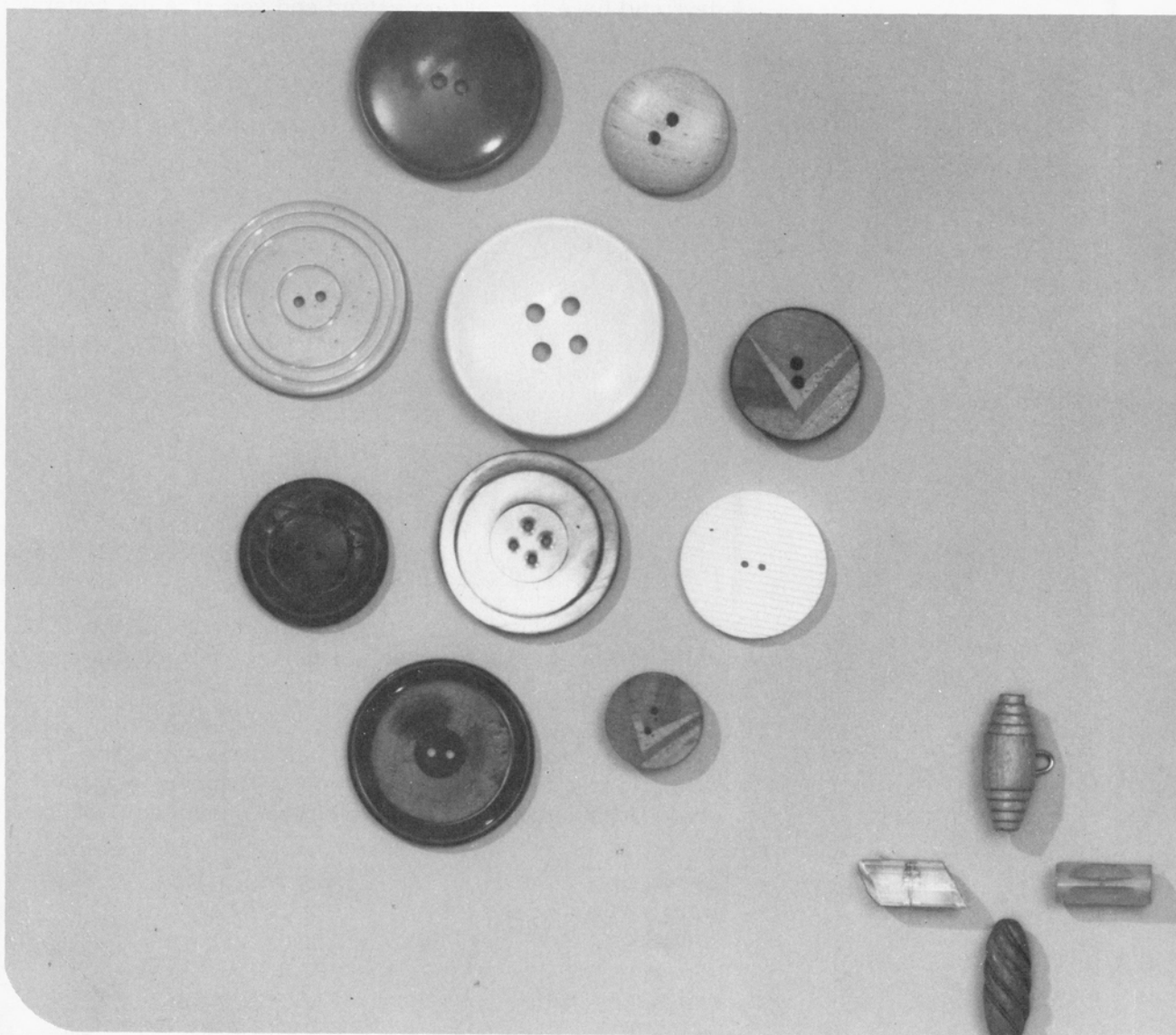


SORTING AND CLASSIFYING



SKILLS AND CONCEPTS

Divergent thinking
 Observing similarities and differences
 Making comparisons of size, shape, color, and detail
 Developing language skills
 Relating abstract ideas to their concrete existence in the real world

**SELF CONCEPT AND
SOCIAL INTERACTION**

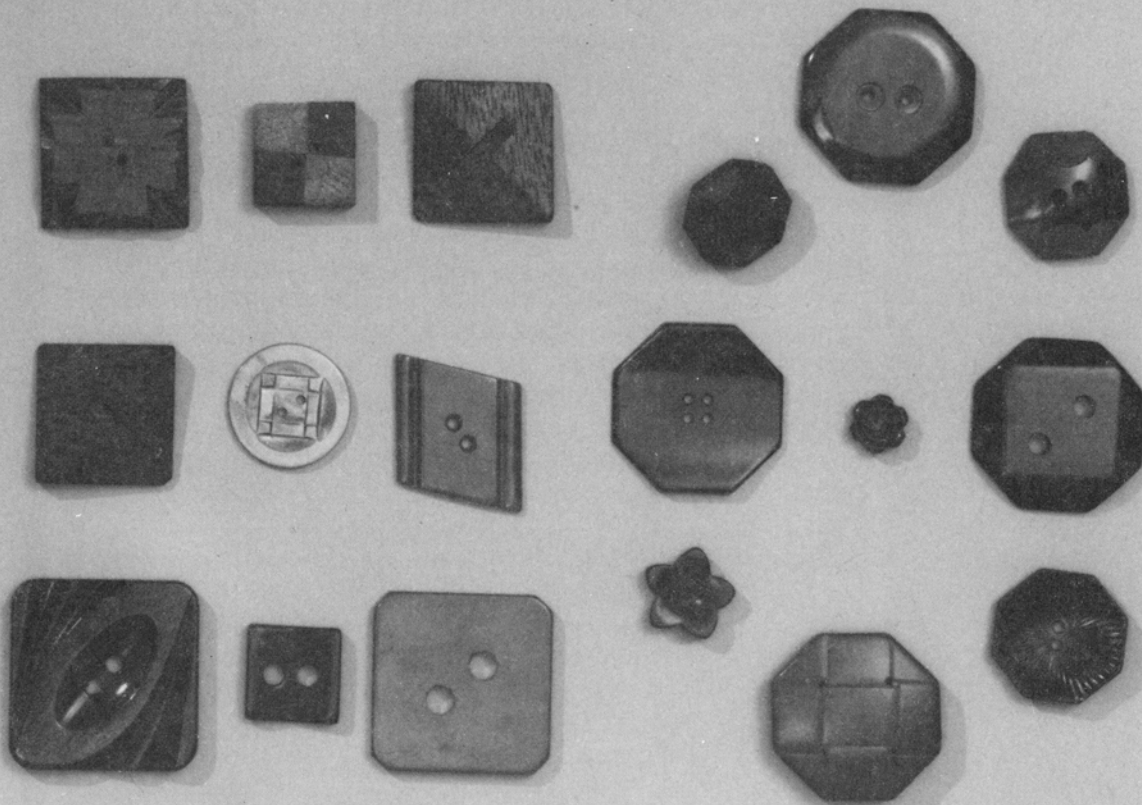
Accepting the responsibility of one's own actions by learning to operate in an independent, self-directed manner
 Developing greater awareness of self and others through recognition of personal attributes, skills, and preferences
 Experiencing many different, equally interesting, equally valid solutions to a problem

FUTURE APPLICATION

Spontaneous recognition of attributes and classifications in the real world
 Making graphs
 Logical thinking
 Sorting systems used by scientists, librarians, managers of retail stores, and others
 Understanding set theory

**PREREQUISITE
CHAPTERS**

Free Exploration



Sorting and classifying are fundamental parts of life. People use sorting when determining what kind of a dog they see, when recalling a politician's name, or when getting another person a screwdriver. People use sorting when they put away the dishes, select cat food at the grocery store, or pick out the appropriate coins to buy an ice cream cone.

The importance of sorting and classifying activities in children's mathematical development is critical. Through these activities children learn to think analytically and to express their thoughts clearly. Forming classes and dealing with the relationships within a class and among different classes encourages the growth of clear and logical thinking, which is the basis of good mathematical reasoning.

In order to sort and classify a group of objects, a child must recognize what is called an *attribute*. This is an intangible idea describing a particular property which some objects have in common. To sort some of the objects, children focus on one property the objects possess to the exclusion of the others.

Describing the attribute with words labels the groups that have been sorted and placed together.


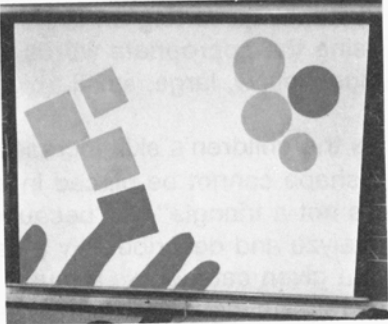
The activities in this chapter give children a wide variety of experiences in sorting and classifying with both structured and unstructured materials. The children sort geometric shapes, junk boxes, materials from the natural environment, one another, geoboards, and other commonly available materials. Each material is sorted in a variety of ways and the necessary vocabulary describing the relationships of size, shape, color, texture, and other properties is developed concurrently.



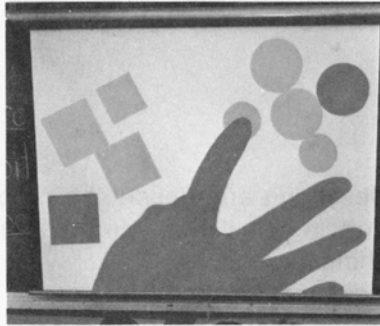
Sorting on the Overhead Projector

SKILLS	Observing and describing properties of objects Noticing similarities and differences Thinking logically Making predictions Drawing conclusions
MATERIALS	Geometric shapes (see Worksheets 20–21) for the overhead projector*
ACTIVITY	The teacher defines the categories by which the children are to sort the shapes. Then the children respond to the teacher's questions indicating whether or not a shape can be placed in a group.

SAMPLE TEACHING STRATEGY

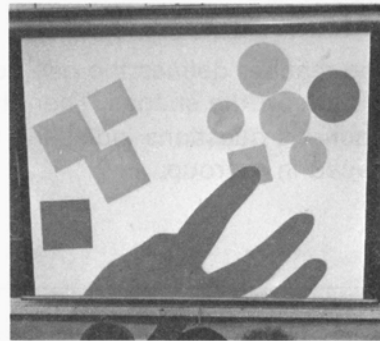
TEACHER	CHILDREN
<p>The teacher puts three squares together and three circles together on the overhead. Taking an additional square the teacher asks, "If we want to put all the squares together and all the circles together, can this go here?"</p> 	<p>"No."</p>
<p>"Can it go here?"</p> 	<p>"Yes."</p>

"How about this shape,
can it go here?"



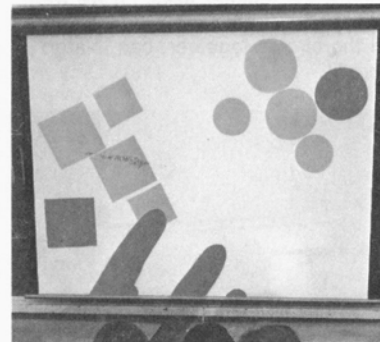
"Yes."

"And this?"



"No."

"How about here?"



"Yes."

Continue to question the children until all the red and blue shapes have been sorted. During the next few days repeat this activity, sorting on the overhead by color, size, or shape, using the appropriate words to describe the attributes: red, blue, yellow, large, small, (big, little), circle, square, triangle.

As the children's skill increases, encourage them to say *why* a shape cannot be placed in a certain category ("because it's not a triangle" or "because it's not yellow.") Being able to analyze and describe *why* a particular item cannot be placed in a given category is a much higher level language skill than merely stating yes or no. Nevertheless, this is a very worthwhile skill to help children develop slowly over time.

People Sorting

3

**SORTING
AND
CLASSIFYING**

SKILLS _____

Connecting an abstract idea to the real world
Observing and describing properties of objects
Comparing
Solving problems
Making predictions
Drawing conclusions

MATERIALS _____

A black and a white Unifix cube for each child

ACTIVITY _____

The teacher explains the categories for sorting and asks three or four children to follow each arrow. This gives the children several examples of sorting within the designated categories. Then about ten more children are chosen to be sorted, one at a time. The other children predict the direction they think each child should take in order to conform to the category, by displaying their white or black Unifix cube.



SAMPLE TEACHING
STRATEGY

TEACHER	CHILDREN
"We are going to sort ourselves by the kind of shirts we are wearing. All the children who are wearing pullover shirts will follow the black arrow. John has on a pullover shirt. John, will you please stand up?"	John stands up.
"Does a pullover shirt have any buttons on it?"	"No."
"Who else do you see wearing a pullover shirt?"	Someone suggests Ronnie and David, and they both stand up.
"All the pullover shirts are supposed to follow the black arrow. Which arrow should John follow?"	"The black one."
"And what about Ronnie and David?"	"The same one as John, the black one."
"Off you go then."	The three children walk past the black arrow and stand together.
"Now we need to find some children wearing shirts that button down the front. Whom could we ask to stand up?"	"Susan and Donna. Yeah, and Peter and Jack too." (Each child stands as his name is mentioned.)
"These people should follow the white arrow and stand together. Are they going to be on the same side as John and David and Ronnie?"	"No, on the other side."
"Yes, the opposite side. Okay, follow the white arrow."	Each child walks past the white arrow and stands with the others.
"What color arrow did the children with pullover shirts follow?"	"Black."
"Will you show that Unifix cube."	The children show their black Unifix cube.
"And what color arrow did the children with shirts that button follow? Will you show me that color Unifix cube."	The children show their white Unifix cube.
"Now I'll call one name at a time. As soon as your name is called, please stand up. We'll look at your shirt and decide if it is a pullover or a shirt that buttons. If it's a pullover, you'll show which color?"	"Black."
And if it's a shirt that buttons, you'll show . . ."	"White."
"Catherine."	Catherine stands up and the children say, "pullover," and show their black cube.
"Okay, Catherine, go to your group."	Catherine follows the black arrow and stands beside the other children who have on pullover shirts.
"Mark"	Mark stands up. The children say, "pullover," and leave their black cube showing.

The activity continues until ten or fifteen children have been sorted into the two groups.

Repeat this activity many times, changing the categories each time. The children can sort themselves by pants and dresses, by boys and girls, by long and short sleeves, by taller than John and shorter than John, by clothes color, by full length coats and jackets, by sweaters and no sweaters, etc. The teacher can choose any categories that the children can perceive visually. (Do not use categories such as “can jump rope and can’t jump rope” or “knows phone number and doesn’t know phone number” because, in addition to introducing the concept of success and failure, such attributes cannot be ascertained visually and hence they eliminate the ability to predict).

When the children are very confident in sorting shapes on the overhead projector as well as one another and can use the words which describe these sortings, they are ready for a more difficult level of these activities: "silent sorting." This demands a great deal more reasoning ability. In previous activities the attributes were clearly stated; now the children will be asked to abstract the attribute from the visual evidence.

Put a star on the board as a signal that no one is allowed to talk during the game, not even the teacher! The teacher determines the categories for sorting and places all the shapes on the overhead accordingly. Then the star is erased and the children discuss how the sorting was done: by size, shape, or color. When working on people sorting, the teacher motions to one child at a time to follow a particular arrow until three or four children are sorted into each category. Then the children predict with their black and white cubes which arrow each additional child will follow.

Junk Box Sorting

SKILLS_____

- Sorting objects by their properties
- Noticing similarities and differences
- Applying an abstract idea to the real world
- Thinking logically
- Making judgments
- Describing the properties used to sort a group of objects
- Finding different solutions to a problem

MATERIALS_____

Junk boxes*

ACTIVITY_____

The teacher works with groups of six children sorting one material in a variety of ways.

Set up activities in reading, art, free exploration, and pattern for the rest of the class to work on independently and allow the children to change tables and activities when they want to. Explain to the class that what you are going to be doing will take your full attention, so they must not interrupt you during the entire period. Be careful to choose activities which the children are familiar with to insure your class will work independently and not interrupt you.

Try to be flexible and allow the level of involvement in each group you are working with, rather than the clock or the rest of the class, to determine the length of time you spend together.

Work with one group of six children for an entire work period each day (30-40 minutes), and by the end of the week you will have worked with every child in the class.

At one time I tried to "get everyone in" in two or three days, taking several groups for a short period each day. I found myself concerned with rotating everyone through my station rather than with observing each child in depth. One group a day helps me to think more about individual children and thus to learn more about each child's cognitive and language development. The time I spend observing the children for this longer period enables me to know more about the children at the end of a week than I otherwise know at the end of three or four months.

Arrange your class in groups of six with your most verbal children together. When the more verbal children are mixed randomly with children who are less verbal, the former tend to dominate the group so that it takes longer to get to know all of the children well.

<u>Highly verbal</u>	<u>Average</u>	<u>Less verbal</u>
John	Jack	Cathy
Carol	Donna	Susan
Donna Sue		Laurie
		Jim



TEACHER	CHILDREN
"I'd like everybody to sit on hisorher hands while I dump this box of junk on the table.	The children sit on their hands.
<p><i>This would be totally inappropriate if the children had not explored the material extensively on their own. These earlier opportunities have given the children time to handle objects, to talk about them, to notice details, to stack them up, to arrange them in patterns, and so on. Now the children should be ready to build on their previous experience and perform on a more abstract level, verbalizing without touching the objects before them. Asking the children to sit on their hands forces them to answer questions with <u>words</u> rather than by pointing to the objects.</i></p>	
"Can you tell me something about the lids?"	"White"
"Are they all white, or are just some of them white?"	"Just some of them."

"Could you all help to put the white lids here?"	"No, you told us to sit on our hands!"
"It's okay now, but thanks for reminding me."	The children put all the white lids together.
"Does everyone agree with everything in this group? Are all the lids white?"	"White, white, white, white, yeah, they're all white."
"Okay, now, let's look back at our original group. Sit on your hands again and think. What other color lids are there?"	"Red." "Yellow." "Blue." "Black."
"Now let's arrange the lids so that each color is grouped together."	The children put all the red, yellow, blue, and black lids together.
"Do you all agree with the groups?" Are there any lids you don't think belong in any of the groups?"	"This one's too dark; it doesn't go here. Yeah, but it's still yellow, even if it's dark. Right. I agree with John. Not me, I think it's mustard, not yellow."
<hr/> <i>Whenever there is a disagreement like this about where an item belongs, we discuss it for a few minutes and then vote to decide where we will place the item. I am very careful not to indicate that the minority opinion is "wrong" because in these activities there is no right and wrong. The important thing is that we discuss different opinions and reach a group agreement. Exactly what the group decides finally is still arbitrary.</i> <hr/>	
"Let's vote to decide where the majority wants this lid placed. Raise your hand if you think this lid should go here with the yellow lids."	Four children raise their hands.
"Raise your hand if you think it belongs over here in a group by itself."	Two children raise their hands.
"This time more people want this lid to go with yellow, so we'll leave it here. It would have been just as right to have put it in a group by itself called mustard color."	
"These are all the . . ." (the teacher puts his/her hands around one group of lids)	"blue lids."
"And these are all the . . ."	"yellow lids."
"And . . ."	"the red lids."
"And . . ."	"the white lids."
"This time we sorted the lids by . . ."	"color."
The teacher pushes all the lids back into one big pile. "Sit on your hands again and think. That time we sorted by color. Can you think of another way to group the lids?"	"by big and little."
<hr/> <i>If you don't get a category response to this question, attempt to suggest an attribute by asking such a question as, "Are all the lids the same size?"</i> <hr/>	
"Put all the big ones here and the little ones over there."	The children work together sorting the lids into two sizes.

If any disagreements arise as to the placement of a lid, we vote. Sometimes the children want to make a third pile for the middle-sized lids. Don't impose this; merely watch to see how each group of children solves the problem.

"Is everyone happy with the grouping?"

"Yes."



"These are all the . . ."

"big ones."

"Who knows another word that can be used to describe the big ones?"

"Large."



"And these are all the . . ."

"Little ones. You could call them small, too."

"The last time we sorted the lids by color. This time we sorted them by . . ."

"big and little."

"Yes. Do we call that sorting by shape or by size or by color?"

"By size."

The teacher pushes all the lids back into one big pile. "Sit on your hands again and think. What else do you notice about the lids?"

"This one's got catsup on it."
(Giggle, giggle)

"Could we find all the ones that aren't clean and put them over there and put all the clean ones here?"

The children separate the clean and dirty lids from one another.

It is important to work with the children's suggestions, even if they sound silly, because children need to experience over and over again that in school their ideas and their way really count. We are trying to fit learning to the children, not make the children fit into some mold that an adult judges to be the "right way."

Continue to push the lids back together and ask the children to come up with new ways to sort the lids. During this period the children might sort the lids with and without writing, with and without liners, by tall and short lids, with or without prices and so forth. The children derive much more benefit from exhausting the possibilities of sorting one material than from sorting many different materials in one way only. This method encourages the children to think creatively and allows them to experience many different “right” possibilities, an important concept for creative problem solving in mathematics, science, art, and daily living. On the following day, work with the second group of children in the same way, choosing a different material to sort.

This will keep you fresher and more alert. It will also help you differentiate among the groups. If every group sorts lids, all the children blend together by the last day. Keep in mind it is not important what material is sorted; it is the process of sorting that is important.

When you have worked with all of the groups, you should have an idea of how each child is progressing in language development and in understanding the process of sorting and classifying. Make a list of the children you feel need special guidance and the children who can manage without much assistance. During the next two weeks allow the children to sort on their own in groups of three or four. Each work period the children should choose a different material, sorting it in as many ways as possible. Children at different levels of language skill should now work *together* so that those who are more confident and those who are less confident have the opportunity to learn from one another. The teacher moves from group to group assisting when necessary, concentrating the bulk of his or her attention on the children needing special guidance. The children can sort leaves, buckles, spools, nuts and bolts, shells, bottle caps, keys, tiles, buttons, small toys, jar lids, collections of foreign money, old pencils, rocks, postage stamps, and so forth. At the end of each work period the children who wish to should have an opportunity to share the categories they used with the whole group.



APPLICATION AND EXTENSION OF SORTING AND CLASSIFYING



The following activities allow the children to explore sorting and classifying in a variety of ways—sorting by given categories as well as guessing the categories used for various sortings, observing attributes in the environment, in children's clothing, and in their names. These activities should be spread out over the year and be repeated many times. As children's skill increases, the same activity becomes a new experience and is carried to a new depth of understanding.

Read My Mind

- SKILLS** _____
- Analyzing and describing the common properties of a group of objects
 - Noticing similarities and differences
 - Problem solving
 - Thinking logically
 - Making predictions
 - Organizing information
- MATERIALS** _____
- Geometric shapes* (see Worksheets 20-21), a black and white Unifix cube for each child, one piece of black construction paper, and one piece of white construction paper
- ACTIVITY** _____
- Explain to the children that this is a silent game and put a star on the chalkboard as a signal. No one is allowed to talk until the star is erased, not even the teacher!
- Place some shapes on the white construction paper and some other shapes on the black construction paper according to certain common attributes. Hold up a shape you are about to place and indicate first one pile and then the other, looking questioningly at the children. The children try to read your mind and predict where you will place each additional shape. When the children have predicted with a Unifix cube, place the shape in the appropriate group.
- Continue in this fashion until all the shapes are placed. Because this is a silent game, each child has the opportunity to think for himself or herself. The teacher can tell at a glance which children have discovered the attributes in

question by glancing at the cubes. Observing which children do and which do not yet abstract the rule used is a good opportunity to watch the idea of sorting and classifying develop.

When all the shapes have been placed, erase the star from the chalkboard and talk about the attribute used to create each group. Ask the children such questions as, "Did I care about the color when I sorted this time? Did I care about the shape? The size? The thickness? Are there any shapes on the white paper that are not on the black paper? Where are all the shapes that are not triangles?"

Repeat the activity many times, sorting by thick and thin shapes, by blue and other than blue shapes, squares and other shapes, and by large and small shapes. Consider using two attributes and varying one; sort small blue shapes and large blue shapes, thick red triangles and other thick shapes, large red rectangles and small red rectangles, etc.



By changing the chalkboard star signal to an audible signal and by allowing a visually handicapped child to feel the foam shapes, as in the above photo, this activity can be adapted for use with blind children as well as with sighted ones.

Sorting and Classifying Walks

SKILLS

Connecting an abstract idea to the real world
Selecting objects with a particular property
Comparing
Making judgements
Stimulating visual imagery
Using all the senses to gain information

MATERIALS

Paper and crayons (optional)

ACTIVITY

This activity basically involves going for a walk with a purpose in mind. There will be greater opportunity for language development if you arrange for volunteers or older children to come along and form the children into small groups. Before leaving the classroom, decide what the children are going to look for, listen for, or collect.

This activity should be repeated many times, changing the focus of the walk each time. Children might look for: diagonal lines, straight lines (both vertical and horizontal), curved lines, squares, triangles, rectangles, anything green (or any other color), things made of metal (or glass or wood or plastic), things that move, things that are rusty, things that look new, signs with numbers, signs with words, different vehicles (cars, trucks, vans, buses, tractors), rough-textured things, delicate things, old things, things that are wet, sounds heard in different places (in the office, in the hallway, in the cafeteria, on the playground, in the classroom), things that are bigger than _____ (or smaller than _____), and things that could be held in one hand. The possibilities are limitless.

Sometimes the children should just *talk* about the things they found with the particular attribute. At other times the children should take paper and crayons with them so that when any of them notices something yellow (if that is the appropriate attribute) sheorhe can stop and draw a picture of the object while the rest of the group continues searching. When the child is finished drawing, sheorhe can catch up with hisorher group. Back in school, the children make a class book of their drawings for the attribute explored on the walk.

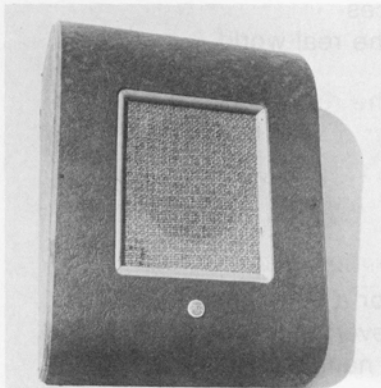
At other times the children should go on a sorting walk and when they *return* to class, draw from memory what they noticed with the attribute.

These alternatives represent three different levels of abstraction and skill. Five-year-olds might only talk about what they find, remaining at the first level all year. Six-year-olds might start at this level but feel comfortable at the second level

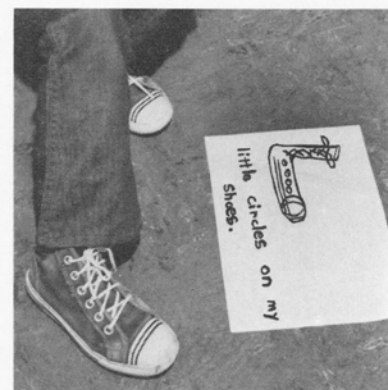
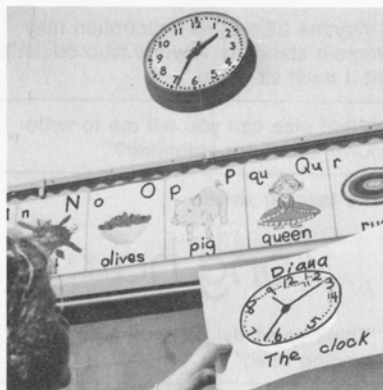
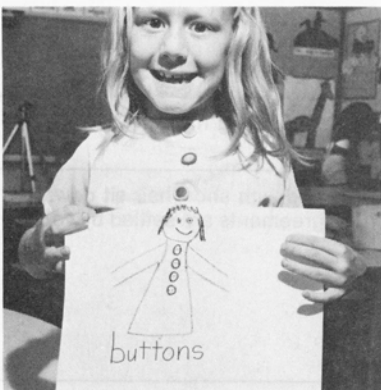
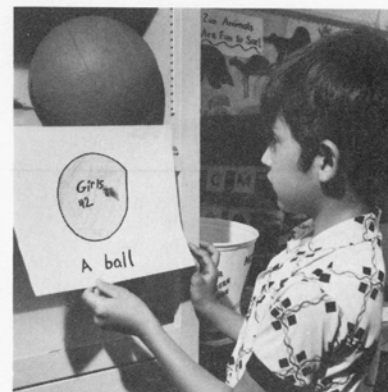
after a few weeks. Seven-and-eight-year-olds could start at the second level and then on an individual basis choose when they want to try the third level.

3

SORTING AND CLASSIFYING



"Round"



Sorting and Classification Walks

Descriptions

SKILLS _____

Observing and describing properties
Noticing similarities and differences
Connecting an abstract idea to the real world
Solving problems
Making predictions
Comparing
Drawing conclusions

MATERIALS _____

Cards for writing attributes

ACTIVITY _____

Assemble the children and ask for a volunteer. This child stands apart from the group so everyone can see him or her. The class describes the child by naming visual attributes. When other children do not possess the suggested attributes, they sit down until the volunteer is the only child left standing. The teacher writes the attributes on cards as each is mentioned.

SAMPLE TEACHING STRATEGY _____

TEACHER	CHILDREN
"Everyone stand up. What can you tell me about our volunteer?"	"She's a girl."
<p>The teacher writes</p> <p>a girl</p> <p>"Anyone fitting this description may remain standing. Anyone who doesn't fit it must sit down."</p>	All the boys sit down.
"What else can you tell me to write down about our volunteer?"	"She's got long hair."
<p>The teacher writes</p> <p>long hair</p> <p>"Think carefully; can you remain standing now?"</p>	The girls with short hair sit down. (Disagreements are settled by voting.)
"What else can you tell me?"	"Martha's got black shoes on."
<p>The teacher writes</p> <p>black shoes</p>	The children with black shoes remain standing, those with shoes of other colors sit down.
"What else can you tell me?"	"She has a ring on."
<p>The teacher writes</p> <p>wearing a ring</p>	The last two children standing sit down, leaving only the volunteer.



Repeat this activity many times, using a different volunteer each day and continuing the descriptions until only the volunteer is left standing.

For an interesting extension of this activity, mix up the cards with the attributes, draw one at a time, and play the game again to see what happens when the order is changed. The cards can be shuffled again and again, and the children can attempt to predict the conclusion.

Sorting by Senses

SKILLS _____	<p>Observing and describing properties of objects</p> <p>Noticing similarities and differences</p> <p>Connecting an abstract idea to the real world</p> <p>Comparing</p> <p>Using all the senses to gain information</p>
MATERIALS _____	<p>Assorted foods to taste, familiar objects to touch, jars of food or spices</p>
ACTIVITY _____	<p>The children taste bits of popcorn, lemon, pickle, candy, grapefruit, red hots, peanuts, coconut, pizza, pretzel, and clove gum and describe each taste verbally as sweet, sour, spicy, or salty.</p> <p>Having used the sense of sight extensively in sorting and classifying, introduce the other four senses separately and in combination.</p> <p>Children focus on the sense of touch when blindfolded. If another child places objects in their hand one at a time they judge them by texture, weight, size, shape and describe the attributes they feel.</p> <p>The children focus on the sense of sound by closing their eyes and telling if a noise is near or far, loud or soft. Children enjoy selecting five children to stand at the front of the room and then with their eyes closed guess which of the five says a word, a sentence, or sings part of a song.</p> <p>The children can focus on the sense of smell by passing around jars to smell and then identifying the items by categories.</p>

Tiptoe: A Sorting Game

SKILLS _____	<p>Selecting objects with a particular property</p> <p>Following directions</p> <p>Solving problems</p> <p>Comparing</p> <p>Using all the senses to gain information</p>
MATERIALS _____	<p>Geometric shapes*</p>

ACTIVITY _____

A group of three or four children spread the shapes out on the floor and follow the teacher's directions one after the other:

"Step on all the squares." (Or any other shape)

"Step on all the blue shapes." (Or any other color)

"Step on all the thin shapes." (Or thick)

"Step on all the large shapes." (Or small)

"Step on all the thick and thin shapes." (Or other combinations to force the child to include all the shapes)

"Step on all the shapes with four sides." (Or three sides or two long and two shorter sides.)

"Step on all the red or yellow shapes." (Or other color, size, or shape combinations.)

"Step on all the small squares." Or other size or shape combinations.)

"Step on all the shapes that are not blue." (Or other negative combinations.)

"Step on all the shapes that are not thin or not red circles."



There are many variations of questions, and, as you can tell from the last question, they can get very complicated and challenging if you wish. Begin with easier questions and play this game every day for one week and then once a week for the rest of the year, each week making the game more challenging. As the children's skill increases, they may enjoy watching one child step on certain shapes and then try to guess what attribute the child is using.

Name Hops

SKILLS _____ Auditory perception
 Noticing similarities and differences
 Connecting an abstract idea to the real world
 Solving problems
 Comparing

MATERIALS _____ Photocopied pictures of the children,* paper





ACTIVITY _____ Involve the whole class in this activity. The children explore the "jumps" required to say each child's name in the class, by translating syllables into jumps.
 Make a record of your findings by gluing down a picture of each child under the appropriate number of jumps.



This activity can be repeated with the children's last names and eventually with their first and last names together.

A clapping game with the children's names will extend this activity. The teacher claps the syllables of a name and the children try to guess whose name sheorhe clapped. Have five or six children come to the front to limit the number of possibilities. As soon as the children have the idea, include the entire group.

 	 	 
Maureen West	Richard Cossen	Karen Sorensen
 	 	 
Lynn Pruzan	Shelly Boutacoff	Kathy Swanson

  —   (Richard Cossen or Kathy Swanson)

 —   (Lynn Pruzan)

  —  (Maureen West)

This activity can be extended by clapping the rhythm of a familiar song and allowing the children to attempt to guess the title.



Geoboard Sorting Game

- SKILLS** _____
- Sorting objects by their properties
 - Noticing similarities and differences
 - Solving problems
 - Making judgements
 - Describing the properties used to sort a group of objects
- MATERIALS** _____
- Geoboards,* geobands*
- ACTIVITY** _____
- Ask a group of children to make a square on their geoboard with only one geoband. Then sort the geoboards.



Do this lesson many different times, each time choosing something different to make on the boards: rectangles, triangles, zigzags, faces, houses, and so on.

Geoboard Paths

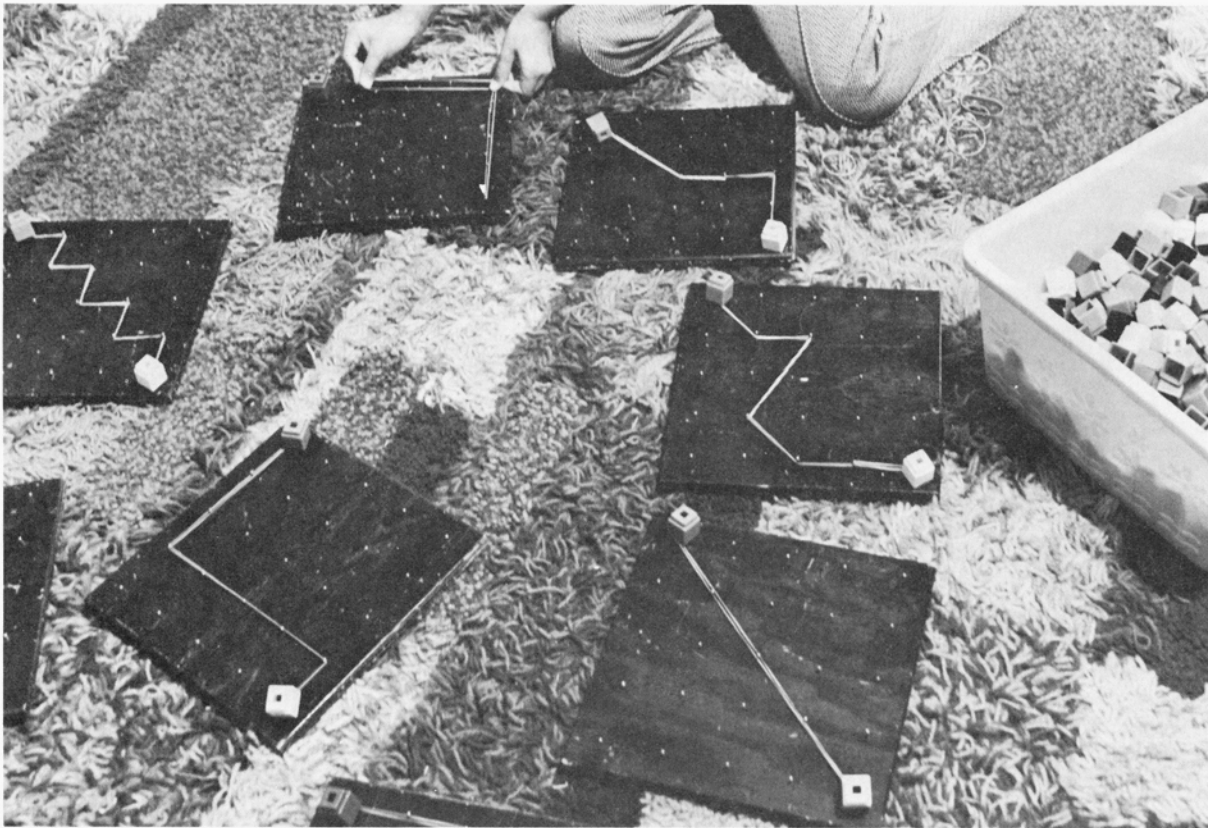
3

**SORTING
AND
CLASSIFYING**

SKILLS _____ Finding different solutions to a problem
Comparing
Noticing similarities and differences
Selecting objects with a particular property

MATERIALS _____ Geoboards,* geobands,* Unifix cubes*

ACTIVITY _____ The children put a red cube (or whatever color you select) on the top left hand nail, and a green cube on the lower right hand nail of their geoboard. The children trace a path from the "red house" to the "green house" with a geoband. When they finish the children put their geoboard along the chalk tray and take another geoboard, trying to find as many different ways as possible to connect the cubes.



The children may want to record the different paths on dot paper and post them on the bulletin board. This method requires the child to possess sophisticated hand-eye coordination in order to copy the pattern from the geoboard to the paper. Some children will thoroughly enjoy the challenge. Other children will be frustrated and prefer to sort the geoboards directly. Both methods serve the same purpose.

Dot paper records of different paths can eventually be made into a class book. The children's photocopied pictures indicate what pages each child contributed (see Worksheet 17).

Geoboard Arrow Games

SKILLS _____ Finding different solutions to a problem
Noticing similarities and differences
Comparing
Following directions

MATERIALS _____ A set of direction cards with arrows, geoboards,* geobands*

ACTIVITY _____ The children try to find as many different ways as possible to follow one set of directions. Everyone who finds a different way places his or her geoboard on the chalk tray. The children who copy their patterns onto dot paper pin the patterns on the bulletin board and eventually they are made into a class book to record all the different solutions. The arrows decorate the cover, and each child's photocopied picture* is added to his or her pages (see Worksheet 17).



Food Coloring

SKILLS _____ Solving problems
Noticing similarities and differences
Comparing
Stimulating visual imagery
Sorting objects by their properties
Using all the senses to gain information

MATERIALS _____ One package of food coloring for every other child, two buckets, baby food jars, water. (It is essential that the children explore these materials before beginning this activity. See p. 11)

ACTIVITY _____ Each child fills his or her baby food jar from the bucket of water and experiments with the food coloring in this jar.

Pose the question to the children—"How many different colors can we make?" The children bring their jar up when they make a color and take an empty jar so they can continue to explore. At the end of the activity the jars are sorted by color.



Later the children can dip a small square of blotter into each jar to make a record of the color. In this way, as the children continue this activity on subsequent days, they can refer to the colors they made previously.

QUESTIONS FROM TEACHERS

I WANT TO CHOOSE TWO OR THREE SORTING ACTIVITIES TO TRY. WHICH OF THE ACTIVITIES IN THIS CHAPTER DO YOU FEEL WOULD BE GOOD ONES TO CHOOSE AND WHY?

A GROUP I WORKED WITH DURING SORTING AND CLASSIFYING STARTED WITH "RED BUTTONS" (COLORS AS THE CATEGORY) AND THEN WANTED TO SEPARATE OUT THE "FOUR HOLE BUTTONS." SHOULDN'T THEY BE CONSISTENT AND LOOK FOR OTHER COLORS (KEEPING THE CATEGORY THE SAME) RATHER THAN SWITCHING TO A NEW CATEGORY SUCH AS THE NUMBER OF HOLES?

I DON'T KNOW WHAT TO DO WITH MY TOP SEVEN KIDS WHO ARE MUCH MORE ADVANCED LANGUAGE AND CONCEPT FROM THE REST OF MY CLASS. I FEEL SO MUCH PRESSURE FROM THESE TOP KIDS THAT IT'S HARD FOR ME TO GIVE THE TIME TO THE CHILDREN WHO REALLY BENEFIT FROM MY BEING WITH THEM DURING THE JUNK BOX SORTING. I'VE TRIED HAVING *THEM* BE THE TEACHERS FOR THE OTHER GROUPS BUT WHAT I REALLY WANT IS TO

"Sorting on the overhead" helps children learn the vocabulary and helps them think in terms of categories. "Junk box sorting" helps the teacher learn so much about his or her children and becomes an independent activity quickly, and thirdly, "Sorting walks" requires no materials and helps the child relate the real world to learning in the classroom.

As an initial sorting experience, yes. If your children have had several sorting experiences, you might give them two loops of black yarn and allow them to choose these two categories. They will, in the natural course of events, find they have some objects that could go in either group. Some children will pile those objects one on top of another outside the yarn loops. Other children will "invent" an intersection and overlap their strings. Other children will merely separate the items in a special part of each loop. All methods are equally good. What is important is that the children confront the problem, puzzle over the solution, and consistently apply whatever method they decide to use.

You can make the junk box sorting a reading activity for those seven. Have those children develop "sorting cards" in the following way. When the children finish sorting their material, write down the categories they used to. If they can write on their own, let *them* do the writing.

Then they should sort their material in another way and record the new categories. The group should use a different material each day, sorting, recording their groups on cards, and then pushing the material back together and re-sorting again.

An example of the cards one group developed for the keys is shown at the top of the next page.

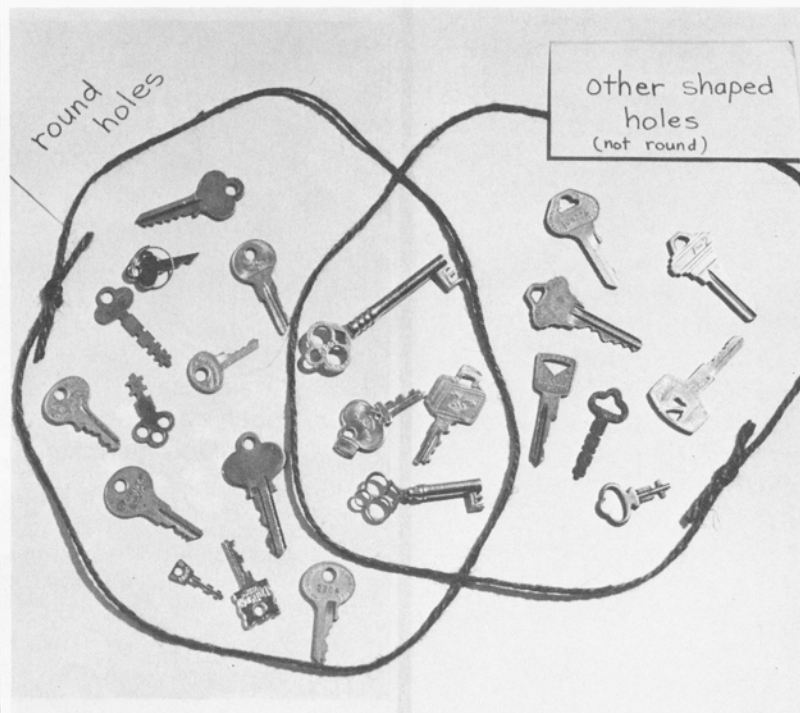
CHALLENGE THEM BY
EXTENDING THE IDEAS IN
SORTING AND CLASSIFYING.

One hole More than one hole
Round holes Square holes Triangle holes
Shiny Dull
Padlock keys Door keys
Animals No animals
Small sized Middle sized Large sized
Round-shaped Bumpy-shaped
Gold colored Silver colored
Teeth on two sides Teeth on one side
Roads No roads
Numbers No numbers

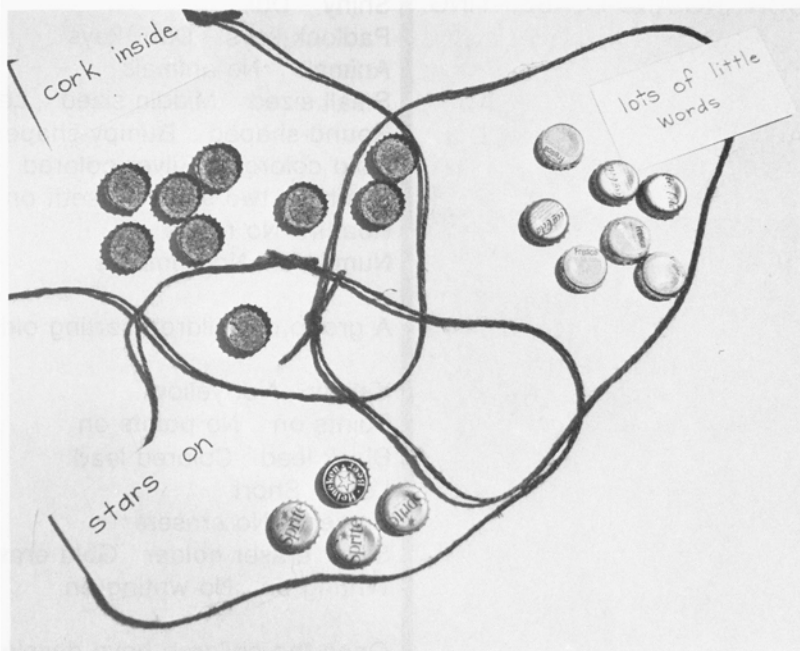
A group of children sorting old pencils developed these cards:

Yellow Not yellow
Points on No points on
Black lead Colored lead
Long Short
Erasers No erasers
Silver eraser holder Gold eraser holder No eraser holder
Writing on No writing on

Once the children have developed a set of cards for a junk box, two or three children work with one box at a time. They use two loops of black yarn, draw two cards, and then sort their junk into the two categories. Let the *children* decide how to solve the problem that occurs when an item can be placed in *both* categories.



When the children are ready for an additional challenge, give them three loops and ask them to draw three cards.



After the children have sorted their junk box, they may enjoy trying to guess one another's categories. They do this by turning over their cards and asking other children to guess how they sorted. Verification is made by turning over the cards.



I'D LIKE TO DO THIS SORTING FROM THE WRITTEN WORDS WITH MY WHOLE CLASS LATER IN THE YEAR, BUT THEY WON'T BE ABLE TO READ ALL THE WORDS. COULD I HAVE THEM TAPE RECORD THE CATEGORIES ON LANGUAGE MASTER CARDS?

That's a great idea if you have access to a language master machine! If you don't, here's what I do in my class:

The children develop the cards by sorting and then asking me to write the words to describe their categories. (The children who can write the words do that with spelling help from me.)

When the children finish their cards (at the end of each session), they glue their photocopied picture on the back of each card they are contributing. Each child becomes responsible for being able to read the written labels of the cards with his or her picture on the back. In subsequent lessons as the children attempt to sort from the written words, if a child has difficulty reading the category to sort by, the child turns the card over and goes to the child whose picture is on the back for help in reading.

We do a lot of sorting from the written records created by the children, and this becomes an activity which the children work on throughout the year. The children have a real sense that they are part of the learning process each time they see the cards, for they know *they* created these materials.

