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
MASTER OF SCIENCE in Psychology
Montana State University

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 rhe preschooler. Further more, there was an indication "chat age variability among preschool-, ers 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 preschooler8 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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Date August 13, 1971

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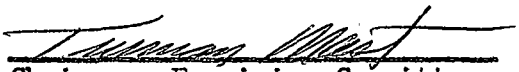

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MONTANA STATE UNIVERSITY
Bozeman, Montana

August, 1971

ACKNOWLEDGEMENT

The author wishes to express sincere appreciation to Dr. Truman M. Mast for serving as major advisor and thesis director. A debt of gratitude is also extended to Dr. Arthur L. McDonald, Dr. M. Paul Willis, and Dr. Frank C. Seitz, members of the advisory committee, for their assistance in preparing this manuscript. To the members of the advisory committee, I am also infinitely grateful for the academic inspiration they have instilled.

This investigation could not have been conducted without the cooperation of the preschool staff from the Home Economics Department at Montana State University. Their assistance and interest was invaluable for effective data collection.

Special thanks are also extended to Kitty Dick and Kathy McDonald for their assistance in the lengthy data collection stages of this investigation.

I wish to espress my deepest appreciation to my husband, Deroy, for constructing the testing laboratory and for his unlimited support throughout the entire study.

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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, Iskrant, 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 grey 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 immanent 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
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
G_1 N_3 B_3	B_1 = skull and crossbones
G_2 N_1 B_3	B_2 = snake
G_3 N_2 B_3	B_3 = crying child
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 be 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.

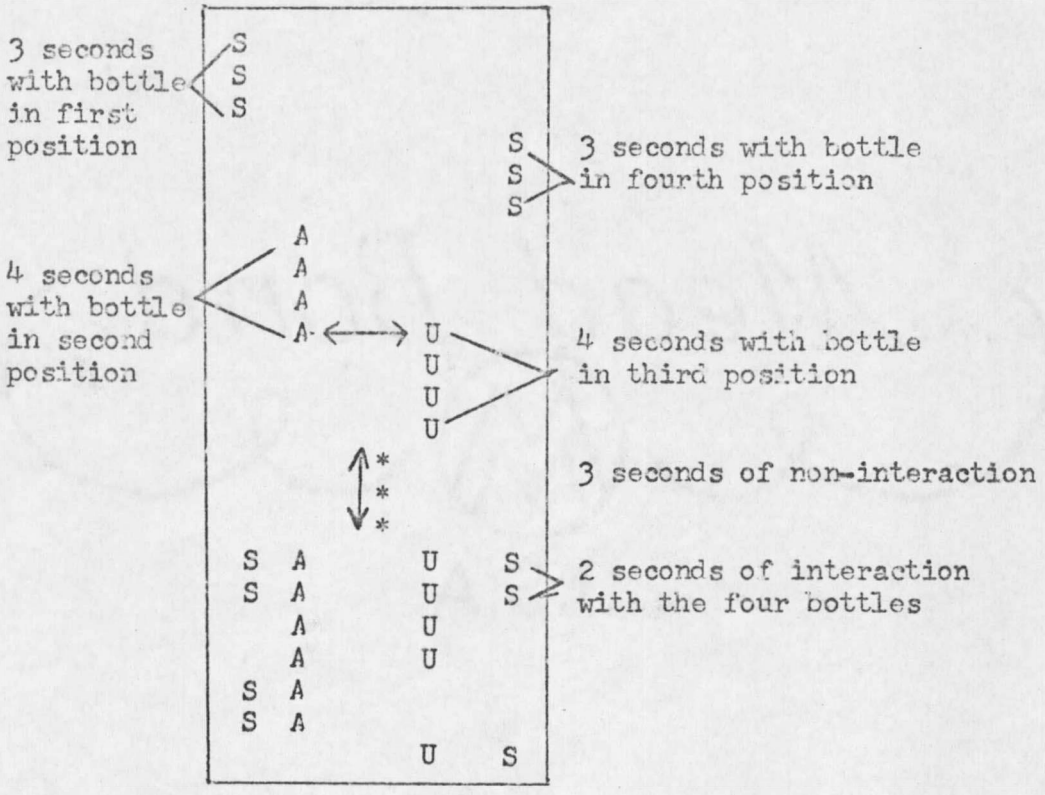
In the observation room, the television tape recorder was turned on at the moment the four bottles appeared on the table, and the child's behavior for the following five minutes was recorded on video tape. During these five minutes, the child's behavior was classified into five categories: (1) interaction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

RESULTS

Part I

Analyses were based on the total number of times each symbol was chosen by all subjects. An rBC analysis of variance design (McNemar, 1969) was used with "r" representing the number of individuals randomly selected from each "B" (sex) nest. The "C" variable represented the nine symbols employed in the Part I procedure. Results of this analysis of variance appear in Table 2. The effect of sex was not significant across the preferred symbol selection. However, the preferences shown towards various symbols were significantly different ($p < .001$).

TABLE 2

ANALYSIS OF VARIANCE: PART I

Source	df	MS	F	p
(r) Individuals	(26)	0	-	-
(B) Blocks (sex)	1	0	-	-
(C) Columns (symbol)	8	7.76	7.16	<.001
B X C Interaction	8	1.08	.99	-
Remainder	208	1.08	-	-

At this point, a series of selected contrasts were applied to the mean choice scores for each symbol using the Scheffe' method of multiple comparisons (McNemar, 1969). Table 3 represents the results of that procedure. A frequency hierarchy of symbols was developed based on the number of times a bottle was chosen. The subsequent analysis involved a series of tests to indicate whether two selected means were significantly different from each other.

The rabbit symbol received the highest number of choices. It was selected significantly more times than any of the other symbols. Second, the teddy bear was preferred more than the face of the crying child and the word "lethal" ($p < .01$) and more than the remaining two words, "danger" and "poison" ($p < .001$). Of special interest was the skull and crossbones symbol which ranked third between two positively valued symbols. Following in fourth and fifth position, were the symbols depicting a face of a smiling child and the snake. The last three symbols cited, each exhibit a preference schedule higher than the symbols carrying the face of a crying child and the word "lethal" ($p < .05$) and the two words "danger" and "poison" ($p < .01$). There was no evidence that the remaining four symbols (face of the crying child, "lethal", "danger", and "poison") were differentially preferred.

A second selected contrast analysis was carried out on the data after grouping the symbols in the original positive, negative, and neutral categories. Table 4 indicates the results of correlations

TABLE 3

SELECTED CONTRASTS BETWEEN INDIVIDUAL SYMBOLS: PART I

Symbols	$\bar{X}$	Symbols and Corresponding K values *								
		G_1	G_3	B_1	G_2	B_2	B_3	N_3	N_2	N_1
G_1 = rabbit	2.21	-	1.38	2.34	2.62	2.88	5.08	5.08	5.35	5.77
G_3 = teddy bear	1.85	-	-	.96	1.23	1.50	3.69	3.69	3.96	4.38
B_1 = skull & crossbones	1.60	-	-	-	.27	.54	2.73	2.73	3.00	3.42
G_2 = face of smiling child	1.53	-	-	-	-	.27	2.46	2.46	2.73	3.15
B_2 = snake	1.46	-	-	-	-	-	2.19	2.19	2.46	2.88
B_3 = face of crying child	.89	-	-	-	-	-	-	-	.27	.69
N_3 = lethal	.89	-	-	-	-	-	-	-	.27	.69
N_2 = danger	.82	-	-	-	-	-	-	-	-	.42
N_1 = poison	.71	-	-	-	-	-	-	-	-	-

* K must equal or exceed 2.05 for the 5% level, 2.78 for the 1% level and 3.71 for the .1% level.

between the groups of different valence. The effect of the neutrally valued symbols was not significant, whereas, the positive group of symbols were selected significantly more than both the negative ($p < .01$) and the neutral ($p < .001$). In addition, the negative category of symbols was preferred significantly more than the neutral ($p < .01$).

TABLE 4

SELECTED CONTRASTS BETWEEN GROUPED SYMBOLS: PART I

Symbol Groups	Symbol Groups		
	Positive($G_1G_2G_3$)	Negative($B_1B_2B_3$)	Neutral($N_1N_2N_3$)
Positive ($G_1G_2G_3$)	-	5.4*	10.5**
Negative ($B_1B_2B_3$)	-	-	5.1*
Neutral ($N_1N_2N_3$)	-	-	-

* $p < .01$ **$p < .001$

Part II

The analyses in this testing procedure were based on the subject's interaction time with each of the four bottles employed. The r(B)C analysis of variance design was repeated on the data from Part II. With the "r" variable representing individuals and "B" signifying the nest of two sexes, as in the Part I analysis. The "C" variable represented the four symbol variables utilized, (1) skull and crossbones, (2) "poison", (3) the preferred bottle, from Part I, and (4) the least preferred bottle, also determined from Part I. Results of the analysis of variance performed on the bottle interaction appear in Table 5. The male preschoolers did not interact with the bottles signigicantly more than the females. However, the various bottle interaction times were significantly different.

TABLE 5

ANALYSIS OF VARIANCE: PART II

Source	df	MS	F	p
(r) Individuals	26	6580.661	-	-
(B) Blocks (sex)	1	350.036	.053	-
(C) Columns	3	3372.286	6.485	$<.001$
B X C Interaction	3	455.274	.875	-
Remainder	78	520.036	-	-

The method of selected contrasts (McNemar, 1969) was also applied to the mean interaction time for the four bottles. The resulting contrasts are presented in Table 6. The preferred bottle was interacted with significantly more than the other three bottles ($p < .01$). The interaction time did not significantly discriminate between combinations of the remaining three bottles (skull and crossbones, "poison", and the least preferred bottle, determined from Part I).

TABLE 6

SELECTED CONTRASTS: PART II

Symbol	Interaction Time ($\bar{X}$)	Symbol			
		Preferred	Skull & Crossbones	Poison	Least Preferred
Preferred	57 seconds	-	3.28 *	3.44*	3.28*
Least Preferred	35 seconds	-	-	-	-
Skull and Crossbones	36 seconds	-	-	-	-
Poison	35 seconds	-	-	-	-

* $p < .01$

It was not possible to acquire an equal number of children in each of the three age groups defined previously, which prevented the analysis of variance design utilized earlier from including the age variable. For the purpose of interest and indications for further research, the age groups were compared in relation to the total interaction time with the bottles in Part II. The mean interaction time for the three-year-old preschoolers was 108 seconds, for the four-year-old group the average time spent interacting with the bottles was 227.5 seconds, and the five-year-olds were engaged in contact with the bottles for an average of 146.9 seconds. Three t-tests between the independent means for the interaction time were performed. The group of four-year-old children interacted with the bottles significantly ($p < .05$) more than the three-year-old preschoolers. Although a definite trend was indicated, there was no significance between the four- and five-year-old groups ($t = 1.07$), or between the children in the age groups of five and three.

DISCUSSION

The results of the present investigation clearly demonstrate that preschool children will differentially respond to simulated poison bottles as a function of the symbol depicted on the labels. For the first testing procedure, a hierarchy of symbols evolved based on the number of times in a series of presentations the symbols were selected as favorite. Again in the second procedure one symbol type emerged from a group of four symbols as the one preferentially responded to during a period of free play. The fact that symbols were responded to differentially, is not especially surprising since previous researchers (Staples, 1931; Garth and Porter, 1934; and Cantor, Cantor, and Ditrichs, 1963) have found that children begin at the age of two to respond to characteristics of form, shape, and color. It is the various symbol qualities responded to which will be valuable in guiding research involving children.

A special interest involves the existence of preferential discrimination against the group of neutrally evocative symbols. The symbols expected to elicit positive evaluating responses were found to be selected more often than either the neutral or negative class of symbols involved. Furthermore, the negative group of symbols were also measured as more preferential than the neutral set.

During testing, it was observed that the symbol figures comprising the positive and negative classifications were employed by the children as imaginative characters in the stories they made up while playing their "new game". In this manner, the figures on the bottles immediately captured the attention of the young preschooler. Similar behavior was not observed in regards to the written words of the neutral category.

A child younger than five years has had little contact with the written language. Therefore, it is not likely that he should differentially respond to written language forms. At the age under question, a child's common associations are derived from pictures in storybooks and from objects he has seen. Piaget (1962) concluded that a child this age will attend to elements of past associations more than he will to novel cues. He also noticed a remarkable persistence in attention following an initial manipulation.

Conclusive in the above discussion is the fact that written words rather than symbolic figures are the most innocuous stimuli among those tested. Label warnings carrying printed messages would still protect the adult who can read. However, printed labels are of greater inherent value to the child who responds differentially to various characteristics of the label but responds least of all to the printed words carried on the label.

The hierarchy of symbol preference may also provide clues to which attracting elements are found on warning labels. The blending of symbols from the different categories (positive, negative, and neutral) throughout the preferred order of symbols is evidence that evaluative weight is not a legitimate measure to use in warning children by way of labels. Rhine, Hill, and Wandruff (1967) found children between the ages of two and six capable of distinguishing good and bad pictures. The present study did not recognize children applying their evaluative potential in their selective play behavior.

One of the best explanations of the difference found between a child's play behavior and his expected evaluative behavior derives from the developmental definition of children this age by Piaget. Between the ages of two and seven, two heterogeneous worlds equally real exist for the child -- the world of play and the world of ordinary life. When a child is involved in his world of play, it is his only reality and the world of ordinary life does not exist. The same type of condition exists when he is involved in his world of ordinary life. All elements of his play world are as real as he sees them. There is no attempt to solve contradictions between the two planes of existence. In fact, he is not even aware that contradictions between the two planes of existence are a reality. The same developmental stage is characterized by strong ego centrism which involves an unusual belief in his own ideas. His convictions rely on past associations from within his "real"

worlds of play and of ordinary life.

Consequently, it seems absurd to expect a child to respond in a manner programmed from the adult world. It is inappropriate to expect him to ignore a skull and crossbones symbol which has a high probability of being previously associated with a dramatic figure such as Captain Hook. The other symbols selectively preferred (rabbit, teddy bear, the face of the smiling child, and the snake) may also have had past associations stimulating the child's selections over the non-differentiated symbols. In the present investigation, the preschoolers did not ignore the skull and crossbones symbol, but selected it as favorite more than one of the positively valued symbols and more than all the neutral symbols and the other negatively charged figures. Considering a child's common associations and the reported potency of familiar cues on a child's attention, it is not surprising that the rabbit and teddy bear were chosen most frequently. The interesting factor is that the skull and crossbones symbol was definately high on the preschooler's selection scale. Consequently, it is safe to assume that it is not the most desireable symbol to have printed on the labels of containers of poisons.

A simple analysis performed between the three age groups pointed out that the four-year-old (3.5 to 4.5 years) preschoolers interacted more with all of the bottles in the free play portion of testing. This variance in the total interaction time among the three age groups appears partially consistent with the research (Rogers, 1957) claim-

ing that children younger than five years are most susceptible to poisoning. Once a child reaches five years, the danger is minimal. Consequently, there may be more value to investigating safety measures in regards to the response variability of the two-, three-, and four-year-old children. In light of the above information and the initial hypothesis, it should be pointed out that the three-year-old preschoolers in the present investigation selected the skull and crossbones symbol over the remaining eight symbols involved. The four-year-old males also selected the skull and crossbones symbol in greatest frequency.

The most meaningful information evolving from this study developed during the second testing procedure. The testing process involved four bottles available for play during a five minute observation period. The bottles carrying the skull and crossbones symbol and the word "poison" on its label were presented to each child. The preferred and least preferred bottles used were determined individually for each child on the basis of his choice responses in Part I.

An analysis of the interaction time for each bottle clearly demonstrates that the bottles in the preferred category were differentially played with. There is necessary value in this reliability between the preschooler's indicated preference behavior and his actual play behavior. The research investigated has not been concerned with that very aspect of children's behavior. However, the applications of this

information are invaluable. If a preschooler's responses are reliable across dimensions of his behavior, a systematic investigation of attracting and avoiding stimulus characteristics would yield meaningful information in the protection of young children from themselves. The proper mode of attack would be to construct potentially harmful devices in a manner which the potential victim will not respond to.

Many comples and interacting human and environmental factors determine the occurrence of accidents in any situation. In the total picture of accidental poisoning, container characteristics are merely one approach towards unravelling the complexities surrounding accident causation. It is certainly distressing to think that the containers of poisons are actually attracting the young children to examine and ingest the bottle's contents.

In view of the findings of the present investigation, it would appear that a systematic study of poison container variables and their influence on the behavior of preschool children is warranted. This study has approached the prevention of accidental poisonings from the angle of designing containers in a manner that the preschool child will not respond to. Particularly discomforting is the fact that at the present time, most poison bottles in the United States depict a bright red skull and crossbones on the bottle label. The present research has shown that differential responses of children towards certain label symbols exist, and it was pointed out previously that children under

the age of six selectively prefer red over other colors. It would be desirable for a full-scale investigation to produce a protective poison container that would serve its' function to the knowledgeable user and still be preventive of danger to the child or unaware user.

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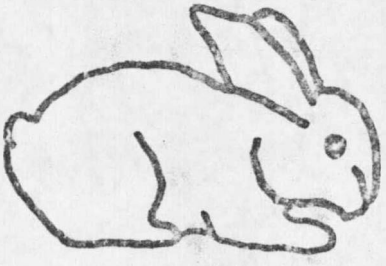
APPENDIX

APPENDIX A

Replication of Label Symbols

G_3

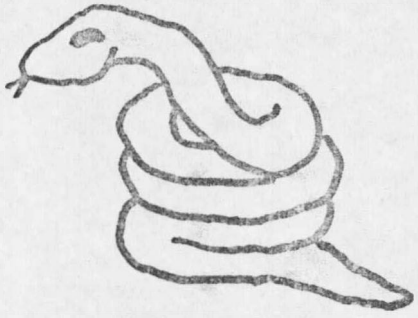
G_2



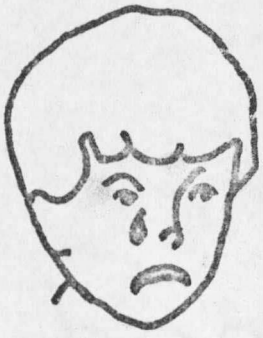
G_1

Replication of Label Symbols (cont.)

B_1



B_2



B_3

Replication of Label Symbols (cont.)

LETHAL

N_3

DANGER

N_2

POISON

N_1

Holt, Sonja

Label symbols and simulated poison bottle interaction among preschoolers