

## **LAB EXERCISE #7**

### **COGNITIVE ABILITIES**

Cognition refers to our abilities to think and problem solve. The current theories of cognitive development mostly come from the work of Jean Piaget. Piaget described cognitive development as a sequence of increasingly complex skills that develop over time and are linked to biological development. Children are active participants in their own development and it is their exploration of the world that helps develop the neural connections necessary for advanced thinking skills to develop.

Piaget also saw development as occurring in four sequential stages, one building upon another. Skills in later stages are dependent upon skills developed in earlier stages. Piaget linked these stages to specific age ranges. For instance, children who are 10 years of age and are in the concrete operational stage should not be able to think abstractly and hypothetically. However, there are some children who are able to think abstractly at age 10. One current criticism of Piaget is that he underestimated the age at which children develop some of his skills. During this activity you will attempt to assess how accurate Piaget's age ratings are.

Another set of theories of cognitive development focuses on the development of memory. The processes of automaticity and attention are involved in memory and both change as children age. Think about the attention spans of a two-year-old and an eleven-year-old. Whose is longer?

As children grow older, their memories also increase in the amount of information that can be remembered and their memory strategies become increasingly sophisticated. For example, in a study of the strategy of rehearsal, researchers found that only 10% of 5 years olds used rehearsal while 85% of 10 year olds used this strategy. Assessing memory skills is another component of this exercise.

In the first part of this exercise you will be testing students to see if they have developed the skills of conservation. Conservation is the idea that an amount stays the same regardless of what size container is used. It is one of Piaget's major cognitive skills and he believed that it typically did not develop until the concrete operational stage (ages 7-11). Additionally, there are several types of conservation (i.e. number, mass, liquid, volume and area), each of which develops at a different age. It is a critically important skill since a person cannot develop abstract thinking without conservation skills. We will look at conservation of liquid, of number and of mass. To test these skills, we will use variations of Piaget's original experiments.

The other skill we will focus on is memory. We will be examining how much children can remember as well as asking about the strategies that they use for remembering.

## Part One

**Make sure to have all of your materials (list below) with you before going to the center.**

You will test 3 children on each of the conservation tasks. Test children of different ages. Try to find children who are 4, 7, and older than 10. (If your center does not have older children, test children of different ages. Try to find them in a range of ages. You may also test children who do not attend your center if you have access to older children.) Record their responses. You should test each child individually so as to avoid contamination.

When you record the children's ages, try to ascertain how many months old they are. This could be pertinent if a 6 year old is almost seven (80 months) versus just turned 6 (72 months).

Remember that for children, development can occur very rapidly. Thus, months can matter.

### Materials Needed:

12 pennies  
2 glasses - clear, same size  
1 glass - clear, different shape than other two  
(32 oz. Clear soda bottles with labels removed and a 32 oz clear glass can be used)  
2 lumps of clay  
food coloring  
"concentration" card game or deck of cards with pictures

*(FN: It might be helpful to have 4-5 sets of glasses made up that students can borrow for this activity. Pennies, clay and materials for the memory activity could also be included in this kit. Most of these materials can be purchased at dollar stores.)*

A. Conservation of Number

You will need 12 pennies for this activity. Divide the pennies into 2 lines of equal length. The pennies should be the same distance from one another. Ask each child:

*(FN: Add picture of pennies or refer students to page in text.)*

"Are there the same number of pennies in each row?"

Child 1 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 2 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 3 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Next, push the pennies in the top row close together. Leave the second row as it was. Ask each child:

*(FN: Add picture of pennies or refer students to page in text.)*

Is there the same number of pennies in each row or does one have more?

Child 1 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 2 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 3 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

## B. Conservation of Liquid

This is the classic Piagetian experiment. To do this activity you will need 3 glasses. They should be clear glass (not colored). Two glasses must be exactly the same size and shape. The third glass should be of a different shape but hold at least as much liquid as the other two.

*(FN: It might be helpful to demonstrate this activity in class prior to the week in which it is done. I would also refer students to proper page in the text.)*

Fill two glasses (Glass A and Glass B) of the same size and shape with water. (I prefer to use colored water since it is easier to see). Ask each child:

"Does each glass have the same amount of water?"

Child 1 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 2 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 3 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Next pour the water from glass A into the odd glass, Glass C. Make sure the child watches this process.

Ask: "Does each glass have the same amount of water or does one have more?  
(Make sure your written report makes clear which glass the child picked.)

Child 1 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 2 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 3 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

## Conservation of Mass

In this activity, you will be assessing conservation of mass. Again, it is a classic Piagetian experiment.

*(FN: Add picture of clay or refer students to page in text.)*

Shape the clay into two balls that are the same size. (Do this before showing them to the children. If you have difficulty with sizes, you can purchase molds which will facilitate shaping the clay into same-size balls. )

Show the two balls of clay to each child. Ask:

"Is there the same amount of clay in each ball?"

Child 1 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 2 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 3 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Next, roll one of the balls into a long hot-dog like shape. Do this in front of the child. Ask:

"Does each piece of clay have the same amount or does one have more?"

Child 1 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 2 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 3 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Part Two Memory

This exercise requires you to play a game of concentration with the child. (Use a game with pictures so that you can play with younger children.) Note how many pairs the child is able to match. After the game, ask the child what they do to remember the pairs. Record their answers.

Child 1 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 2 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

Child 3 (age \_\_\_\_\_) \_\_\_\_\_

\_\_\_\_\_

## LAB REPORT PART B QUESTIONS

1. Summarize what you found about the development of conservation. Concentrate on any age differences you found.
2. Discuss the memory strategies used by the children during the game of concentration. Compare those strategies to the strategies that you use to remember.
3. Reread the chapter on cognitive development. Based on your limited experiment, analyze how accurate you think Piaget was. Can the speed of development be increased? If so, how?