



Label symbols and simulated poison bottle interaction among preschoolers  
by Sonja Bunke Holt

A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of  
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Abstract:

An investigation was conducted to study the preschool child's behavior towards the skull and crossbones symbol when it was presented in combination with other symbols commonly thought to elicit positive, negative, and neutral evaluative responses. Twenty-eight preschoolers were tested as to whether they responded differentially to simulated poison bottles as a function of the type of symbol depicted on the labels. The degree of preference exhibited by a preschooler towards nine different symbols was measured. Two measures of preference were employed. The first measure consisted of a frequency count, of the number of times in a series of presentations, each child points to the bottle he would like to play with. The second measure was the amount of time each child spent manipulating the simulated poison bottles in a free play situation. The preschool child does not intuitively ignore the skull and crossbones symbol when it appears on a bottle label, but in fact, prefers it over six symbols tested. Symbols with figures were preferred over labels of verbal messages. There are indications that symbols with familiar associations are attended to more frequently and for longer durations. Evaluative weight is not a factor to be considered in developing effective warning signals for the preschooler. Furthermore, there was an indication that age variability among preschoolers is a factor influencing differential responses toward warning labels. Preschoolers indicated that a high reliability exists between a verbal preference response and his actual play behavior. The results are discussed in relation to Piaget's explanation of the preschooler's developmental stage. It is suggested that the results be considered in the construction of warning signals which are accessible to the preschool child. As an aside, further investigation into the effect of other relevant stimulus variables is warranted.

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August 13, 1971

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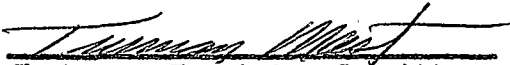
Psychology

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August, 1971

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## ABSTRACT

An investigation was conducted to study the preschool child's behavior towards the skull and crossbones symbol when it was presented in combination with other symbols commonly thought to elicit positive, negative, and neutral evaluative responses. Twenty-eight preschoolers were tested as to whether they responded differentially to simulated poison bottles as a function of the type of symbol depicted on the labels. The degree of preference exhibited by a preschooler towards nine different symbols was measured. Two measures of preference were employed. The first measure consisted of a frequency count of the number of times in a series of presentations, each child points to the bottle he would like to play with. The second measure was the amount of time each child spent manipulating the simulated poison bottles in a free play situation. The preschool child does not intuitively ignore the skull and crossbones symbol when it appears on a bottle label, but in fact, prefers it over six symbols tested. Symbols with figures were preferred over labels of verbal messages. There are indications that symbols with familiar associations are attended to more frequently and for longer durations. Evaluative weight is not a factor to be considered in developing effective warning signals for the preschooler. Furthermore, there was an indication that age variability among preschoolers is a factor influencing differential responses toward warning labels. Preschoolers indicated that a high reliability exists between a verbal preference response and his actual play behavior. The results are discussed in relation to Piaget's explanation of the preschooler's developmental stage. It is suggested that the results be considered in the construction of warning signals which are accessible to the preschool child. As an aside, further investigation into the effect of other relevant stimulus variables is warranted.



## INTRODUCTION

Accidental poisoning continues to be one of the leading causes of death in children of the United States. According to Smith (1970), it was the fourth highest cause of accidental death among preschool children. In addition, Smith reports that in 1969, 83% of childhood poisoning fatalities were children between the ages of one and four. A number of authors (Lossing and Goyette, 1957; Cann, Iskrent, and Meyman, 1969; Corsa and Stallones, 1961; and Stallones and Corsa, 1961) have reported that 80% to 90% of the children victimized by accidental poisoning were less than five years of age. Furthermore, there is a disproportionate number of males over females involved in fatal poisonings. This overwhelming number of deaths in preschoolers has progressed throughout recent years.

Another very commonly reported finding in childhood poisoning accidents is that well over half of the poisonous substances ingested were drugs or medicines in tablet form. As an aside, common aspirin tablets have been the cause of over 50% of these reported accidental poisonings (Corsa and Stallones, 1961). Conley (1955) and Cann et al. (1960) have suggested that flavored aspirin as well as other medicine had been treated as "candy" by parents in an effort to induce the ingestion of medicines. This practice obviously leaves the child with little information

concerning the danger of taking these medicines at inappropriate times. Mellins, Christian, and Bundesos (1956) reported that children said the reason they sought out and ate flavored baby aspirin was because they liked the taste.

No one would disagree that the child's perception of the world varies considerably from that of the adult's. The invaluable research done by Jean Piaget has promoted the theme that the child has unique needs with a mentality adapted to serve these needs (Piaget, 1959). It should follow that safety regulations which could directly affect the child should consider the mentality in adapting procedures utilized by a child in his everyday behavior. However, this approach certainly has not been the case when manufacturers design containers and labels for poisons.

A number of studies have suggested that stimulus variables associated with the chemical compound itself may play an important role in many poisoning accidents. McKendrick (1960) found that the color of the medicine was a determining factor in terms of which compounds were taken most frequently. He reported that colored tablets were taken more often than gray or white tablets. In addition, Jolly and Forrest (1958) tested children on their preference for different colored tablets, and found that children in their sample were most attracted to bright colored and brown pills. The investigators suggested that the children were attracted to colored and brown tablets because they thought they were candy. It

should be noted that these findings could be expected for reasons other than the young child's desire and search for candy. There is a considerable amount of evidence which suggests that strong color preferences are exhibited by preschoolers. By the first year of life, the child demonstrates a definite preference for bright, saturated colors at the red end of the spectrum (Garth and Porter, 1934; and Staples, 1931). Therefore, the color characteristics of the medicine, the container, or the label may be important determinants in poisoning accidents.

Labeling has been studied by chemical manufacturers for many years. While the principles of labeling developed by the Manufacturing Chemists Association (MCA) are primarily intended for the use by makers of industrial containers of chemicals, manufacturers of household products also follow these guidelines. Presently the MCA labeling guidelines require that a label on an industrial container carry a single word--"danger!", "warning!", or "caution!"--whichever expresses the relative severity of the hazard that the product affords. When an industrial product is extremely harmful; i.e., contact with which will lead to fatal results, the label may carry the word "poison!", and a skull and crossbones symbol (Manufacturing Chemists Association, 1956).

A number of warning systems have been employed to provide cues to a person so that he can operate in a safe manner. The various codes involved are used to indicate the various types or relative amounts of imminent danger. Although labeling has been recognized as an important

factor in accidental poisoning prevention, it has always been viewed from the vantage point of the adult. Since preschoolers cannot read, it has been assumed that they will not respond to the warning messages, symbols, or other characteristics of warning labels. It is apparently an almost universal belief among many manufacturers that the label is solely intended for and responded to by the adult (Foulger, 1957) and that it can only be effective in accidental poisoning prevention if parents will read it and follow in the advice of keeping household chemicals out of the reach of young children. Because of this attitude, the total makeup of label design characteristics has been directed at adults without any consideration of what the effects might be on the child.

Many studies reviewed indicate the importance of drug stimulus variables on the risk of childhood poisoning. However, it may also be that there is an influence by the container of lethal agents on the young child's behavior in regards to that container. If this is the case, then the label should be one of the characteristics designed to diminish the frequency of accidental poisoning.

With this in mind, the following study was designed to test the responses of preschool children to simulated poison bottles differing only in the type of symbol printed on the label. The variable under study was the amount of preference exhibited by preschoolers towards the different warning symbols. The design of this study operated on the

basic assumption that a child will spend more time with an object that he has a preference for. In addition, it is assumed that the object (in this case, a simulated poison bottle) attended to for the longest period of time, is the bottle which is most likely to be opened with the contents readily available for ingestion.

## METHOD

### Subjects

A total of 28 preschool children were involved in this investigation. At the time, they were attending a preschool operated by the Home Economics Department at Montana State University. There were 14 boys and 14 girls ranging in age from 2.5 to 5.5 years. The mean age for all subjects was 4.13 years. The children were all from white, middle class families. Three age groups were defined for purposes of analysis. The three-year-old children were those ranging from 2.5 to 3.5 years, the four-year-old children were those ranging from 3.5 to 4.5 years, and the five-year-old category consisted of children between 4.5 and 5.5 years. There were an equal number of boys and girls in each age group.

### Apparatus

The test bottles were commercial aspirin bottles with the dimensions of approximately 6 x 3 x 1 inches. The bottles were painted white on the interior and filled with candy to produce a familiar sound in an effort to arouse interest when the bottle was played with.

The commercial labels were replaced with the simulated labels of approximately 2 x 3 inches. There were nine different labels varying only by the type of symbol depicted on the label. The symbols were

black line drawings on a white background. Three symbols (a rabbit, the face of a smiling child, and a teddy bear) were believed to elicit a positive response from preschoolers. Three written words ("poison", "danger", and "lethal") were used as the symbols expected to elicit a neutral response. The last three symbols (skull and crossbones, the face of a crying child, and a snake) were submitted as stimuli to which preschool children elicit a negative evaluation.

The different labels were formed into subsets in a method similar to that used by Rhine, Hill and Wandruff (1967). This technique permits the investigator to test a number of stimuli while at the same time keeping the number of test presentations at a minimum, a necessary procedure when working with preschool children. Twelve subsets were formed with each subset containing three symbols. Nine subsets contained one positive, one neutral, and one negative symbol from the classifications listed above. Three subsets were comprised of three symbols of equal valence. Table 1 represents the various subset components and the corresponding symbols.

The testing took place in a small room near the preschool. It was approximately 6 x 14 feet and was furnished and decorated to appeal to the preschooler. A table and two chairs, preschooler size, were placed in the center of the room. A closed circuit television tape recording system was used to facilitate recording the preschoolers interaction time with the various test bottles. The system was comprised of a television camera, a video recorder, and a television monitor. The camera was

TABLE 1

## SUBSET CONSTELLATIONS AND CORRESPONDING SYMBOLS

Subsets	Symbols
$G_1 N_1 B_1$	$G_1 =$ rabbit
$G_2 N_2 B_1$	$G_2 =$ smiling child
$G_3 N_3 B_1$	$G_3 =$ teddy bear
<hr/>	
$G_1 N_2 B_2$	$N_1 =$ poison
$G_2 N_3 B_2$	$N_2 =$ danger
$G_3 N_1 B_2$	$N_3 =$ lethal
<hr/>	
$G_1 N_3 B_3$	$B_1 =$ skull and crossbones
$G_2 N_1 B_2$	$B_2 =$ snake
$G_3 N_2 B_3$	$B_3 =$ crying child
<hr/>	
$G_1 G_2 G_3$	
$N_1 N_2 N_3$	
$B_1 B_2 B_3$	

Note: "G" represents positive symbols, "N" indicates neutral symbols, and "B" delineates the negative symbols.



concealed in a corner behind the subject's chair. The recorder and monitor were placed in an observation room which was located behind the child and connected to the testing room by means of a one-way mirror.

In addition to the television recording system, a courtroom stenograph was used by the observers to secure immediate data. A metronome and electric timer were used in conjunction with the stenograph to record the time in seconds that each child interacted with the bottles. This stenographic natural observation technique was patterned after one reported by Heimstra and Davis (1962).

#### Procedure

Part I. -- Each child was tested individually by three female experimenters working together. One experimenter tested the child while the other two observed and recorded his responses. Prior to testing, each child was informed that he was going to play a new game, and was then escorted to the testing room by a teacher from the preschool. After a brief familiarization with the room, and with the experimenter, the child was given the instructions: "Let's play our game now. I will show you some bottles and I want you to show me which one you like best." At that point, the first subset of three bottles was presented simultaneously, and the child made his selection. If a child could not make a decision, he was prompted to guess. The following eleven subsets were presented in the same manner.

A random order of subsets was prepared prior to experimentation and the sequence of administration was the same for each child tested. Also, the position of the symbols within the subsets was randomized in a pattern which was the same for each child. It was necessary to present all the bottles in each presentation simultaneously to control for a temporal position effect. This was achieved by placing a pasteboard screen between the child and the bottles during the intervals between presentations.

Part II. -- The second testing procedure followed immediately after the first. In that procedure, four bottles were employed: (1) the skull and crossbones labeled bottle, (2) the bottle carrying the word "poison", (3) the most preferred bottle, determined from Part I, and (4) the least preferred bottle, also determined from Part I.

Following Part I, the observers tallied the number of choices the child made for each symbol. The bottles with the highest (most preferred) and the lowest (least preferred) number of choices were determined. Because the skull and crossbones label and the "poison" label were already included as two of the four bottles to be presented in Part II, they were excluded from the tabulation of "most preferred" and "least preferred" bottles. In the event that two or more symbols were selected an equal number of times, a table of random numbers was used

to break ties.

The list of four bottles to be used in the Part II procedure was relayed to the experimenter testing the child. These bottles were then presented simultaneously to the child for an interaction period of five minutes. Prior to experimentation, the order of bottle presentation was randomized for each subject. At the time that the bottles appeared before the child, the experimenter coached the child, "You may play with these now. You may do anything you wish with them." The experimenter remained in the room with the child, but avoided unnecessary interaction with him. However, the experimenter answered the child's questions and encouraged him to play with the bottles for the entire five minute play period.

Only fourteen of the twenty-eight children remained in the testing environment for the entire five minute observation session. Children refusing to interact with the bottles were excused from the test room. After this testing procedure was completed, the child was returned to regular preschool activities. The total time each child spent in testing was approximately twelve minutes.

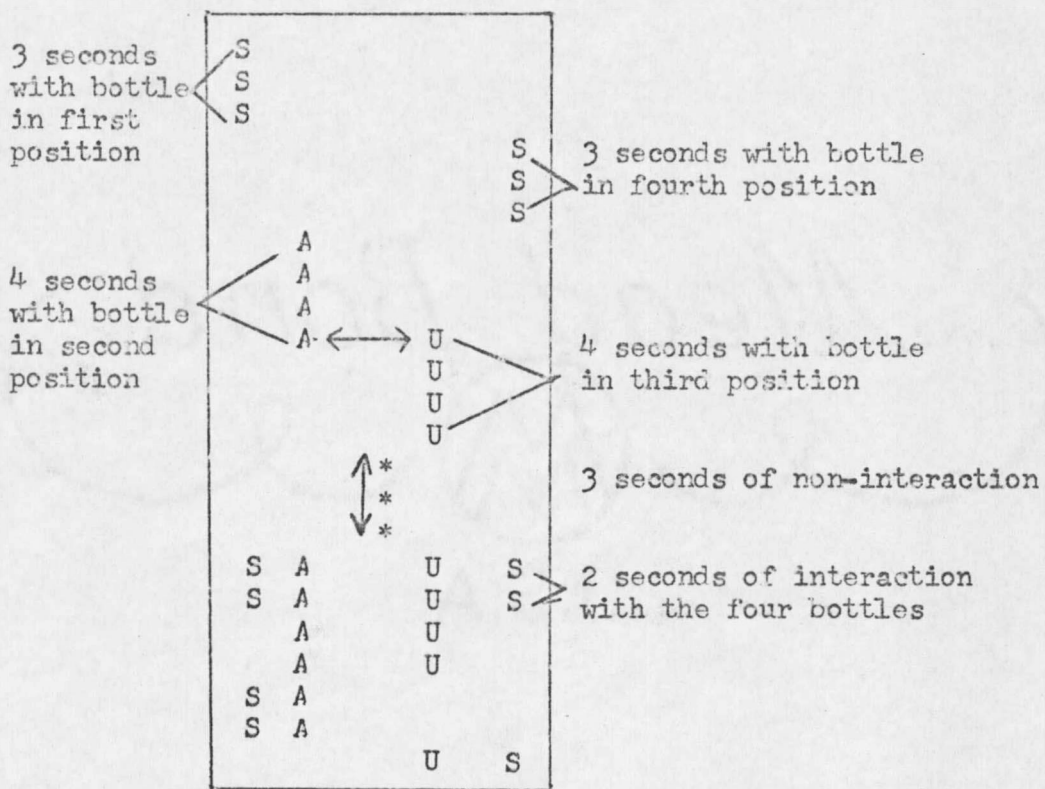
In the observation room, the television tape recorder was turned on at the moment the four bottles appeared on the table, and the child's behavior for the following five minutes was recorded on video tape. During these five minutes, the child's behavior was classified into five categories: (1) interaction with the skull and crossbones

bottle, (2) interaction with the "poison" bottle, (3) interaction with the most preferred bottle, determined from Part I, (4) interaction with the least preferred bottle, also determined from Part I, and (5) non-interaction with the bottles. Interaction was defined as physical contact between the bottle and the child.

In addition to the television recording system, the observers also recorded the time involved in each of the above five categories of behavior. This was done using a stenograph machine in a technique adopted from a detailed description by Heimstra and Davis (1962). Depending on the child's behavior, the observer depressed one of the five keys signifying the five behavior categories. Throughout the five minute observation period, the keys were depressed at one second intervals marked off by the beat of an electrical metronome. A record was kept on stenographic tape (Figure 1) which was advanced each time a key was depressed. In this manner, the amount of time in seconds was recorded for each behavior category. Each time a key is depressed, the appropriate figure is printed, and the tape moves forward. Several keys can be depressed at the same time and all the figures will be recorded. This allows the observer to record two or more categories of behavior that occur simultaneously. When a particular behavior occurs successively, the paper tape will show a vertical column of that figure representing the particular behavior

Figure 1

Representation of a behavioral record made with the Stenograph machine



Involved.

Figure 1 illustrates a stenograph recording tape with the designation of the letters that represented each category of behavior. The horizontal double arrow is shown to call attention to the fact that at this time, two bottles were in physical contact with the child. The vertical double arrow indicates three seconds of non-interaction with the bottles.

The procedure described above computed the amount of time in seconds for each behavior category. Only the time recorded for actual bottle interaction was utilized in the subsequent data analysis. The fifth behavior category, non-interaction with the bottles, was included merely to provide a measure of inter-observer reliability.

A further check was made on the accuracy of the data when the observation measures were reduced from the television recording tapes. This was used primarily as an additional control for reliable data collection. The data was reduced from the tapes by means of the stenographic technique cited above.

#### Control of Extraneous Variables

In order to study the effect of various symbols on the preschool child's behavior, numerous variables were controlled. These variables include label variables, bottle variables, bottle content variables, as well as procedural variables. It was intended that these variables be controlled in the present study and be systematically manipulated

as independent variables in separate studies.

Label variables that were controlled in this study included the size and color of the label, the saturation of the label color, and the shape of the label. All these variables were held constant in that the background color of the label was white, and the symbols were black line drawings. The relative complexity and size of the symbols were held as constant as possible, since previous research suggests that children show a preference for complex figures as opposed to simple (Cantor, Cantor, and Ditrichs, 1963).

Bottle variables controlled for included: size, shape, color, translucence, and type of closure device. In addition, the contents of the simulated poison bottles was held constant. All bottles contained an equal quantity of candy, and the interiors were all painted white. This was done to enhance the overall attractiveness of the bottles and to maximize the children's desire to interact with the bottles.

Several procedural variables were held constant during the investigation. This included the degree of familiarity between the child and the experimenter. Previous research (Mussen, 1960) indicates that this is critical to the success of any study involving young children. The research indicates that a child will not remain in a strange room unless in the company of a familiar person. For this reason, a teacher from the preschool also accompanied the child-

ren to the testing room and remained with them throughout the testing. The same instructions were given to each child. Similarly, the experimenter systematically prompted the children to play with the bottles in Part II of the test session. It has been reported by Pielstick and Woodruff (1964) that sometimes a child will not play with objects unless he is instructed to do so.

During the free play part of the test sessions, the children were exposed to only four bottles. In order to control for the position variables, bottles were randomly arranged for both test conditions. All bottles involved during a presentation appeared simultaneously in order to control for any effects of temporal presentation on the child's preference responses. In Part I, the same randomized presentation order was used for each child. However, in Part II, a different randomized order of test bottles was used for each child.















































