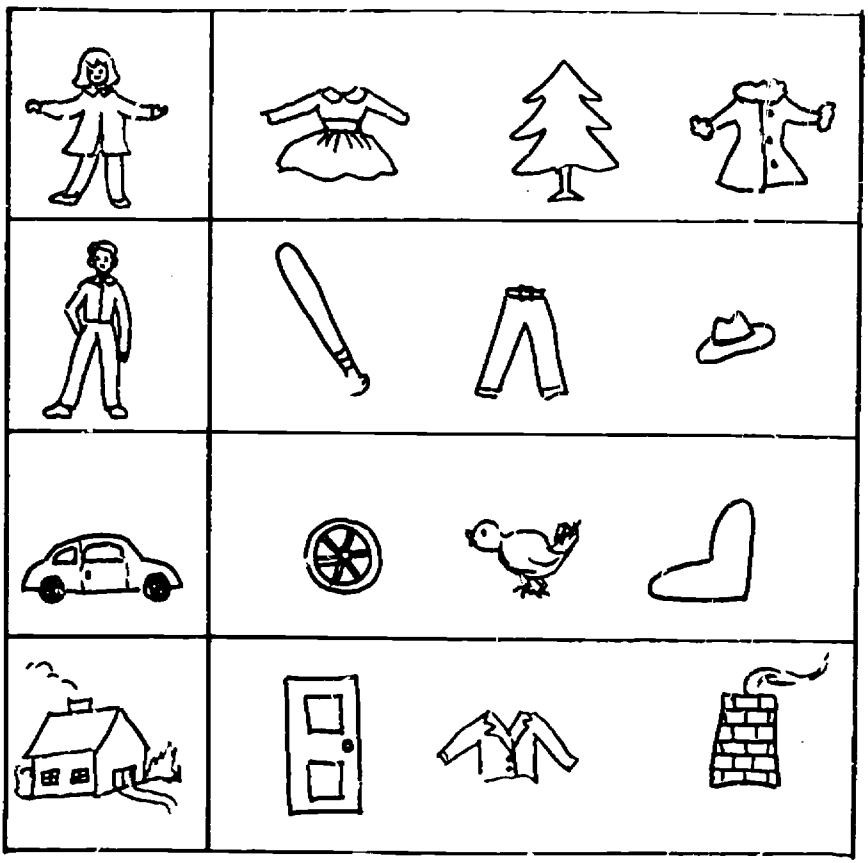
Put the beads back and group according to shape. Then if possible group according to size.

Which Go Together?

Materials: Mimeographed sheet

Procedure: Put an X on the ones that go together.

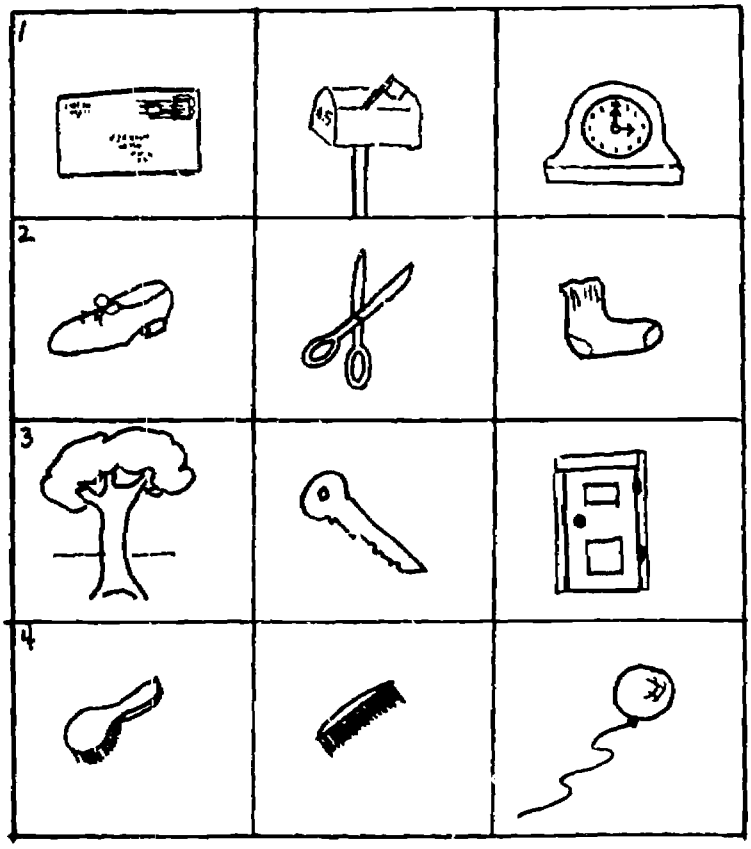
(See illustration on following page.)



Which Belong Together?

Materials: Mimeographed sheet with two objects that belong together and one that has no associative quality.

Procedure: Have children mark the two that belong together.



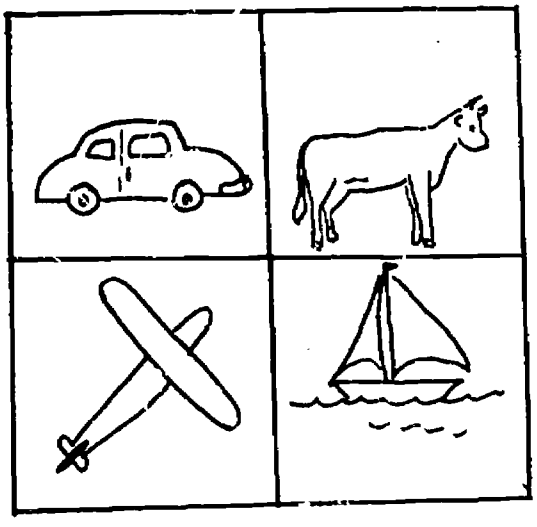
Which One Doesn't Belong?

Materials: Representations of 3 vehicles and one animal or 3 foods and one automobile or any other such groupings.

Procedure: After discussing the pictures ask, "Which one doesn't belong? Why do you think this one doesn't belong?"

Direct other questions to require the children to examine the attributes of color, size, shape, and use.

This activity of group inclusion and exclusion should be repeated whenever possible. It can be practiced with toys and storage space.



Alike or Different Box

Materials: Have a collection of items which have something in common (usually their use.) but are different in other ways.

Procedure: Have child hold up one item and choose another child to pick one like it in one category (use):

1. button-zipper
2. chalk -crayon
3. mitten -glove
4. shoe-boot
5. book-magazine.

Have child tell you also how they differ.

Matrices
(Multiplicative Classifications)

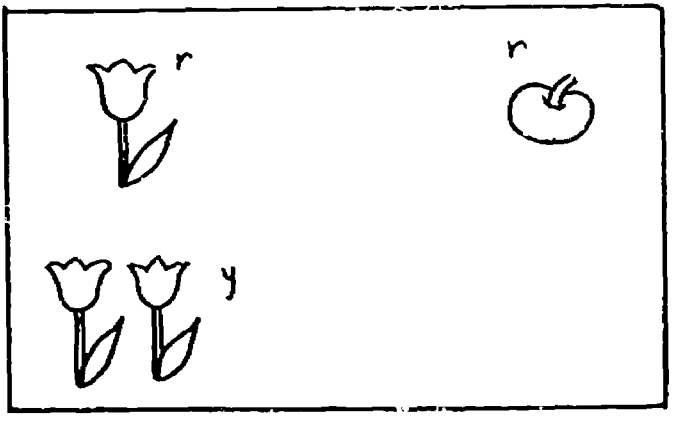
Materials: Nine matrices, two with geometric figures and seven with flowers and animals, grouped according to form, color, size and orientation. Smaller cards showing one figure only.

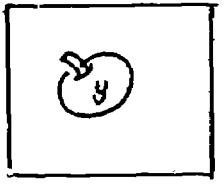
Procedure: Card 1: Here is a card with some figures on it. Do you know what we call these? (Supply names: square, circle)

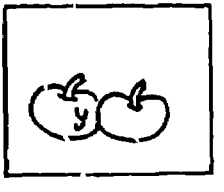
Now here is a space for another figure, and here are some little cards with figures on them. Can you find the card that would go as well with these (draw fingers across the row horizontally) as with these (draw fingers down the vertical row)?

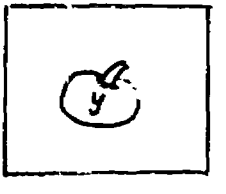
Why do you choose that one? (If child does it wrong, ask him, "What goes nicely with these?", pointing out horizontal or vertical row, depending upon where his error lies.)

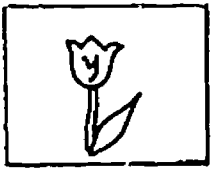
(When the child is satisfied with his choice, continue as follows:) Is there one that will go better? Why? or Why not?

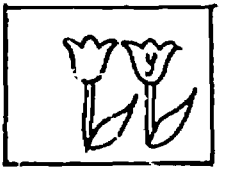


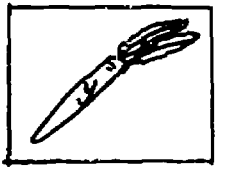












Department Store

Materials: Cards bearing pictures of different departments such as:

clothing
toys
furniture
candy

Department signs identified by pictures, disks or play money.

Procedure: Children decide on clerks. They then visit various departments to buy and receive appropriate card if they come to proper department.

Clerk receives disk or money in payment. The one who has the most cards wins.

The same type of activity will be found under Symbolism.

Where Would I Find?

Materials: Pictures of objects or objects themselves such as:

fruit or vegetables
any item of clothing
any object in schoolroom
an item found in drug store, gas station, paint store, etc.

Procedure: Hold up object and ask child where you would find it.

Tell Me or Show Me

Materials: If possible, have pictures of objects children are likely to mention.

Procedure: Teacher tells a small group, "Tell me or show me all the things I can wear on my hands (polish, gloves, rings, mittens, etc.)."

"Tell me all the things I can find in the Bakery Department."

"Tell me things that are larger than I am, etc."

Guessing Game

Materials: None

Procedure: "I am something you can find in the kitchen. What am I?"

The child who is "It" whispers the correct answer to the teacher. The child who guesses the correct answer is the next "It."

Other locations could be: in the classroom
at the post office
in the grocery store
in the cafeteria
etc.

Various classifications could be:
1. animals in the woods, zoo, farm
2. vegetables...roots, seeds, leaves
3. fruits...
4. insects
5. flowers

6. birds
7. toys

Listen and Do

Materials: None

Procedure: Instruct children to listen carefully as you read a list of words. If the word means something to eat, they should raise their right hand and say "taste." If it is something they can hear, say "hear" and raise their left hand.

Examples:

automobile horn	candy
apple	firecracker
jelly	tomato
telephone	hamburger
bell	siren
drum	bird

Riddles

Materials: None

Procedure: The teacher reads a riddle which contains facts pertaining to a certain category. The children give the category, i.e.:

We have four legs.
Most of the time we are pets.
We may be either large or small.
We like to eat meat and chew bones.
We like to bark.
What are we? (dogs)

We have two legs, two arms and two feet.
We go to school.
We like to play.
We are either girls or boys.
What are we? (children)

Then reverse procedure. Let children tell you how children are alike; how dogs are alike.

Finish It

Materials: None

Procedure: Read each sentence and have child finish sentence or fill in missing word.

1. He crossed the river in a _____.
2. Jane enjoys the music she hears on the _____.
3. In the flower garden, he saw roses, tulips and _____.
4. She wanted to buy a doll, drum, and roller skates so she went to a _____.
5. He liked to feed the cows, chickens and _____ on the farm.

Vocabulary Building

Materials: None

Procedure: The teacher gives the sentence, leaving out the last word for the child to say:

1. A fish swims; a bird_____.
2. A squirrel climbs; a rabbit_____.
3. A snake crawls; a dog_____.
4. A big boy walks; a baby boy_____.

5. A kangaroo leaps; a caterpillar_____.

Other categories might be body coverings (skin, fur, scales, etc.; animal sounds, homes, etc.).

Tell Me Something That Is

Materials: None

Procedure: Keep on file a list of adjectives that are a part of your group's vocabulary. This list should grow daily. Use these as a game to help children associate properties. The teacher gives a word. A child gives a noun possessing the property that is indicated. The teacher says "Funny." The child says "Clown."

The list could start with such words as:

1. large
2. huge
3. tiny
4. yellow
5. green
6. funny
7. square
9. etc.

This activity may be extended by having the children make up complete sentences using both words.

Examples:
1. A funny clown is at the circus.
2. John will be a funny clown on Halloween.

Opposites

Materials: None

Procedure: Teacher will give sentences using opposites - of sound, texture, size, and number. If possible, objects which are compared should be shown in either three or two dimensional form.

1. A plum has one seed but a watermelon has _____.
2. A tree is tall, but a bush is _____.
3. A mouse is little, but an elephant is _____.
4. A shout is loud, but a whisper is _____.
5. The peeling of a pineapple is rough, but the peeling of an apple is _____.
6. A rock is hard, but cotton is _____.
7. Cement is a solid, but water is a _____.

I Am Wishing

Materials: Cards with several categories of pictures on them: transportation, fruit, vegetables, toys, farm animals, zoo animals, etc.

Procedure: Give each player three cards. The leader says, "I am wishing for some fruit." The ones who have such cards say "I can make your wish come true." The leader collects his cards.

Variations: Ask for certain cards, like "I wish for yellow fruit." " I wish for vegetables whose roots we eat." Or the leader might make a riddle of his wish.

Quick Thinking

Materials: None

Procedure: Set up categories with similar sets of characteristics.

Animals

1. Zoo Circus Farm
2. Swim Walk Crawl
3. Fur Skin Scales

Food

1. Vegetables Fruit Meat
2. Milk Products Cereal Vegetables

People

1. Family Community Helpers Occupations

Name one of the categories and give a child 5 seconds in which to come up with the name of something in the category. Later the child could name several things in a given time, or write his answers.

Tape Activity

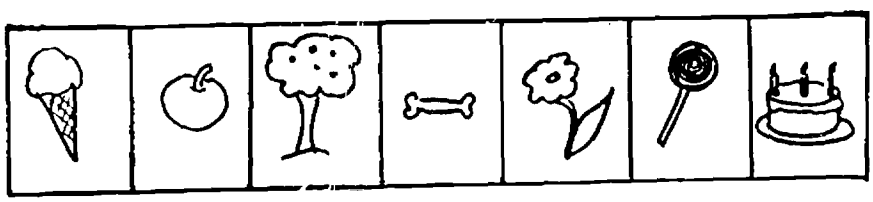
Materials: Prepare ditto sheet for each child. Number a selection of pictures. Use the alphabet or some symbols to indicate where the child can put his correct answer. Next, prepare a tape giving directions for the children to follow:

1. "Put your finger on the A. Now find the picture of something you might have on your birthday. Yes, it is number 7, so you put a 7 on the line by the A. I will not help any more. Think hard."

2. "Put your finger on B. Now look at the pictures. Find a fruit. Do you see the number on the fruit picture? Put that number by the B. "

3. "Put your finger on C. Find something a dog would like to eat. Put the number of this picture by the C."

Continue with the game in this manner:



A _____ C _____ E _____ G _____

B _____ D _____ F _____ H _____

Silly or Not Silly

Materials: A story which contains sentences which obviously are ludicrous to the children.

Procedure: "Today I am going to tell you a story that has some silly thing in it. When you hear one, raise your hand. Then I will call on you and you can tell what is silly and why you think it is silly."

"During winter vacation Johnny went to visit his grandfather and grandmother who lived on the farm. One day while it was snowing heavily, he put on his swimming suit to go to the barn to help his grandfather feed the animals.

As he came into the henhouse to feed the hens, he heard them say, "oink, oink, I am glad you are here." As long as he was in the henhouse, he decided to see if the hens had laid any buttons because he wanted fried buttons for breakfast."

Wooden Beads
(Hierarchy of Classes)

Materials: A box with 8 wooden beads colored red and 2 colored yellow

Procedure: Show the box of beads to the child and ask: "what are these? Do you think all the red beads are of wood? Do you think the yellow beads are wood?"

Part I: "In this box, would you say that there are more red beads or are there more beads made of wood?"
Justification: "Why? How do you know?"

Part II: "There are two little girls who would like to make necklaces out of these beads. One would like first to make a necklace out of the red beads, and then, when she gives the beads back to me, the other girl would like to use the wooden beads. Which of the two necklaces will be the longer?"
Justification: "Why?"

Part III: 1. "If you give me all the yellow beads, what will be left in the box?"

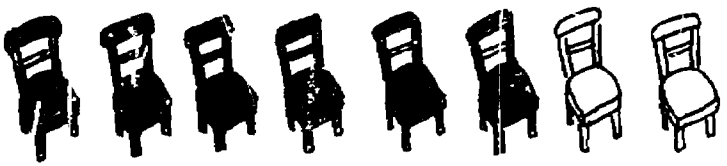
2. "If you give me all the wooden beads, will there be any beads left in the box?"
Justification: "Why?" How do you know?"

Part IV: Repeat Part 1.

Wooden Chairs

Materials: 8 wooden chairs

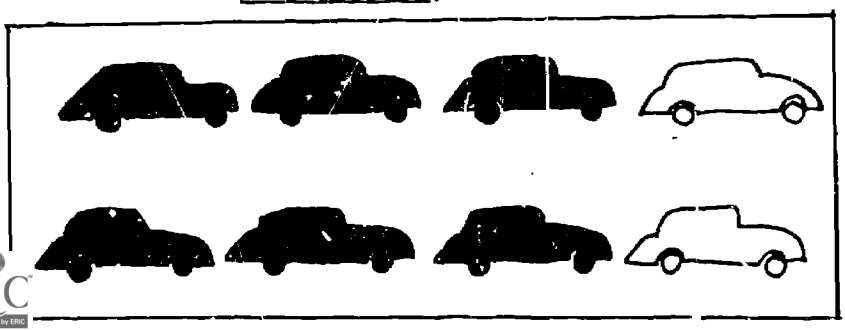
Procedure: "Class Inclusion" see Piaget's activity Wooden Beads, on preceding page.



Plastic Cars

Materials: 8 plastic cars (6 green, 2 red)

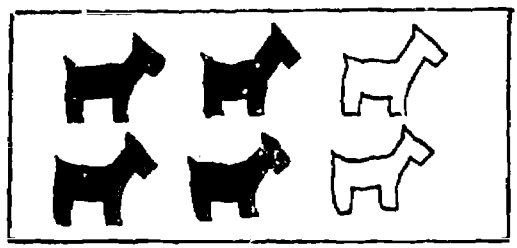
Procedure: "Class Inclusion", see Piaget's activity Wooden Beads, on preceding page.



Wooden Identical Animals

Materials: Wooden animals (4 brown, 2 white)

Procedure: "Class Inclusion", see Piaget's activity "Wooden Beads," on preceding pages.



Candy Trains
(Hierarchy of Classes)

Materials: 6 pieces of red hard candy and two pieces of yellow hard candy. (Same shape and size and one box.)

Procedure: Show box containing all candy and ask, "What are these?" (pointing to the red candy) "What are these?" (pointing to the yellow candy)

Be sure the child understands that all pieces are hard candy.

Part I: "In this box would you say there is more red candy or is there more hard candy?" "Why?""How do you know."

Part II: One little boy named Phil decided to make a train using just the pieces of red candy. When he was through, he put the candy back and another little boy named Mike decided to make

a train using the pieces of hard candy. Whose train will be the longer?

Other objects which may be used are:

1. Carmels-Chocolate & Vanilla
2. Gum-Green & Yellow wrappers
3. Flannel Squares & Triangles
4. Crayons-Red & Blue
5. Pegs-Red & Green

Vegetable Towers

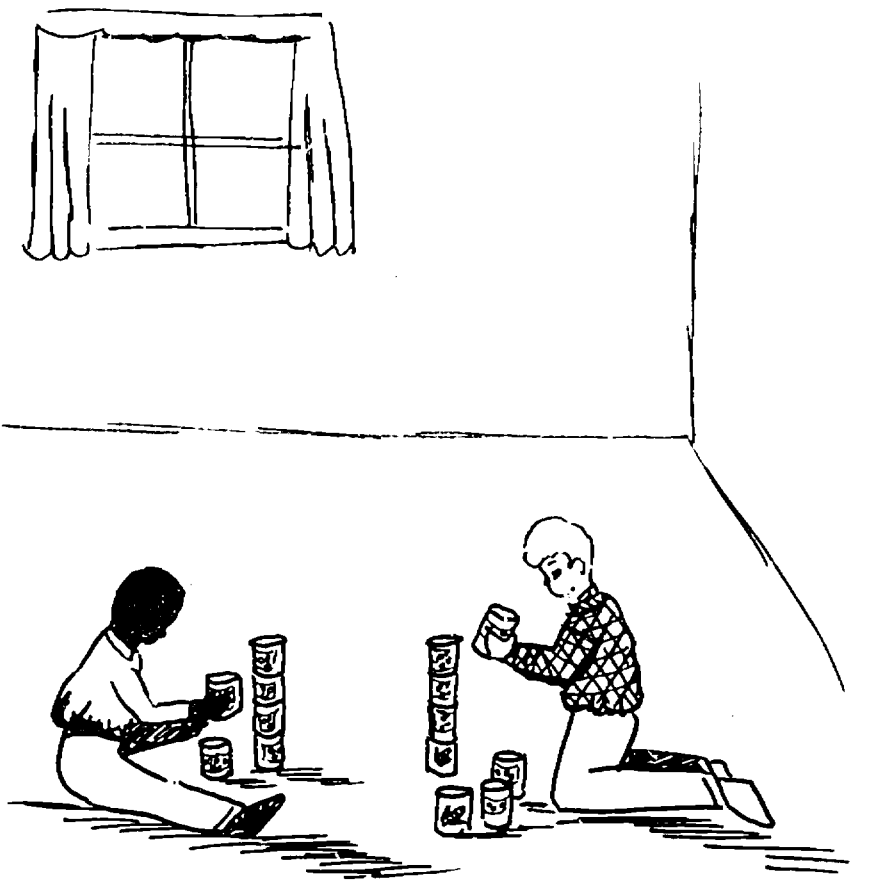
Materials: 6 cans of Peas, 2 cans of Corn

Procedure: One day John's Mother bought 9 cans of vegetables at the store. "What are these?" she asked pointing first to the Peas and then to the Corn. "What do you think John said?" (ilicite that they are all cans of vegetables)

She put them on the table and John and his friend wanted to play with them. Did they have more cans of Peas to play with or more cans of vegetables? Why? How do you know?

Variation: John decided to build a tower with the cans of Peas. Then his friends said, "Let me have them. I want to build a tower with the cans of vegetables." "Whose tower will be taller? Why? How do you know?"

(See illustration on following page.)



Cognitive Corner

Materials: Various pictures

Procedure: Have a special table on which objects pertaining to a particular category are placed, i.e. pictures of butterflies showing evolution

types of butterflies

flowers, etc.

seasons- objects and pictures which are related.

News Reporter

Materials: Bulletin Board

Procedure: Have monthly newspaper or bulletin board. Encourage the children to bring news pictures which correlate with whatever is being studied that month, or whatever is seasonal. The children who bring pictures can be called "News Reporters". The news reporter can come before the group and talk about his picture. The teacher may ask for questions. She will then have the news reporter pass the picture around the group and the teacher may ask if anyone sees something in the picture which he would like to report and which the news reporter missed. All those who have something new to add can be put on the reporter list for the day. The picture is then tacked on the monthly newspaper for the children to study during free play.

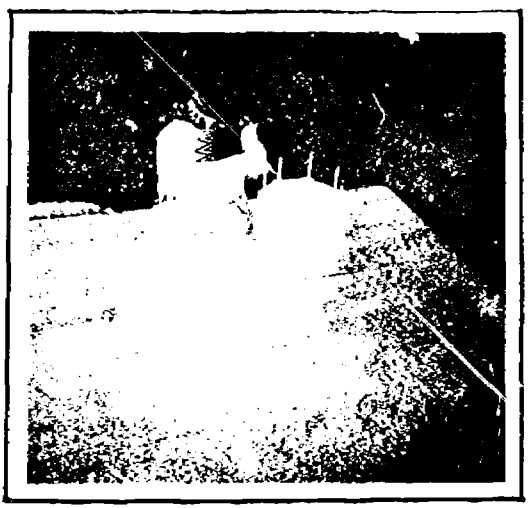
Use of the Weekly Reader Surprise

Materials: Weekly Reader/Surprise

Procedure: After discussing the science page, or our big world page, these pictures can be mounted on cardboards and used as a basis for continued exploration and discussion.

e.g. A picture of a dinosaur was followed by a week of children bringing from home toy dinosaurs, or books with dinosaur pictures for "Show and Tell."

ACTIVITIES EMPHASIZING CONSERVATION



Introduction

The term Conservation, as defined by Piaget, means that amount of space, matter, or weight is conserved or remains the same, regardless of a change in shape, if nothing has been added or taken away, or if one can reverse the process and return to the starting point.

The success of the following activities depends on the questions asked: What is your reason? Why did you do it that way? Is there another way? Such questions must be posed constantly.

MATERIALS

Clay
Cardboard for forms or parking lots
Scale
Egg Cartons
Small Blocks
Beads
Glasses (different shapes)
Birthday Cake and Candles
Cardboard Tube

GENERAL ACTIVITIES

Any activity in which there is a change in the shape of the substance but the amount of the substance does not change.

Any activity in which there is a change in the shape of the weight but the weight does not change.

Any activity in which objects placed on a surface can be arranged in different ways without changing the surface area.

SPECIFIC ACTIVITIES

Cows in the Pasture
(CBS)

Materials: Two pieces of rectangular cardboard, painted in green, exactly the same size and shape (the pastures or fields); two cows (or sheep, horses, etc.), and 28 houses.

Procedure: Place both pastures side by side, with about 2" between them, the small side of the pastures facing the child. Place a cow on each pasture.

"Do both cows have the same amount of grass to eat?"

Before continuing the experiment, the child should agree that both pastures have equal quantities of grass.

Put one house on pasture A and leave

pasture B without a house.

"In this pasture (A) a farmer has built a house." Explain that in order to build a house the grass is removed. The house is placed 1" from the upper right hand corner of the field.

"Do the two cows have the same amount of grass to eat? What do we have to do so that the two cows will have the same amount to eat?" (The solution is put a house in field B.)

If necessary help the child to find the solution and put a house in field B.

"Do both cows now have the same amount of grass to eat, or does one cow have more to eat than the other?" Do not continue before the child agrees with the equality.

Part I: "From now on, each time I put a house in this field (A), I shall also put a house in this field (B)." The houses should be placed in the fields simultaneously.

Pasture A: The houses are placed in a row, close together.

Pasture B: The houses are dispersed over the entire field.

When 3 houses are placed in each field: "Do both cows have the same amount of grass to eat?"

Justification: "How do you know?"

The same questions are asked for 5,7,10 and 14 houses. (In field A, there are finally two rows of 7 houses.)

Part II: a) Take all the houses off the two fields. Line them up in the space between the pastures so that there are two lots of 14 houses each (columns of 7).

"Did the same number of houses come from each field?"

Justification: "Why? How do you know?"

Part III: a) Do as in Part II.
b) Arrange the houses as follows:

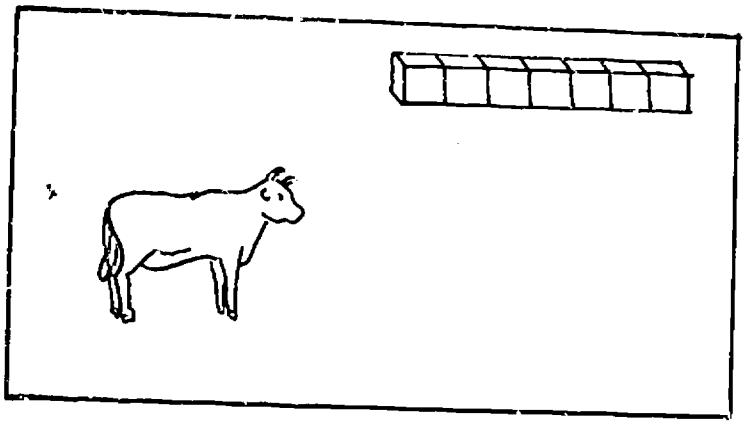
Pasture A: In the upper right hand corner, group the houses on a surface of 1/6 of the field.

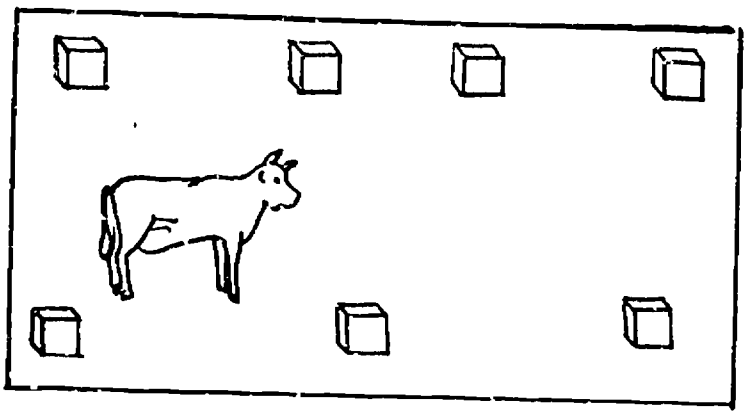
Pasture B: Arrange the 14 houses over the whole field.

"Do the cows have the same amount of grass to eat, or does one have more than the other?"

Justification: "Why? How do you know?"

(See illustration on following page.)



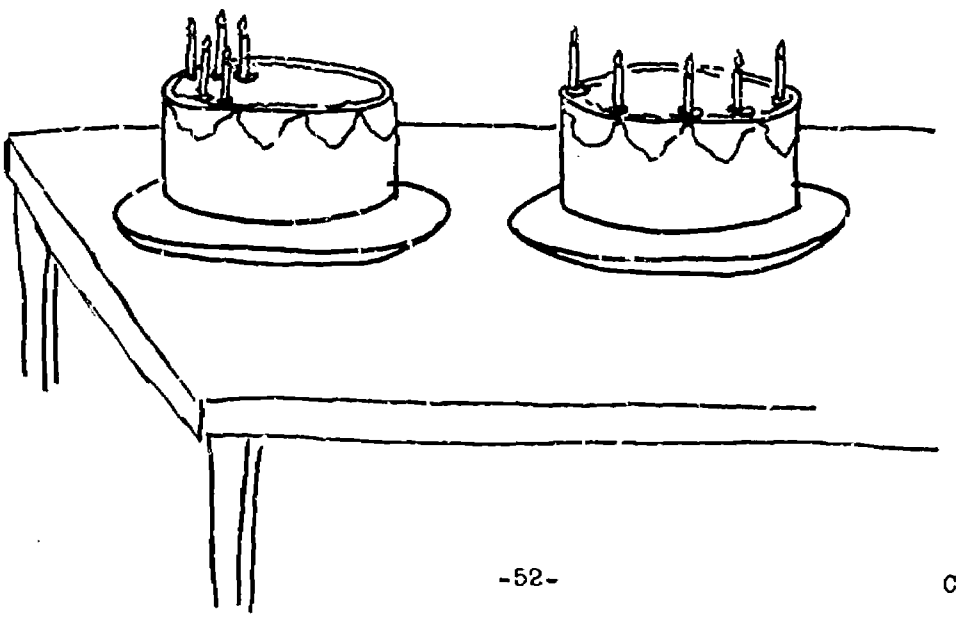


C

Birthday Cakes

Materials: Two identical birthday cakes about 12" in diameter made from styrofoam. About 20 candles (dowels about 1/8" in diameter) in wooden holders about 1" in diameter.

Procedure: What can you tell me about these cakes? Be sure that the children are sure that you can see the same amount of icing on the tops of both cakes. Proceed with the questions as in Cows in the Pasture.

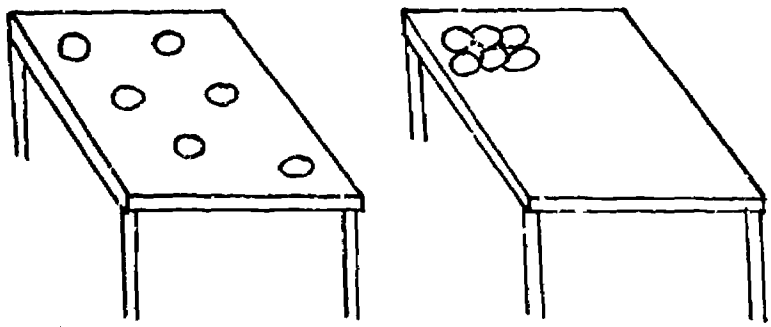


Conservation of Space

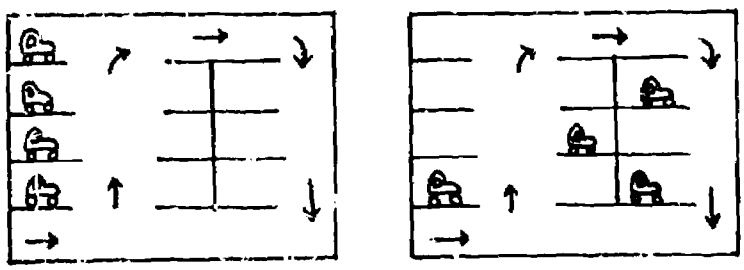
The following ideas could be used as variations for the Piaget-type activity Cows in the Pasture. (Conservation of surfaces)

1. Paper plates with two tables
2. Card with two parking lots
3. Identical books on shelves (or blocks)
4. Groceries on grocery shelf (use identical cans or cereal boxes.)
5. Cherries with two flannel trees
6. Teepees with two camping grounds

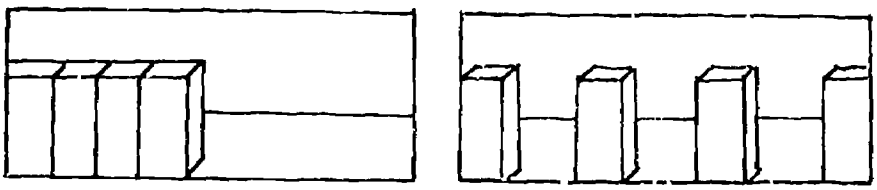
Plates with Tables



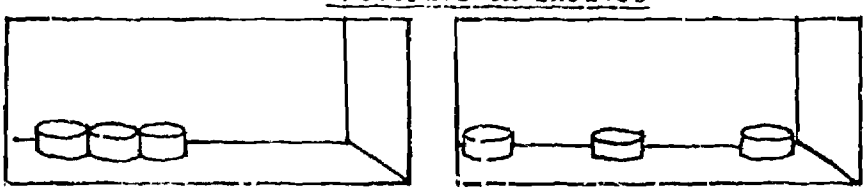
Cars on Parking Lot



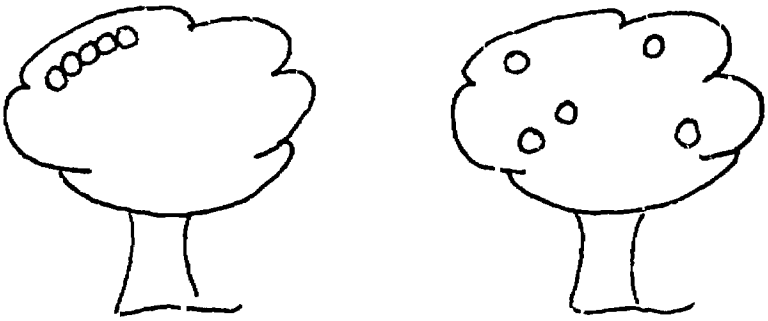
Blocks on Shelves



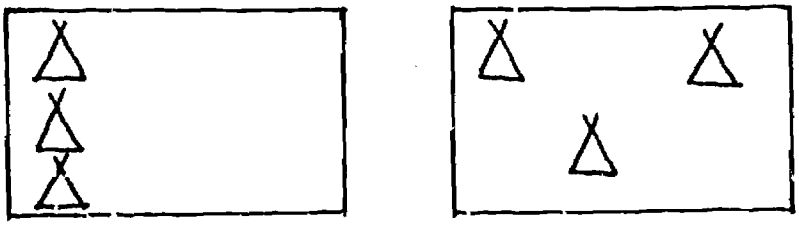
Groceries on Shelves



Cherries on Trees



Teepees on Camping Ground



Hamburger and Hot Dogs
(Small Group Activity)
(CBS)

Materials: Two fist-sized balls of plasticine of different colors but equal sizes, weigh on scale.

Procedure: First be sure that pupils know such words as longer, shorter, taller, fatter, thicker, thinner, and others by which they can compare one dimension to another. Then show the two balls and ask if they contain the same amount of plasticine.

If the pupils agree that they do, shape one of the balls into a "hot dog" about 5" long. Ask if the objects now contain the same amount of plasticine. Then shape the remaining ball into a hamburger or pie and repeat the question. Reshape one of the objects into a ball and ask the same question. Finally, break one of the quantities of plasticine into a dozen or more pieces, then put them together in a new shape. Repeat the question each time.

For a variation of this activity, use two equal quantities of colored liquid and pour them alternately into glass or clear plastic containers of several different sizes and shapes.

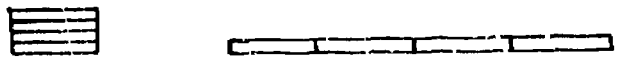
For further variations see following page.

Variation of "Balls of Clay"

Use these ideas for Piaget's activity "Balls of Clay."

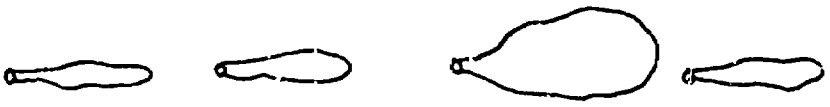
Adapted from: Le developpement des quantites chez l'enfant, chap. I.

1. Carpenter's Rule



2. Two Cotton Balls

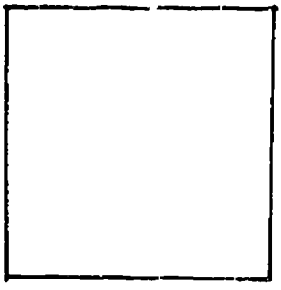
3. Two Balloons with Rubber Band

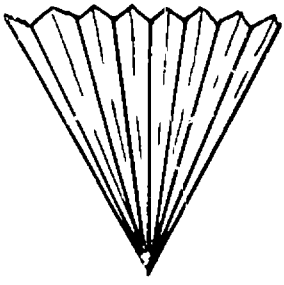


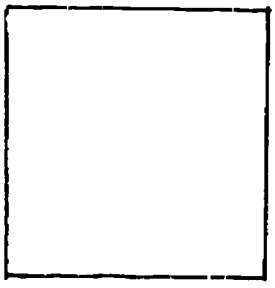
4. Two Rubber Bands...one stretched, the other unstretched

5. Two Papers...identical in size: one folded like a fan, the other flat.

one folded into 4 squares, the other flat.







The Loaves of Bread

Materials: 2 batches of dough which the children mix (the teacher measures the ingredients so that the children can see that amounts are equal)

Procedure: Establish that the amounts of dough are equal. After the dough is mixed talk about the different kinds of bread: i.e. French Bread and Loaf Bread. Designate one child to be baker of Loaf Bread and another to be baker of French Bread. Have the children discuss which loaf they think has more dough in it and why.

Through questions bring out the idea that if nothing is added or nothing taken away, the substance of the objects remains the same.

Scales
(Conservation of Weight)
(CBS)

Materials: A scale and two clay balls of different colors

Procedure: "Here are two balls of clay. I would like to have the two balls exactly the same weight. How can I be sure?" (Weigh them and have child verify that they are equal in weight.)

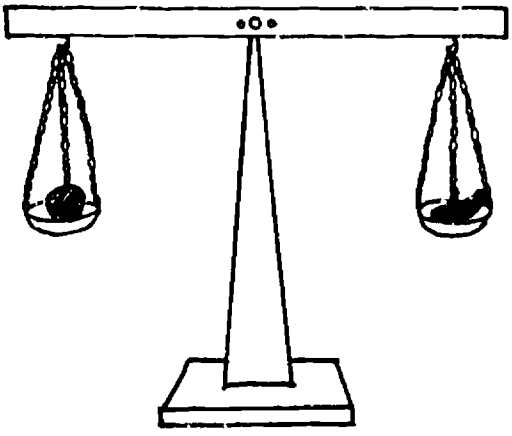
Shape one of the balls into a hot dog on the scale, do you think the ball would weigh the same as the hot dog, or would the ball weigh more than the hot dog? Why do you think so?"

Then remove a piece of clay surreptiously from the ball of clay. "Let's put the ball on this side of the scale, and the hot dog on this side and we'll see if they still weigh the same." "My,what is happening here? The scale goes down on the side of the hot dog." "What does that tell us about this side? Which weighs more? But you said that they both weighed the same. Do they both weigh the same? How do you know?"

Break one of two equal balls into about a dozen pieces. "If we put this ball of clay on one side and these peices on the other, which would weigh more. How do you know?"

Before you begin each experiment, be sure the child is sure both balls of clay are equal.

By questions try to bring out the idea that if nothing is added or nothing taken away, even if the shape changes, the weight is the same.



Fireman's Hose

Materials: Two pieces of yarn (identical in length to represent fireman's hose)

Procedure: "Let's pretend that these two pieces of yarn are fireman's hose. Are they the same length? How do you know? Now you show me how the fireman would carry the hose on the ladder."

"Yes, he would have it rolled up. Now, is this hose, (pointing to the rolled one), as long as this one (pointing to straight one). How do you know?"

Colored Lemonade
(CBS)

Materials: 2 glasses that are identical (marked A-1 and A-2), 1 glass that is higher and smaller around or narrower than A (mark this B), 1 glass that is shorter and larger around than A (mark this C), 4 glasses of identical shape, about ½ the size in volume of A (these will be E-1, E-2, E-3, and E-4), and 2 bottles containing water, colored water two different colors.

Procedure: Take A-1 and A-2, tell the child, "you see these two glasses are the same."

Take one of the bottles and pour colored water into A-1. Tell the child himself to take tht other bottle with colored water and to put as much into A-2. If the child has difficulty the person in charge may do it himself.

Before starting the game, make the child understand that each glass holds the exact same amount of water. Then tell the child, "If you drink the contents of A-2 and I drink the contents of A-1 will we be drinking the same amount or will you be drinking more or less than I?"

Part I: Pour the water into A and B. Then ask the child, "Now will we both drink the same amount or will you drink more or will I drink more and why?" Then pour the water out and ask the same question, "Will I pour more water out of the glass or less water than you?"

Part II: Pour water into A and C. Continue the same procedure as you used in the first part.

PartIII: Pour water back into A and A-2 Be sure child agrees the amount of water is the same. Pour contents of A-2 into four small glasses E-1, E-2, E-3, E-4.

The above activity was adapted from:

The Child's Conception of Numbers; Chapter I.

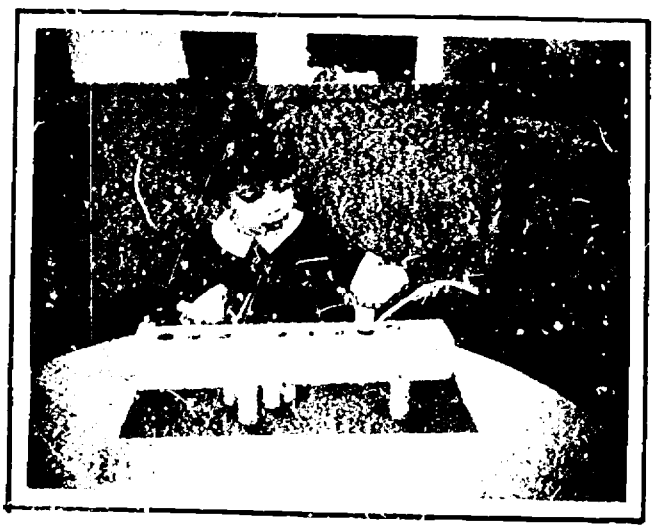
Are They the Same?

Materials: Two cartons of milk, two glasses (identical), one glass tall and narrow (Daddy's glass), one glass short and wide (Mommy's glass)

Procedure: "What can you tell me about each carton of milk? What can you tell me about these two glasses?" (identical ones)

Have child pour milk into identical glasses. "If I take this glass, will I have as much milk to drink as you will? Now, let's pretend that I'm Daddy and we'll use his glass. Please pour the milk for yourself. Does Mommy have as much milk to drink as Daddy?"

ACTIVITIES FOR DEVELOPING AWARENESS OF SERIATION



Introduction

While classification requires the putting together of objects without regard to how they are arranged within the group, the emphasis in the pre-seriation task of "ordering" is on the arrangement of things within the collection of objects. (i.e., a child might separate the squares from the triangles, (classification by pre-seriation activity). One prerequisite for seriation is the ability to discriminate different sizes. A variety of sensory-motor activities should be used in the exploration of seriation. (Cuisenaire rods, blocks or nested boxes are useful.)

The manipulation of objects would of course precede the use or pictorial representations or abstract symbols, just as the order of difficulty increases from a very basic distinction between two sizes, to a high level of coordination between order and cardinal number, taking into account both series and being able to reverse these processes without confusion.

Beginning at the simplest level with dichotomies of grossly different sizes, children will soon become able to manipulate, order and verbally express relations of two sizes, "big and little" and "large and small." This should be expanded to include quality as well as quantity and position (ordinality). Only after the children have a thorough understanding of dichotomies should they be introduced to three, or four or more quantities, remembering that mastery of each step of cognitive growth makes the next step possible.

MATERIALS

Floor blocks (varying sizes and shapes)
Nested boxes or cans
Cuisenaire rods
Geometric shapes in variety of sizes
Set of 35mm empty film cans (filled with sand or BBs to develop series of different weights)
Series of boxes (put beads in..fewest-most)
Measuring spoons (graduated sizes)
Plastic measuring cups (graduated sizes)

GENERAL ACTIVITIES

Pre-seriation tasks can be built into almost any activity in the daily program (with large and small art paper, long and short brushes, big and little trucks or blocks or thick and thin cookies). This informal opportunity to use the vocabulary in the familiar context of daily activities helps to make the concept more meaningful.

Size:

As children work with any of the above materials, help them to develop the concept of size, beginning with dichotomies:

big-small, large-small
long-short, longest-shortest
largest-smallest, tallest-shortest
wide-narrow, fat-thin

Quantity:

more-less
some-all
many-few
greater-less
none-some
one-two

Quality:

hard-soft
thick-thin
old-new
heavy-light
etc.

Position:

first-last
first-second

After the preceding concepts are well established, let the children put three objects in order, developing the following which extend the preceding dichotomous comparisons:

middle
first, second, third
between
before, after, next
first, middle, last
least, more, most
lightest to heaviest
shortest to tallest
etc.

Increase the number of objects gradually, remembering to ask questions frequently to get children to justify their responses. Concepts of quality are more abstract than visible concepts of sizes, so be sure children develop the language necessary to clarify them.

Initial Concepts of Number:

counting
number-naming
comparing
ordering or patterning
matching..one-to-one (singly and in sets)

SPECIFIC ACTIVITIES

Biggest and Smallest
(Comparison of Size)

Materials: Five to ten cubes graduated in size

Procedure: Follow a 3-step presentation similar to that used by the Montessori method of introducing materials to children. If the child has difficulty with step 2, return to step 1. Do not proceed with step 3 until step 2 is mastered.

Distribute cubes on flat surface.

1. Identify the biggest and the smallest cube by labeling them for the child.

2. Ask the child to give to you the biggest and then the smallest cube.

3. Ask the child, "What is this?" Point to biggest and then to smallest.

Work with the same procedure using materials to bring forth comparisons mentioned in the introduction on p. 64. For example, sandpaper strips graduated from fine to coarse grains for comparisons of quality; a large and small apple for comparison of quantity; a book to designate first and last pages for comparisons of position.

Cuisenaire Rod Activity I
(Discrimination of Sizes)

Materials: Cuisenaire Rods

Procedure: Have children each take 3 rods (a white, red, and light green) in their hands, and hold them behind their backs. Tell them to feel the rods (no peeking) and find the smallest rod and hold it up. When each child is holding his smallest rod in the air, have them look at one another to see if they all agree it is the white rod. Then repeat the game asking for the longest rod, and again, asking for the middle-size rod.

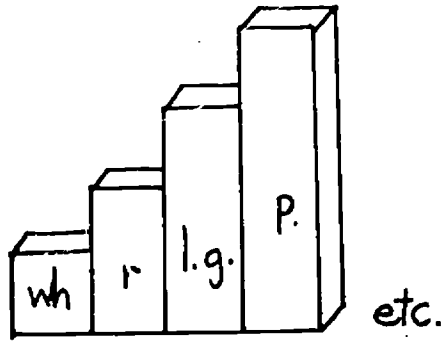
This can be done with any 3 rods, but these 3 are the easiest for a small hand to hold. The game could also be played by putting the rods in a flat box and reaching into it without looking.

Cuisenaire Rod Activity II
(Ordering)

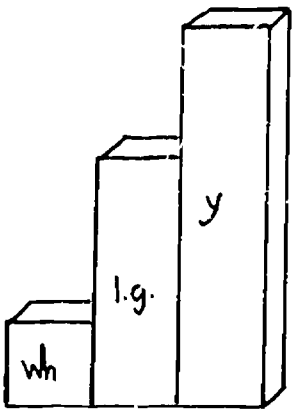
Materials: Cuisenaire Rods

Procedure: Have the children build a staircase with the rods, starting with the white rod or two in the sequence, ask, "Is this step the same size as the other steps or is it larger?" Then tell them to find one that will fit in between to make it (the step) the same as the other.

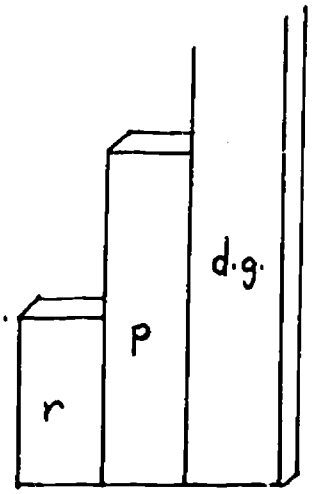
(See illustration on following page)


wh
r
l.g.
P.
etc.

This activity can be varied and more difficult by telling the children to start with the white rod, skip a step, put the green one next, then continue the staircase. Or start with the red rod, skip light green, use purple next, and continue the staircase, keeping the steps (intervals) even.



etc.



etc.

The Necklace Game

Materials: Box of 20 or more beads of different colors; red, blue, yellow, green
A string on which are 9 beads in the following order; blue, yellow, green, red, blue, yellow, green, blue, red. (this string serves as the model)

Procedure: First part:

Model beads in a straight position. Ask the child to name the color of the beads. Show the child the first string you have arranged. Give the child the second string and the box of beads. Ask the child to choose the same color beads and to put them on the string in exactly the same way as the model. If the child makes an error put the second string in front of him and ask to start over. Ask him to justify his actions by asking: "Why did you put that one on the string?"

Second part:

Model beads in a circular position. Show the child the model necklace of beads and give him one string and the box of beads. Ask him to string the beads in exactly the same color order as that in the necklace. If it is necessary show him that he can tie the ends of the string to form a circular necklace. It is good to note if the child notices where he has stopped and if he can find where he went wrong and start over again. As he works continue to ask for justification of the placement of the beads.

The preceding adapted from activities suggested by:

Madame Marianne Denis
Institute des Science
De l'education
Geneva, Switzerland

The Clothesline

Materials: Pieces of doll clothes and other items placed in a box. These should include:

2 red dresses
2 blue skirts
2 pajama pants
2 shorts (as in play clothes)
2 dish towels
2 handkerchiefs
2 aprons
2 blouses
2 sweaters
2 clotheslines
18 snap clothes pins

Procedure: First part: (Copying Identical Pattern)

Place the box with all the clothes in it, in front of the child and then suspend from one clothesline in the following order: one pajama pants, one handkerchief, one red dress, one blue skirt, one pair of play shorts, one apron, one blouse, one sweater, one dish-cloth.

Going from left to right ask the child to name each piece. Make sure that you have some clothesline left on either side of the clothes that you have hanging. Then have a second cord and show it to the child. Ask that he be able to put the same number of articles of clothing on the second line as you did on the first line. When he is finished ask him to justify his placement by asking, "How do you know that should be hung next?" Then take all of the clothes off the second line and put them in the box.

Second part: (Spacing the pattern): Ask the child to hang up some clothes like he did just a little while ago but this time that he must hang the clothes the whole length of the cord. Again, ask him to justify his placement as he works. When he has finished, take all the clothes from the second cord and put them back in the box.

Third part: (Reversing the pattern): Then ask the child to select exactly the same clothes and to hang them but in a reversed order. This assignment is always very difficult for the children to understand. Try to explain it in several different fashions so that he will be able to understand. Explain that, "You will do just the opposite of what you just did. Instead of hanging them this way," showing with your hands, "we will start over here hanging them this way and finish at this end." If it is at all necessary you hang the first article of clothing and ask that he continue, justifying the placement.

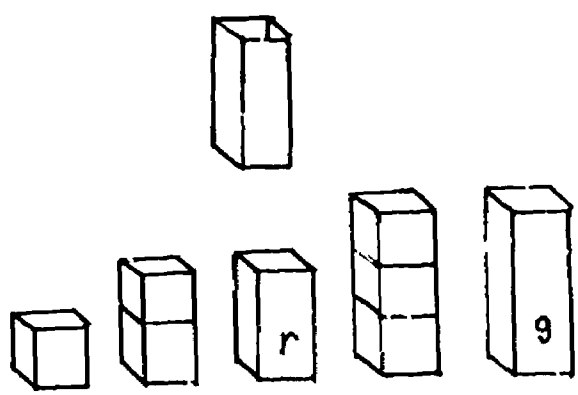
The preceding activity was adapted from suggestions from:

Madame Marianne Denis
Institute des Science
De l'education
Geneva, Switzerland

Cuisenaire Rod Activity III
(Middle, Between, Next, etc.)

Materials: Cuisenaire rods

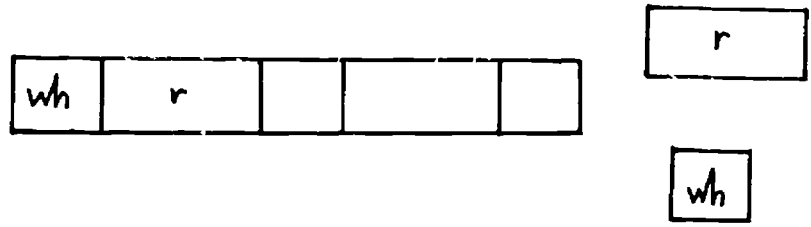
Procedure: Using three rods (white, red, light green) have children tell which rod is in the middle. Then removing the red rod, ask which rod goes between the white and the light green. Do this with rods of other color sequence. It can also be done by making and using a 3-dimensional bulletin board (see below). This helps children become familiar with the color sequence of the rods and their comparative sizes and relationships for use in other activities.

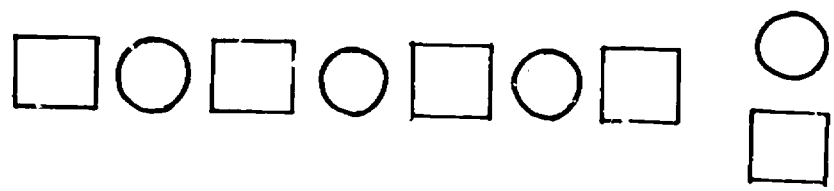


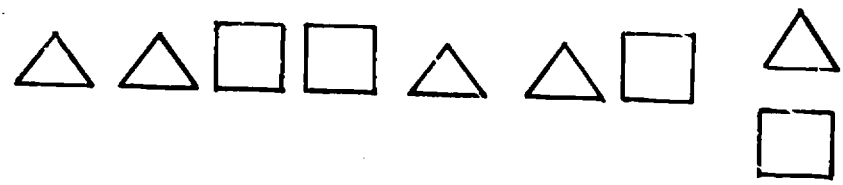
Patterning
(Sequence)

Materials: Cuisenaire rods, beads, or blocks, later on using cards or sequential pictures.

Procedure: Begin with very simple patterning, and increase in difficulty. (See illustrations below)



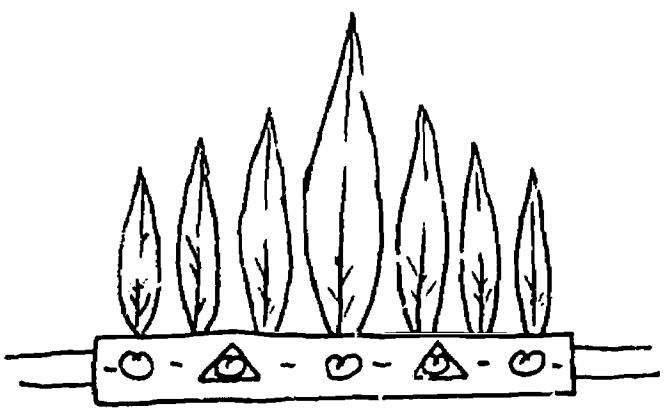




Making an Indian Headband
(Reversibility)

Materials: 7 paper feathers, paste

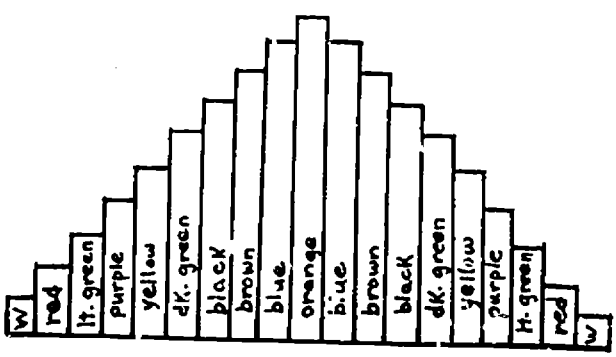
Procedure: Use 7 paper feathers, 3 pairs of different heights. One only of the longest. Peste the feathers on a paper headband so the tallest feather is in the center and the shortest are at the ends.



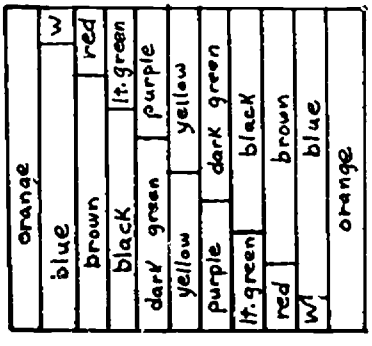
Cuisenaire Activity IV

Materials: Cuisenaire rods

Procedure: Have the children build a staircase from white to orange, then using the orange rod as the middle, build down to white again.



Variation: Let them fill out the square by inverting them in this way.



Pebbles In the Bag
(More or Less)

Materials: Cloth bag of pebbles (or a bag of Cuisenaire rods)

Procedure: Remove a handful of pebbles from bag and put them aside. Appoint one child to hold bag and another to be the Helper in putting in or removing pebbles from the bag, and another to say "GO" when asked.

Explain to the children that there are pebbles in the bag, but that we aren't concerned about how many are there now. Ask child to say "GO". He will respond, "Put in 4", then Helper counts four pebbles as he drops them into the bag. Now teacher questions "Do we have More or Less pebbles in the bag now than we had before "John" said "GO"? How Many more? New helpers are appointed and game starts over. This game leads into the use and understanding of positive and negative numbers at a later age by recording the operations on the board.

The above activity adapted from:

Robert Davis
Madison Project Materials

Blocks
(More or Less)

Materials: Several blocks

Procedure: Put five or more blocks in the center of circle. A child counts the blocks and turns himself around so as not to see. Another child takes away or adds to the blocks. Teacher says,

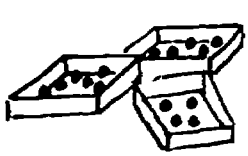
"Blocks, blocks on the floor
Are there less or are there more?"

First child turns around to see if number is more or less.

Marbles
(Fewest to Most)

Materials: A series of flat boxes containing marbles (one marble in one box, two in another, etc.)

Procedure: Have children arrange the boxes in sequence from fewest to most, or vice-versa.

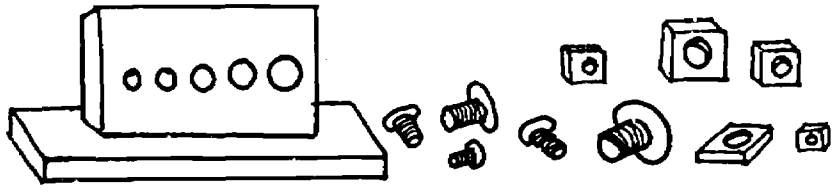


etc.

Bolt Board
(Fewest to Most)

Materials: Board with holes of various sizes, bolts to fit holes, and nuts to fit bolts.

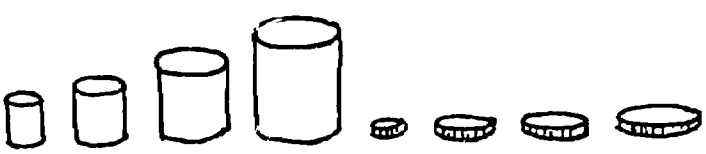
Procedure: Let children experiment with this. It is an excellent way of developing the concept of seriation by matching the various sizes.



Matching

Materials: A group of jars of various sizes and lids to fit

Procedure: Allow children to arrange jars in a row from large to small, then arrange the tops in another row from large to small and find tops to fit each jar. Later, second row can be arranged in the opposite series, then see if children can find top to match. Questioning about ordinal position(first, second, third, etc.) as well as "How do you know that will fit"? is helpful in getting the children to think out their problems.



Matching Number to Numeral

Materials: Series of flat boxes containing marbles or white Cuisenaire rods (one in one box, 2 in another, etc.), cards with numerals printed on them

Procedure: Let each child come up and select a piece of paper with the numeral written on it and return to circle. Then have child holding "1" start the game by coming up, putting his numeral on the table with a block to show "how many", and return to his place.

The next child (2) should recognize his turn when it comes up and go through the same procedure. He not only has to recognize his number and be able to count out the number of objects, but also understand his place in the ordinal series.

This is One

Materials: Various and assorted objects in classroom setting

Procedure: One child starts by putting hand on specific object and saying, "This is one". Next child repeats words and actions of first child, and then says "This is two" pointing to another object. Game continues with each child repeating numbers and objects of previous child and continuing the sequence.

Hurdle Race

Materials: 10 nested plastic hexagons
11 circles (paper)
1 toy dog

Procedure: Teacher lines up six hexagons according to size with smallest first with 2" space between each hexagon. Child then places last four in order.

Place "pads" (circles) between each hexagon and at each end.

Designate beginning and end of race (first and last circle) and name hexagons "hurdles" for child. (If child has difficulty with the word "hurdle", substitute "fence.")

"Jump" toy dog over 3 hexagons and place it on 4th. circle, and ask, "To finish the race, does the dog have more hurdles to jump or less hurdles than he has already jumped?"

Justification: "How do you know?"

"Jump" dog over two more hurdles so that he is placed on the 6th. circle. Repeat above question and have child justify his answer.

"Jump" dog over three more hurdles so that he is on the 9th. circle and repeat above procedure.

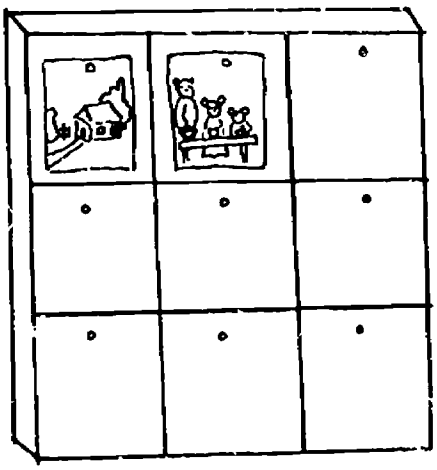
Finish race.

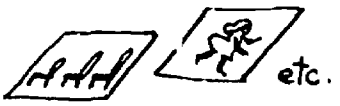
Story Cut Ups
(Listening for Sequence)

Materials: Buy dime store book of familiar stories (Three Pigs, Three Bears, etc.) told pictorially and cut them up

Procedure: Hand each child a picture of part of the story, and have them listen as you tell the story. As you get to their part, they come forward one at a time until whole story is represented.

These can also be punched and a STORY BOARD made (See below) so they can work at this independently. It is similar to "Seequees".





Farmer In and Out of the Dell

After children have gotten used to playing Farmer In The Dell in the proper order, it might be fun to try to empty the circle by reversing the order.

Old MacDonald's Animals

Materials: None

Procedure: Children sit in a circle. Each child thinks of a different animal. Sing the song and point to one child to "Talk" like his animal.

When you backtrack, each child must remember his animal and whom he comes after.

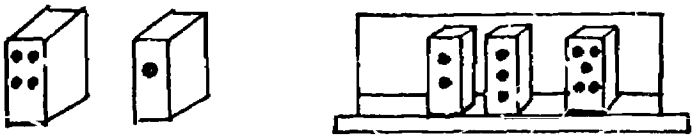
Example: Billy...bow-wow here
Jane....oink-oink here
Bennie..meow-meow here

Variation: They can move like their animal.

What's Missing

Materials: Shelf and set of rectangular blocks that have had dots stuck on edge representing number

Procedure: Have children arrange blocks on shelf in numerical order, then take some out and have them find missing ones. "What comes between?" "What goes before, or after?"
(See illustration on following page.)



Toy Store (CBS)

Materials: 8 toy cars or other toy objects, 10 pennies

Procedure: The child is told that he can play store again.

Arrange 8 cars on the table so that there are 2" between each of them. The pennies should be bunched on the table in front of the child.

Part 1: "Take just enough pennies from the dish for each of the cars, no more and no less: 1 penny for each car.

Justification: "How did you decide..?"

Part 11: Put the pennies close together and leave the cars in place. "Are there as many pennies as there are cars? Or are there more pennies, or are there more cars?"

Justification: "Why? How do you know that?"

S

Part III: The pennies are now separated, but the cars placed close together.
"Are there now as many pennies as there are cars? Or are there more pennies or are there more cars?"
Justification: "How do you know?"

Grocery Store (CBS)

Materials: 8 pennies and 12 items of a "play grocery store."

Procedure: The examiner asks the child if he would like to play "store."

Part 1: The child is the buyer:

"You can take all the money and do the shopping. Every time that you buy a package of something, you must pay me a penny. Each package costs one penny."

After the first exchange of the 8 items, put the 4 remaining packages to one side.

"Do I have the same number of pennies as you have packages? Do I have more pennies than you have packages, or do you have more packages than I have pennies?"
Justification: "How do you know? Why?"

Part II: The examiner is the buyer:
(8 pennies and 8 items)
After six exchanges the child

is left with two packages. Stop buying and ask: "Can you tell me how many pennies I have left?"

Justification: Depending upon the child's answer: "How did you know that I still have two pennies (one penny, three pennies)?"

Continue with the last two exchanges. "Now with all the money that you have, can you buy all the packages I have? Could you buy more packages than are here, or could you buy only some of them?"

Justification: "Why? How do you know?"

Domino Match

Materials: Large wooden domino blocks

Procedure: These can be used in several different ways in helping children become familiar with initial concepts of number; counting, number-naming, comparing, matching, ordering or patterning and matching sets. There are several kinds on the market, but the ones with grooved-out dots have the added advantage of permitting tactile learning as well as visual. Dominoes help children see patterns in grouping.

Old playing cards (without the face cards and with the A's changed to 1) can also be used for seriating.

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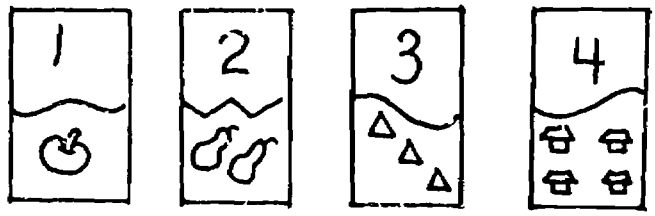
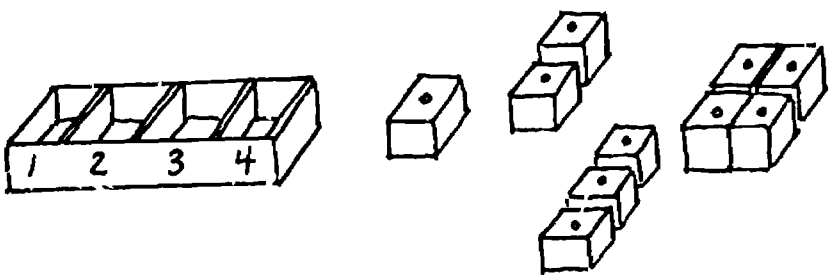
Number Sorter Board: This can be made or purchased. It is a wonderful aid in helping children gain a concept of number sequence as well as matching.

Relating Numeral to Number: (Match-Mates can be made or purchased)



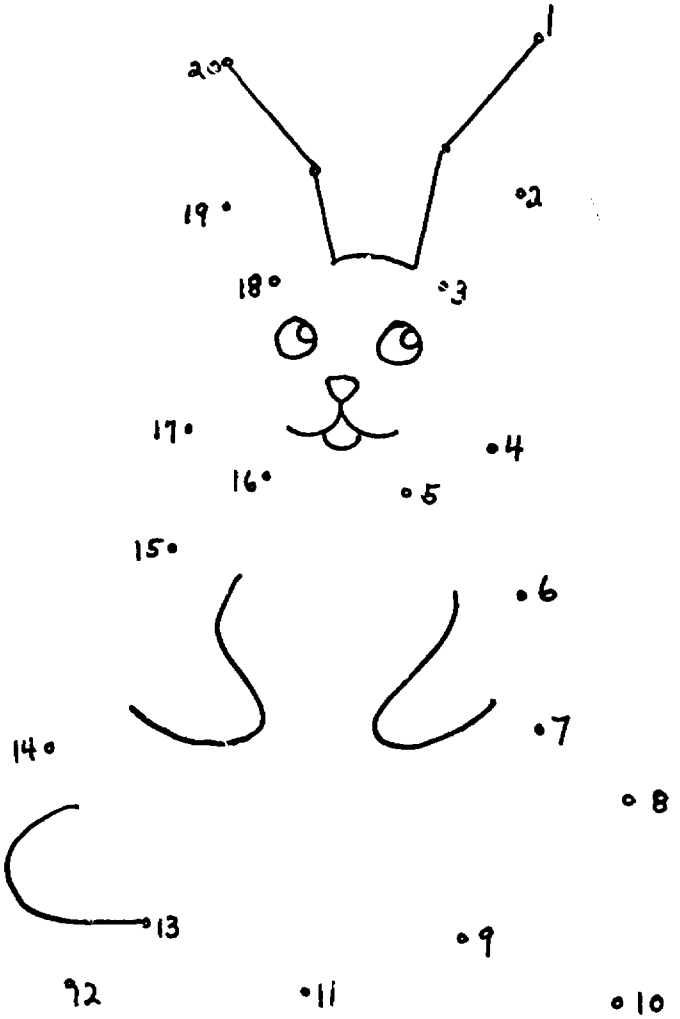
One-to-One: These can be made or purchased.

Divided Block Box: These can be made. This can be used in ordering as well as relating numeral to number, or could be used as conservation.



Cuisenaire: Finding two rods that are as long as one (red and green for yellow for instance), or estimating (spatial).

Follow the Dot Picture: For older children, this is a good exercise in seriation.

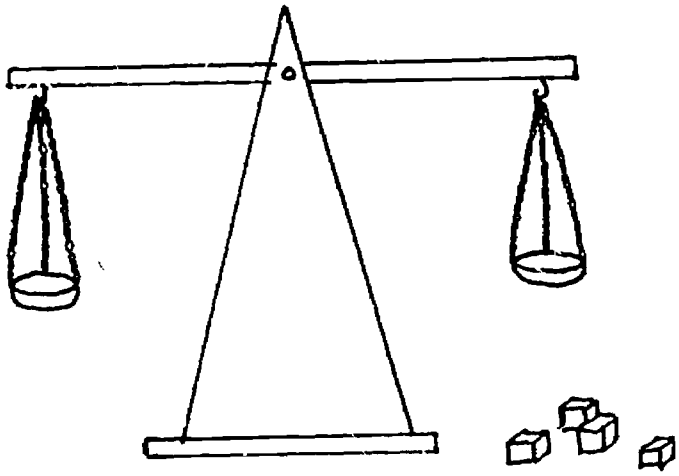


Estimation in Weights

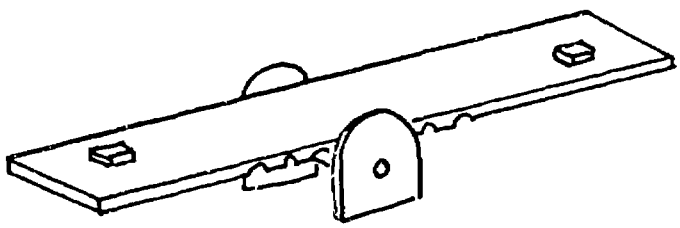
Materials: Pan balance scale, see-saw type board scale, ring equalized type scale, large washers

Procedure: There are three or four different types of scales that can be bought or constructed to provide experiences (structured or unstructured) in weight experimentation and balance, and in estimation.

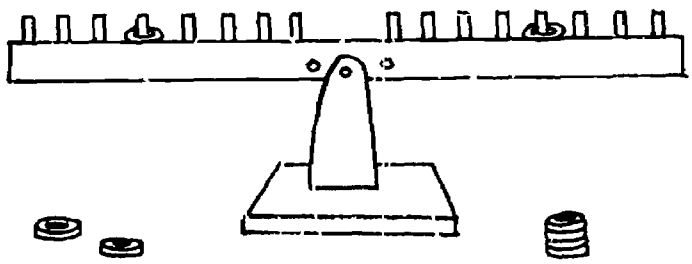
The suspended pan balance scale can be used in experimentation with weight comparison (lighter and heavier).



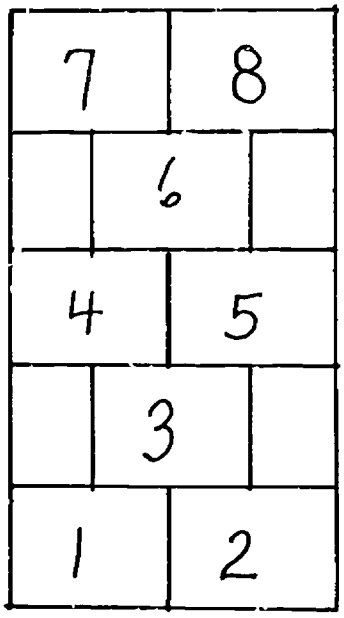
The see-saw type board scale can be used in experimentation with weight comparison, but (through trial and error) will also help them discover some basic principles of balance and imbalance.



The ring equalizer type of scale, used with large washers, challenges children to match weights on either side of the balance. They soon discover that the distance from the center and quantity have a definite relationship.



Plastic hopscotch: Can be purchased, and used as a large group activity for matching number of objects to numeral, or as a game of bouncing a ball the number of times represented in each square, as well as a Hopscotch game.



ACTIVITIES EMPHASIZING SPATIAL RELATIONSHIPS

Introduction

After the child has had successful motoric experiences with object-to-self relationships, (See Booklet I, Position in Space) which help develop the systematic teaching of spatial relationships, he is then ready for the next level of understanding....the recognition of object-to-object-relationships.

Activities providing sensory-motor experiences in the manipulation of objects lay a ground work for later recognition of spatial position from pictures and to verbalization of spatial relationships.

Every opportunity during the daily activities to stress spatial relationships should be utilized. (i.e. "Put the big blocks on the shelf above the trucks." or "A crayon has rolled under the table. Please put it in the box.") Tasks relative to the development of vocabulary and concepts of spatial reasoning are easily coordinated with informal activities in the daily program, as well as direct teaching activities.

MATERIALS

Blocks
Dishes
Cuisenaire rods, beads
Animals and barn
Trucks or boxes

GENERAL ACTIVITIES

As children work with any of the above materials help them to develop concepts of spatial position through the use of the following prepositions:

in, on
up, down
here, there
above, below
under, over
far, near, next to, first, second
beside, behind, between, in front of, close
inside, outside
etc.

Setting the table, putting dishes on the table, cups on saucers, knives and forks next to the plate, etc. is fun for most children and can be capitalized on by the teacher as a directed activity in the development of spatial relationships. Games of following directions will be enjoyed by the children and will provide manipulative experiences in putting objects in (on, under, etc.) other objects.

After the motoric experiences of placing things, help children verbalize their actions. Later on things on the shelves or in the room can be explored

verbally with regard to location and for stimulating discussion regarding spatial relationships. (i.e. which animals are nearer and which farther away, and why; pictures of things up in the air and down on the ground, inside the fence and outside, etc.).

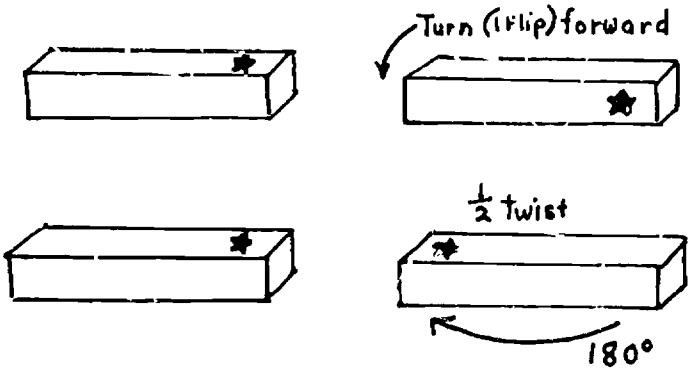
SPECIFIC ACTIVITIES

Turnee-Twistee

Materials: Construct a tagboard open-ended rectangle, and paste a star on one surface at the far end

Procedure: Lay the rectangle on the table in front of the children and ask them where the star is. Explain that a turn will be one flip in the forward direction and a twist will be a complete 360 degrees and ask where the star is (give them a chance to check by looking), turn again and ask again, etc. until a complete turn has been made and star is back on top. Then ask them where star would be if you give a ½ twist, after they've guessed, do it and let them see. Keep going, being sure you give the child ample time to estimate, see you perform the turn, and then check to see if he is right or wrong.

(See illustration on following page.)


Turn (Flip) forward
½ twist
180°

Child In The Garden (CBS)

Materials: Two identical dolls of small size, a tall folding screen and two identical model landscapes or "gardens" with distinctive features, such a pond, a path, a bridge, a clump of trees, a gardener's house. (See A in the drawing on the following page)

Procedure: 1. Show the pupils the "gardens" and ask if they look alike. Let them identify the features and discover for themselves the two are identical. Once the pupils have reached this conclusion, place the gardens oriented in the same direction...on two tables a foot or two apart.

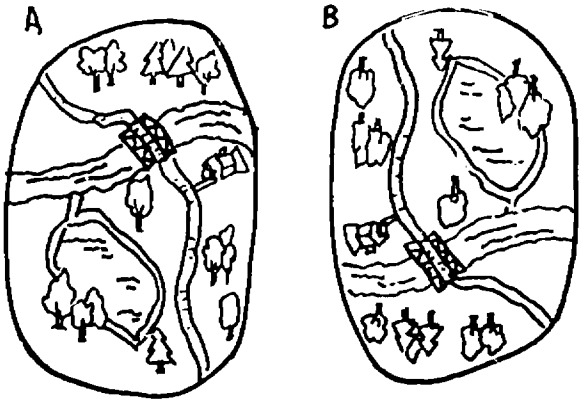
2. Then stand one of the dolls in one of the gardens and ask a child to place the other doll in the same position in the other garden. Ask him to be sure his doll is facing in the same direction as yours. Ask him how he can be sure his doll is located in the same place as yours.

3. Place your doll in several different locations, facing it in different directions, and give all the children a chance to place the other doll in the other garden. Ask each child to state his reason for placing the doll as he does. (You should expect them to say, "Well, yours is right by the pond and sort of near the path and looking toward the house.")

4. Now turn the garden the children are working with 180 degrees (See B, in the drawing on the following page) and repeat the procedure. This will be more difficult. Some children should have learned to orient the doll according to the physical features of the garden...rather than the physical features of the classroom.

5. After all the children have had a chance to position the doll once more, turn the garden the children are working with back to its original position. But now place the screen between the two tables so a child standing before one garden cannot see the other. Place your doll now, let a child take a good look at it, then let them go behind the screen and place the other.

6. Then with the screen still in place between the tables, turn one of the gardens 180 degrees again and proceed as before. To vary this activity... let a child stand at one garden with the screen still erected and let him position his doll according to the directions you call out. You might say, "I'm placing my doll near the bridge, between the pond and the path, and he's looking at the trees"....let the child figure out from that where his doll should be placed.


A
B

Water In The Bottle (CBS)

Materials: A clear bottle, with a screw cap, mimeographed sheets showing a similar bottle in six different positions, (see illustrations on following page) enough colored water to fill the bottle about a third full, a brown paper bag

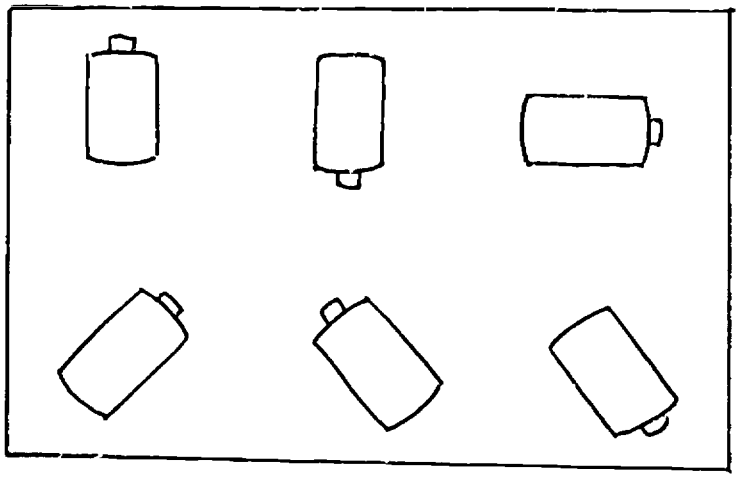
Procedure: 1. Show the bottle, containing the water, to the class and call attention to the mimeographed sheets (each child should have one). Hold the bottle in the different positions and let the pupils compare its appearance in your hands with its appearance on the paper.

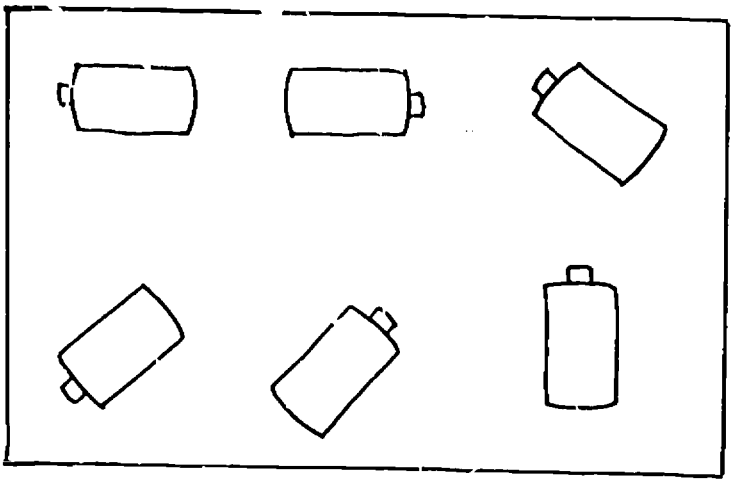
2. Then place the bottle inside the paper bag. Explain that you are holding the bottle in the position shown in the upper left-hand corner of the mimeographed sheet. Ask the pupils to draw in the water "as you think it is in the bottle." Tip the bottle, still in the paper bag, into the other five positions asking the pupils to draw in the water each time.

3. Then remove the bottle from the bag and let the pupils check the accuracy of their drawings as you hold the bottle in the six positons once more. Then pass out fresh copies of the mimeographed sheet, replace the bottle in the bag, and repeat.

You could also handle this exercise by calling the class together, displaying the bottle, then putting it into the bag and asking several pupils to point to where they think the water is. You

should wrap the bag tightly around the bottle so its outlines can be seen clearly. As each pupil responds, ask him how he knows where the water is and whether the surface of the water makes a straight line.





Eiffel Tower (CBS)

Materials: Blocks, a short stick, a long stick

Procedure: Each child (or pair of children) has a set of blocks in front of him on the floor. The teacher builds a tower of blocks on a low table and asks the child to build one just as tall on the floor.

Many of the children are likely to judge that the towers are of the same height if they reach the same eye level. They will not take into account the fact that you began building yours from a higher base.

Ask the children, then, how they know the towers are of equal heights. You should get a variety of answers here.. for example, "They look that way"; "They both come up to here on me"; "There are just as many rows of blocks."

Comment on the variety of answers and emphasize any disagreements. Ask, "How can we be sure the towers are of the same height?" Let the children test any ideas they have and question each one as to how his method proves that the towers are of equal height.

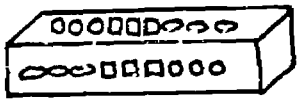
Then you might produce the two sticks and let the children figure out how to use them as measuring standards.

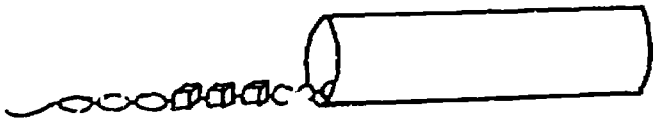
Beads In The Tunnel (CBS)

Materials: 9 beads on a rod,(3 red, 3 yellow, 3 blue) have a tunnel made out of paper, a carton on which we have drawn 3 red beads, 3 yellow beads, and 3 blue beads strung on a shaft

Procedure: Show the shaft to the child and ask that he identify the three colors of beads. We might tell the child that it is a train with three different colors on it.

The carton or box with the drawings of the three sets of beads remains in front of the child throughout the whole activity.





First part: Take the shaft with the beads and pass it into the tunnel from your extreme left to your right. Now while the shaft is in the tunnel, ask the child, "If you pull the beads out to the right which color will appear first? If you pull it out to the left which color will appear first?"

Do the experiment so that the child can see whether he is right or wrong. Tell the child to watch carefully and to watch to see what you are doing.

Second part: Now turn the tunnel 180 degrees so that the right side now becomes the left and the left side now becomes the right.

Ask the child to guess the order that the beads will come out of the tunnel this time. Show him on the box the drawing as a help so that he can see the order of the beads, red, blue, and yellow. Do the experiment so that the child can see what happens.

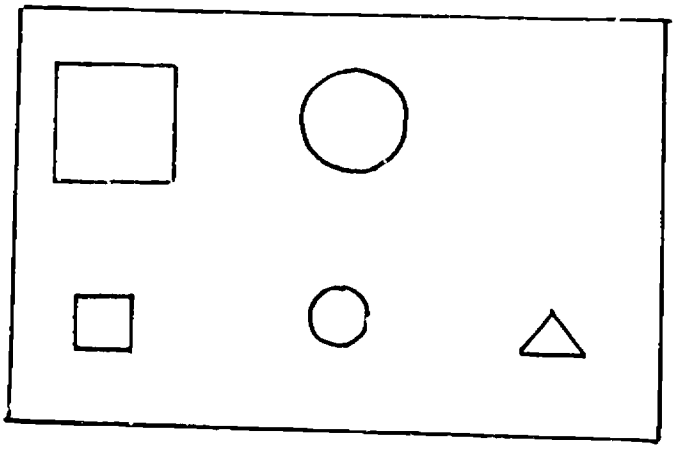
Third part: Now turn the tunnel 360 degrees and repeat the activity.

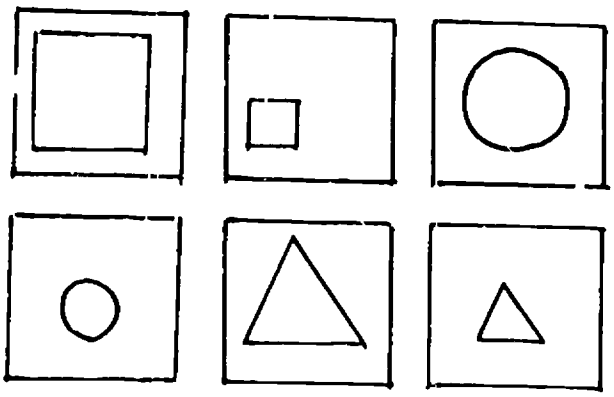
Matching Shapes

Materials: A variety of sets of large and small illustrated cards (see drawing on following page). Develop at least ten or a dozen different sets

Procedure: Demonstrate for the class by giving one child one of the large cards and the accompanying set of small cards. Ask him if he knows the names of the figures; point out the space on the large card and ask him to fill it with the small card that "goes with" the figures on the large card. Ask the child to explain his choice and ask if another of the smaller cards would go better.

Then distribute sets of cards to the entire class and let the pupils make their choices independently while you pass among the desks offering comments and asking several times in the course of this activity, so that each child grapples with a variety of problems.

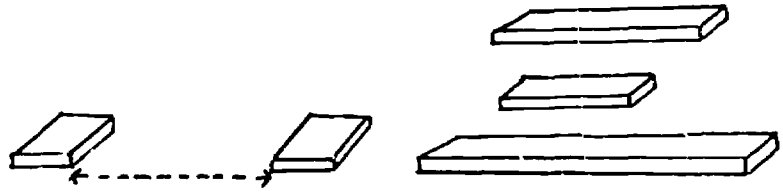




Fit A Space
(Estimation)

Materials: Floor blocks

Procedure: Place two blocks on the floor, and select three other blocks (two of them too short, and one a little longer than the space between the blocks placed on the floor.) Let the children estimate which will make a bridge across the blocks on the floor, and why they think so.



Footprints
(Estimation in Measurement)

Materials: Adult and children's rubber hands and footprints (Creative Playthings, Princeton, N.J.), (could also be cut out of thin foam rubber)

Procedure: Many types of activities can be devised to provide meaningful experiences for children in the realm of estimation. The following is an example which can be enlarged upon or varied in many different ways: Select a tall boy and short girl.....

"John" is tall. His legs are long. He can take Big steps.

"Susie" is short. Her legs are short. She takes Small steps.

How many steps do you think it would take John to get from (optional distance) to the wall? (Let children guess)

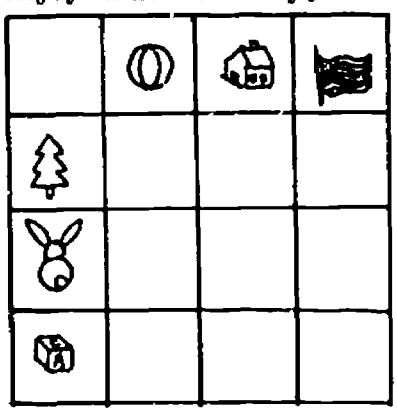
Guessing Game
(Location)

A quiet guessing game can be played by the teacher and the children with the teacher starting by saying, "I'm thinking of something in a box near me." The child who guesses correctly can ask the next question. This can develop into a game with more difficult clues.....but gradually!

Picture Matrix

Materials: Flannel board, ditto sheets

Procedure: This can be done with a flannel board, or developed into a large chart, or prepared for use on the overhead projector. Working with groups of children, they can take turns coming up and following directions. After concept is developed pictorially, (see illustration below) ditto sheets or charts can be used developing the spatial concept of first row, third column, etc. Children enjoy this activity.



Directions can be varied in both type of activity and degree of difficulty. Beginning with simple directions such as, "come up and put your finger on the bunny. Move your finger across the row until you find the box under the house. Good, now let's try it from the other direction. Put your finger on the house, then move down until you find the box that is on the bunny row. Beginning terminology should build on verbal concepts developed earlier (i.e. up, down, across) ideas of rows and columns should be developed later. Is it the same box? Yes, now let's try another." After the idea is well understood, you can ask children to come up and mark the box in some way, with an X or a colored circle, etc. Directions can become more complicated as the children progress (using colors, symbols of various kinds, etc.)

	1	2	3
1			
2			
3			

In later mathematics this becomes an important concept. It is also a good activity for developing pre-crossword puzzle concepts.

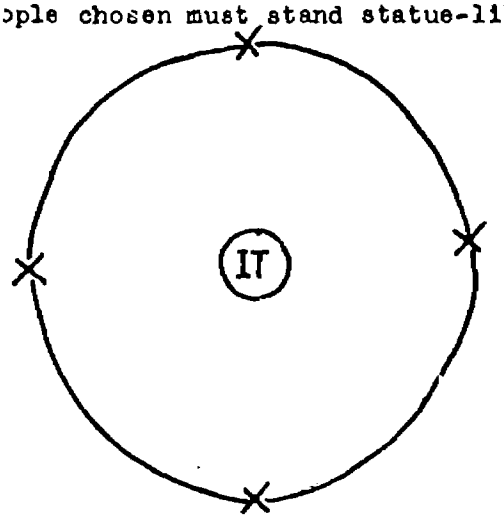
Who Sees My House?

This is a topic for conversation to help a child learn to relate himself to a point of view not his own. Say to the children: "Pretend you are the postman that comes to your house. Describe your house as the postman sees it."

If this activity is used with early kindergarten children, the instructions should be simplified. As each child leaves one afternoon, say to him: "Go home and pretend you are the postman. Each of you will tell the rest of us what your house looks like as your postman sees it." This activity may be changed by taking the point of view of the policeman, garbageman, meter-reading man, pilot, telephone lineman, etc.

It's A Point of View

Choose one person to be "IT" and four people to stand in a circle around him. "IT" and the other people chosen must stand statue-like without moving.



"IT" and the teacher pick out one of the children in the circle. The class now tries to guess which child they picked by asking "IT" questions that he must simply answer by "yes" or "no". All these questions must be based on whatever is in or out of child's vision without turning his head. The questions should be similar to:

"Can this person see your_____?
(eyes, toes, right hand, left foot, etc.)

Continue until enough questions have been answered so that the group can decide which child was designated.

Patterning with Pegboards

Have child copy a simple pattern, or do pattern completion using pegboards. Alternate colors or skip a space....begin with a very simple design.

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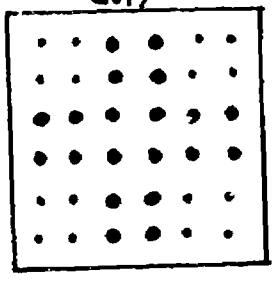

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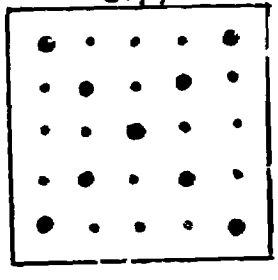

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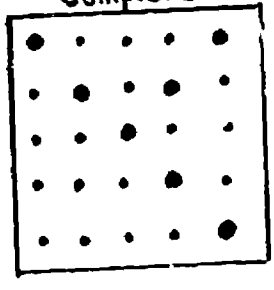
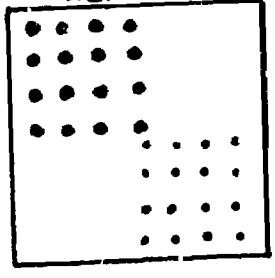


Reversal



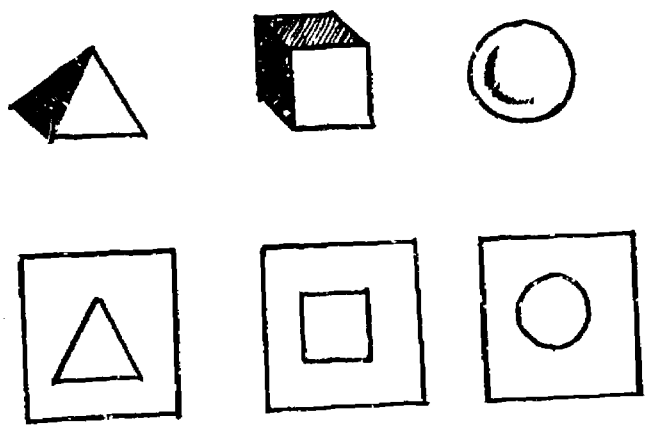
Have child copy but in opposite corner

3-Dimensional Matching
(Perspective)

Materials: One set of wooden geometric forms and set of cards with geometric shape outline pictures

Procedure: Let children match wooden shape to picture (or symbolic shape) of object. This can also lead to 3-dimensional picture matched to symbolic shape picture.

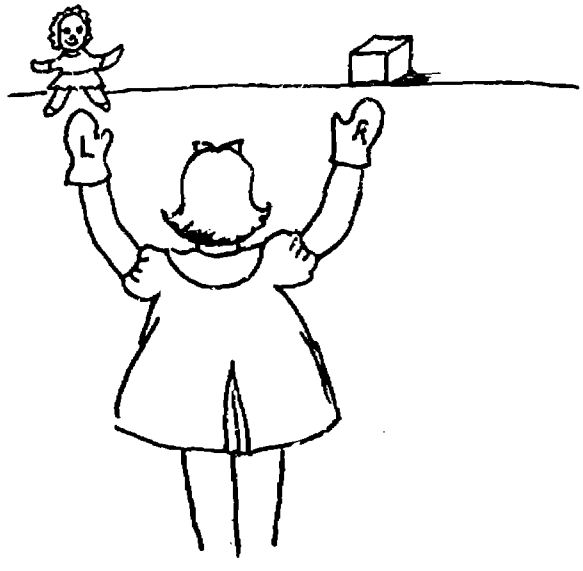
Variation: Let child choose a shape and tell all of the things that have that shape (i.e. circle = wheel, plate, ball, etc.).



Left-Right

Materials: Concrete objects, blocks, toy cars, etc.

Procedure: Place two (later increase number of objects, one at a time) toys on the table. Have children tell which is on the left of the other object (then vice-versa). (Left and right should have been experienced by the children in many motor activities and in relation to themselves before this activity is introduced in object to object relationships.)



ACTIVITIES EMPHASIZING AWARENESS OF TEMPORAL RELATIONSHIPS

Introduction

Temporal reasoning is concerned with the relationships between events rather than relationships between objects, and if, then, and because relationships of causality. Young children live in the "here and now" and have some difficulty with temporal order.

Relationships of time can be emphasized throughout the school day. Keeping a calendar, talking about today, yesterday, and tomorrow, as well as what

comes after juice time, all help reinforce the concept of temporal order. Small children often confuse time and size in their thinking...believing someone is older because he is bigger. Opportunities should be used throughout the day to make children aware of the sequence of events, such as daily activities following one another, listening to sequence in stories, relating time units to past and future as well as present.

Cause and effect relationships can easily be related to many activities in the daily program. (i.e. if the truck is pushed into the block building, it will fall down, or if you don't wipe your brush before you paint, the paint will run down the picture, etc.)

While conservation is concerned with lack of change despite change in appearance, causality is concerned with change...the cause and effect relationship.

MATERIALS

Clock
Large Hour Glass
Day-by-Day Calendar
Family Figures (grandfather, grandmother, father, mother, older brother, sister, baby)
Incubator and Fertile Eggs (a 21 Day Cycle)
Bulbs to Plant and to Watch Grow
Sweet Potato to Grow Vine (which can be measured at intervals)

Time concepts are extremely difficult for young children to grasp. The materials listed above are helpful in giving them concrete and observational experiences in temporal order, but it is up to the teacher to help the children see the relationship between the activity and time...relating to the past and anticipating the future, developing concepts of:

Oldest, youngest
Oldest, newest
Past, present, future
Temporal Units (seconds, minutes, hours, days, weeks, months, years, centuries)
Next, then
Fast, slow
What happened first, second, third.

TEMPORAL RELATIONSHIPS

What Next!
(Sequencing of Time)

Playing games involving the sequencing of events are helpful. Starting the day: 1st. child: I get up when my mother calls me.

2nd. child: First I go to the bathroom.

3rd. child: Then I put on my clothes.

4th. child: I eat breakfast next.

5th. child: I feed my dog.

6th. child: I brush my teeth.

7th. child: I comb my hair.

8th. child: Etc. until someone goes to school.

Then start another activity such as: "When we go on a picnic", "When we take a trip", "When we take a walk in winter", etc.

Packing a Suitcase
(Memory and Sequencing Game)

Use the old game of Packing a Suitcase or make up variations such as: 1st. child: "As I helped my mother last night, I set the table."

2nd. child: "As I helped my mother last night, I set the table and poured the water."

3rd. child: "As I helped my mother last night, I set the table, poured the water and carried out dishes." Etc.

How Fast Does the Sun Move?

Find a good place in the room, on the floor, where the sun shines every day. Using colored tape or some other materials, mark with a small piece so that children can observe the changes that take place.

Water Glasses

Materials: Four glasses of water, puppet, table

Procedure: Place four glasses of water on the table before the children; 1 glass full 1 almost full, 1 almost gone, 1 empty. These could be arranged as if drinking of filling the glasses. Pictures of glasses could be used. Use a puppet to initiate group story of Mortimer coming in thirsty from play.

Variation: This same pattern can be used with graham crackers, partially and fully blown balloons, plant growing, etc.

Picture Cards
(Picture Sequencing)

Materials: 4 picture cards

Procedure: Give children with simple representational pcitures of familiar nursery rhymes or simple stories illustrated for them to bring to the front of the class as poem or story is told.

Example: "Hey diddle diddle,
The cat and the fiddle,
The cow jumped over the moon.
The little dog laughed to see such sport,
And the dish ran away with the spoon."

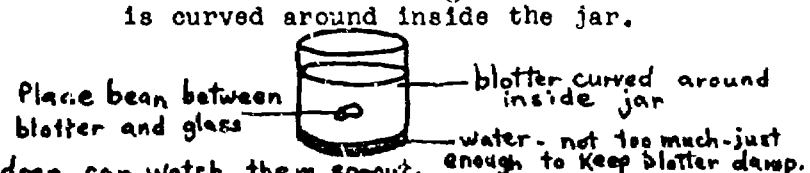
Story Cut Ups
(Listening for Sequence)

See Story Cut Ups listed under Seriation on p. 88 .

Growing Lima Bean Sprouts

Materials: Jar, dried lima beans, blotter paper

Procedure: Just put enough water inside the jar to keep the blotter damp. Place bean between blotter and glass. The blotter is curved around inside the jar.

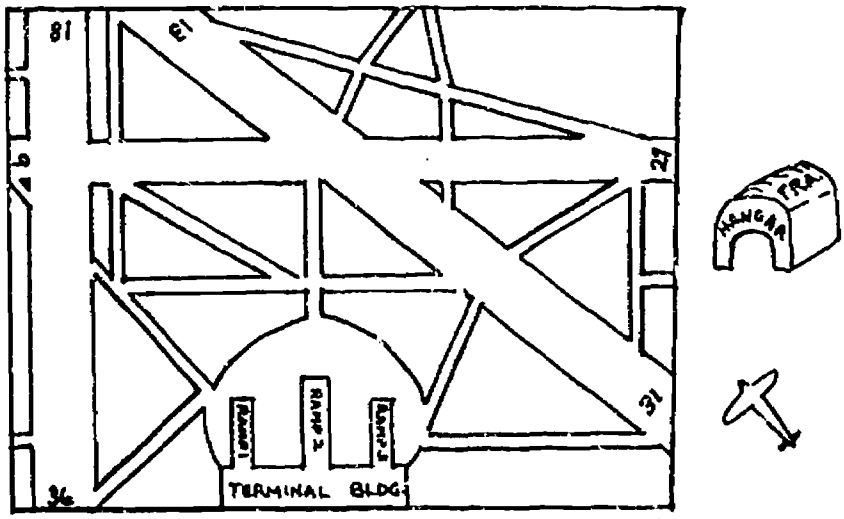


T

The Airport
(Maze)

Materials: This can be painted on a sheet of plastic (for more permanence) or laid out with strips of paper on the floor, an inverted box (open ended) can serve as the hangar, a small wooden plane is to be maneuvered

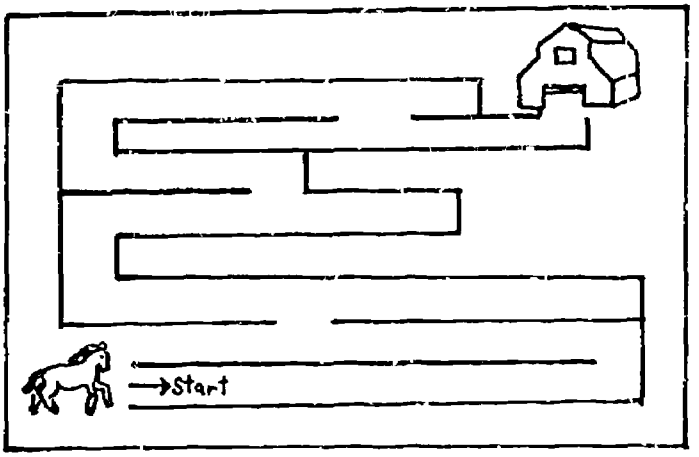
Procedure: Plane can be coming in on any designated runway and because it is late (or needs gas) must find the most direct way to the airport building to deplane the passengers and then go on to the hangar. To vary the game hangar may be moved into different positions on the field.



Variation: Other maze-type activities can be constructed to be used in this way with block houses and streets.

Large charts can be made with more complicated paths to be followed (the horse going to the barn, etc.). The child can trace these with his finger, or better still, cover the chart with a large sheet of acetate and let child use marking crayon (which will wipe off so the next child can work on same maze).

(See Mazes under Eye-Motor)



Let's see how close we came to guessing. (Have John take big steps from a marked starting point to the wall while children count. Now, will Susie take more steps or fewer steps than John? (Be sure to ask children why they think the way they do...have them try to justify their estimations.) Then have Susie walk in her small steps to the wall while the children count. (Why did it come out this way)?

Variations: Floor blocks of different length, etc. are good materials for providing other estimation activities.

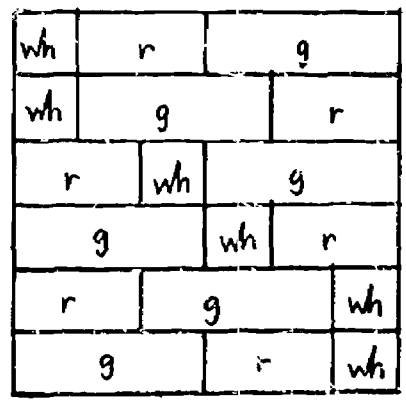
Trains
(Pattern Discovery)

Materials: Cuisenaire rods

Procedure: Give child a group of several white, red, and light green rods. Ask him to make a train, using one of each color, and after he has completed his task, ask him to see how many other patterns he can make with the three rods, by changing them around in order.

(See illustration on following page)

This is an important concept in later mathematics (the idea of permutation). It also lays a ground work for combinativity, for when rods represent number, white, red and light green will signify 1,2, and 3 and the sum will be 6 regardless of the grouping arrangement.



CAUSALITY

Causal relationships are particularly difficult for children to grasp because there is more abstract relationships between the "if" and "then" (or cause and effect).

During the course of the daily program teachers can take advantage of many opportunities to point out the if and then relationship, such as "if you push your juice glass too fast, then it will spill". "If you will sit down, then I will read you a story". "If yo put your boots together when you take them off, then you will be able to find them later"., etc.

Answering "why" questions with "because" answers also helps in the development of causality. Mathematically, many opportunities can be developed. (i.e. if we add 1, then we have 1 more, or 2; or if we take one away then we have 1 less, or 0).

Many simple science experiments can be done illustrating causality factors, also taking advantage of first predicting outcome, then following it up by actual experimentation.

Ice Cubes

Materials: Ice cubes, foil plates

Procedure: Put several ice cubes in shallow foil plates. Ask the children what would happen if you put one in the sun? Why? What would happen if you put one on the radiator? Why? What would happen if we put one in the sun, but covered it with a book? Why? What would happen if we put one in the refrigerator? Why?

Which one would melt the most? Which the least?

Then do it and leave them for about 5 minutes, letting children watch (except the one covered by the book needs to remain covered, also it wouldn't be practical to stand and watch the one in the refrigerator...but peeks could be taken). Afterwards go over the results remembering to say "if we did... then this happened."

Hot and Cold

(Heat melts, Cold changes back to solids)

Materials: Candles, paraffin, crayon, paper cups wicks

Procedure: Allow children to handle some candles and paraffin. Then melt the candles, paraffin and crayon, letting them watch the change of form take place, from solid to liquid. Then pour liquid into paper cups, place a weighted wick (which had been dipped first into cup,) place it in refrigerator until hard. Let children examine candle you made, light it and watch it melt again.

Burning Candle

(What happens when you cover a burning candle with a glass?)

Materials: Candle, empty tuna can, glass chimney

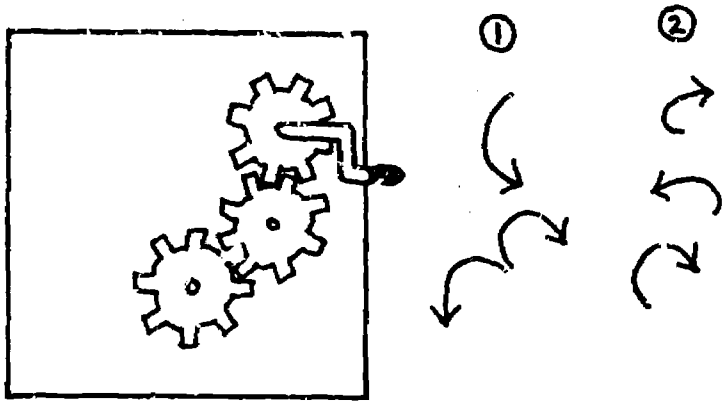
Procedure: Place a warming candle in an empty tuna can. Light it, watch it burn. Place a glass over the candle. What happens? Light it again, this time placing a glass chimney in can. What happens? Why? See if the children can figure out the difference in why the candle goes out when a glass is put over it, and does not go out when a glass chimney is put over it.

If children seem to understand this concept, another can be fixed with holes punched around lower edge (allowing air to enter) then light candle and cover it with the jar. Why doesn't the candle go out like it did in the other experiment? What happens when you blow on the lighted candle with and without the chimney? Why?

Gear Box

This can be purchased, and should be a simple one with few gears. Ask children what makes the wheel turn, why, and later predicting which direction it will turn if the wheel turned when the crank is turned in a certain direction? This can provoke some stimulating thought.

Variation: Have an old clock you can look into from the back and see all the fly wheels.



What If?

Materials: None

Procedure: What would happen if: 1. we forgot to put the covers on paint jars?

2. we did not put paint brushes in the right paint jars?

3. we didn't take turns talking?

4. I put too much air in the balloon?

5. I put ice cubes on the table on a hot day?

6. I put some pins near a magnet?

7. I look at an object through a magnifying glass?

8. I put some salt or sugar in a glass of water?

9. I don't take proper care of my teeth?

10. I put some water on the stove and turn on the heat?

Let's Think

Materials: None

Procedure: The teacher begins an informal story, stopping at a crucial point with a question.

Example: The family went on a trip in the car. After they had passed through a town, Dad said, "My, there must have been a big windstorm and a great deal of rain in that town?" How could Father know that?

They went through another town. Mother said, "My, this town hasn't had any rain for a long time." How did Mother know that?

Things Grow Shorter After Use

Materials: Mimeographed worksheet containing pictures of eraser, chalk, book, candle, pencil, sucker, fountain pen, etc.

Procedure: Children mark items that grow shorter after use. Have them give a reason for choice.

What Happens?

Materials: None

Procedure: Have child finish the following sentences.

1. When you are angry, you scowl but when you are happy you_____?

2. When you are sleepy, you go to bed, but when you are wide awake, you_____?

3. When you get your milk carton, it is full but after you have finished drinking the milk, it is _____?

4. When it rains the ground is wet, but after the sun has been out for a while, the ground is _____?

Class Activities Inventory

Concept Development

	Age						
Understands Prepositions (in, under)	2½						
Names action word for agent	3						
Labels own drawing	3						
Understands-"bigger-longer"	3½						
Understands-"heavier-more"	4						
Defines in descriptive terms	4-5						
Completes opposite analogies	4						
Points to "prettier"	4½						
Asks meaning of words	5						
Tells if-morning or afternoon	5						
Names pennies, nickle, dime	5						
Defines object by category	5+						
Names circle, square, cross	5+						
Indicates day of week	6						
Tells how things are "different"	6						

COMMERCIAL MATERIALS

American Guidance Service, Inc.; 720 Washington, S.E., Minneapolis, Minn.: Peabody Language Development Kits, I and II.

Continental Press; Elizabethtown, Pa.: Dittos.

Constructive Playthings; 1040 E. 85th., Kansas City, Missouri. Fractional Pies (wood).

Creative Playthings; Princeton, N.J.:
- Day-By-Day Calendar
- Family Figures
- Fractional Fruit
- Fun Stik
- Games and Puzzles
- Incubator
- Jumbo Hour Glass
- Measuring Devices
- Plastic Hopscotch
- Rubber Hands and Feet
- Scales

Educational Testing Service; Board of Education, N.Y.:
- Card Games
- Sequence Cards
- Instructional and Assessment Materials for First Graders
- Let's Look at Children

Follett Publishing Co.; 1010 W. Washington Blvd., Chicago, Illinois: Picture Cards; Come and Count
Come and Hear.

Harper & Row Publishers; Evanston, Illinois: Pre-Number Series: Books A,B, and C.

COMMERCIAL MATERIALS (cont'd.)

Houghton-Mifflin Publishers; ' Part Street, Boston, Mass.: Modern School Mathematics (Kindergarten Level).

Ideal School Supply Co.; Chicago, Ill.: Pictures: Classification and Opposites.

Instructo Products Co.; Philadelphia, Pa.:
New Math Readiness
Magnetic Primary Counting Shapes
Opposite Concepts
Rhyming Pictures
Classification
Water Transportation
Air Transportation
Cars and Trucks
Animals (Farm, Domestic, Wild)

Prentice-Hall; Englewood Cliffs, N.J.: Advantage: A Program for Pre-school Children.

S.R.A.; 259 E. Erie, Chicago, Illinois: Exploring Number and Space
Learning To Think Series: Red Book, Blue Book, Green Book and Gold Book.

BIBLIOGRAPHY

Fostering Intellect in Young Children: Teachers College Press; Columbia University, N.Y. 1962.

Early Childhood: Alfred Knopf; N.Y. 1967

Intellectual Growth in Young Children: Schocken Books; N.Y. 1966.

New Directions in the Kindergarten: Teachers College Press; Columbia University, N.Y. 1965.

Predicting Reading Failure: Harper, Row; N.Y. 1966.

Revolution in Learning: Harper ,Row; N.Y. 1966.

The Remediation of Learning Disabilities: Fearon Publishers; Palo Alto, Calif. 1967.

Young Children's Thinking: Chittenden & Miller; N.Y. 1966.