RISK TAKING AND THE RISKY SHIFT IN CHILDREN

A Dissertation

Presented to

the Faculty of the Department of Psychology

University of Houston

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

By

Robert J. Maurer

December, 1972

ACKNOWLEDGMENTS

In some respects, the most important findings from this study do not appear in the pages that follow but are, instead, the knowledge, friendship, and kindness given so freely during this study's odyssesy. Some of those who have shared so much are:

Dr. Edwin P. Willems, Chairman, and friend, who allowed me to partake of his skills, his infectious curiosity, and his patience. He shared not only his time and energy, but his home and family as well.

Drs. William LeCompte and Shalom Vineberg, who contributed their knowledge, imagination, and friendship.

Drs. Richard Rozelle and Robert Stewart, whose insights and encouragement were deeply appreciated.

Mel Taylor, who provided the sample populations used in this project.

Dr. Timothy Sadler, who aided in the computer analysis.

My parents, whose financial support and whose absolute refusal to take me seriously, was desperately needed.

And above all, Sandy.

RISK TAKING AND THE RISKY SHIFT IN CHILDREN

An Abstract of a Dissertation

Presented to

the Faculty of the Department of Psychology

University of Houston

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

By

Robert J. Maurer

December, 1972

ABSTRACT

Age, sex, and ethnic differences in the individual risk taking of children were investigated. In addition, an attempt was made to establish the group-induced shift toward risk in children. The study involved Anglo and Mexican-American children from lower socioeconomic class families, male and female, and three age groups: six years (6-0) through seven years, eleven months (7-11); 8-0 through 9-11; and 10-0 through 12-0. The measure of risk taking was a modified version of Slovic's (1966) apparatus, a box with ten toggle switches, one of which, the child believed, was connected to a buzzer. The child was instructed to choose as many switches as he wished, the experimenter flipping the desired switches. The child could choose from a variety of prizes, one prize for each switch that was chosen and which did not result in the buzzer being sounded. The child was told that if he chose the wrong switch, i.e., the one connected to the buzzer, the prizes already won would have to be returned and the game would be over. During the practice trials, the child heard the buzzer connected with various switches, but in the experimental sessions, the buzzer was disconnected. Thus, the point at which the child voluntarily withdrew from the task was taken as the measure of risk.

Children were tested in one of two conditions: either an individual played alone twice (I-I) or he was allowed to play one time alone and then a second time as part of a three person group (I-G). In the group, the children had to discuss and agree upon which switch and how many to press. In addition to the number of switches chosen, a measure of the percentage of dimes to total prizes was used.

For the first trial (I), the measure of individual risk taking, the independent variables were age, sex, and ethnicity. There were no significant differences in individual risk taking for any of these variables nor were there any significant interactions among them. Most children chose around five switches, independent of their age, sex, or ethnic group.

For subjects in the I-G condition, a shift in risk occurred ($p < .001$). The average shift in risk from the I to the G trial was 2.2 switches. There was a slightly negative shift in risk for subjects in the I-I condition. For the I-G subjects, there were no significant differences in the amount of risky shift across age, sex, or ethnic groups. The measure of the percentage of dimes to total prizes proved to be of much interest. On the first trial, the individual measure, Mexican-American children chose a higher percentage of dimes to total prizes than Anglo children and males chose a higher percentage than females. For both conditions, I-I and I-G, there was an increase in the percentage of dimes to total prizes chosen from the first to the second trial; the amount of increase was almost identical for both conditions. A correlation between the shift in risk and the shift in dime preference from the first to the second trial proved insignificant, and an analysis of covariance in which the effect of dime preference was covaried, left the strength of the risky shift virtually unchanged.

A significant correlation was found between the degree of heterogeneity of the group's initial risk preferences and the degree of shift in risk. The "ceiling effect," commonly found in adult risky-shift groups appeared in only two thirds of the I-G groups. Limitations of the present study and areas for further research are discussed.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Research on risk taking by individuals and groups is, by now, very extensive. The group-induced shift toward risk or the risky shift, i.e., the tendency for the members of a group to make riskier decisions than they do as individuals, has been found with great consistency under an assortment of laboratory conditions. It is such a consistent occurrence that it is commonly used as a classroom demonstration, but the phenomenon is a curious one. Common sense and anecdotal reports suggest that people would make more conservative decisions in a group than they would as individuals (Janis, 1971). Yet, this seldom appears to be the case in laboratory or classroom experiments. In most risky shift tasks, be they of the paper-and-pencil or the gambling variety, groups are found to take greater risks than the individuals do when making the choices alone.

Curiously, the phenomenon has been investigated almost exclusively with adults. The one risky-shift study which employed children (Kogan & Carlson, 1969) found no evidence of a shift toward risk:

> The risky shift was obtained in the case of the college students, but was exceedingly weak in the sample of elementary school children (p. 167).

However, a recent review of the risky-shift literature (Dion, Baron, & Miller, 1970) concluded incorrectly that the risky shift had been found with children. On the basis of the Kogan and Carlson study (1969), Dion et al. stated that the risky shift occurs in grade school boys and girls.

A misinterpretation such as this, appearing in a major publication, tends to become regarded as fact by persons who do not read the primary source and thus a myth is born. It would seem necessary, then, to carefully investigate the risky shift in children in order to establish whether it does or does not occur. Investigation of the risky shift in children of different ages is one of the major purposes of the present study.

A second and equally important purpose is to study individual differences in risk taking in children of different ages, which have been investigated only sparsely to date. Thus, the main purposes of the study are: (a) to investigate chronological differences in the degree of risky shift in children and (b) to investigate chronological age differences in the individual risk taking of children. Though the age dimension is the study's chief concern, ethnic and sex differences will also be examined. Some of the questions for which this study seeks answers include:

(1) What chronological age differences, if any, exist in children's individual levels of risk taking?

(2) Are there ethnic and sex differences in the levels of individual risk taking in children?

(3) Does the risky shift occur in children? If so, how is it related to age?

(4) How is the risky shift in children affected by ethnic and sex differences?

CHAPTER II

REVIEW OF THE LITERATURE

The relevant literature will be reviewed in terms of the two areas with which this study is concerned: risk taking and the risky shift. The studies in risk taking are those which have sought to measure individual differences in performance on risk-taking tasks. The risky-shift studies have gone a step further, comparing the performance of individuals on risk-taking tasks to their performance on the same tasks as members of groups.

Risk Taking

Several studies have explored risk taking in children and sex differences have been the common finding. Swineford (1941) found that ninth-grade boys chose more difficult (presumably riskier) items on an IQ test measure than did girls of the same age. Similar results were reported by Crandall and Rabson (1960). Kass (1964), using pinball machines with six, eight, and ten-year-old children, found that males were riskier than females at all three ages.

Anastasi (1958) observed children on a playground and reported that boys were more bold and adventuresome than girls. This study could be subject to experimenter bias in that the observations were not conducted in any systematic or measureable manner. Propensity for risk taking in males has been used to account for the greater number of accidents that occur among male children as compared to females (Douglas & Blomfield, 1956; Suchman & Schertzer, 1960) and has even been

invoked to account for the higher rate of delinquency among males (Anastasi, 1958; Cohen & Hansel, 1956).

Slovic (1966) studied both sex and age differences in childhood risk taking. His methodology is just as important as his findings. Dissatisfied with the risk measures available, he listed four criteria for an adequate measure of risk:

> (a) the task should be a decision-making procedure that explicitly focuses the child's attention on risk taking, that is, one which requires the subject to assess probabilities of winning and losing and their corresponding utilities prior to making a choice; (b) the task should be standard for all Ss; (c) the instructions should be easily understood by even the youngest of the Ss; (d) the task should not require motor or physical abilities that are possessed in greater measure by children of a particular age or sex (p. 171).

Slovic created a risk-taking device which has been modified for the present study. His subjects sat before a board which contained ten small knife switches. The child was told that nine of the switches were "safe" but that one of them was a "disaster" switch. The child was then instructed that he could pull as many switches as he wished, one at a time, and could stop any time he wished. But he had to stop if the disaster switch was pulled (which resulted in a buzzer sounding). For each safe switch pulled, the child received a spoonful of candy with the understanding that all candy previously won had to be returned if the disaster switch was pulled. In order to make the risk clear, each subject was informed that the more safe switches he pulled, the more likely it was that the disaster switch would be next.

Since both the probability and the magnitude of the possible loss increased with each trial (each pull of the switch), the measure of risk was the number of switches pulled before the child stopped voluntarily or before the buzzer rang.

These "involuntary terminations," he assumed, would balance out across age groups. He also assumed equal utility across age and sex groups for the candy prize. Both of these assumptions seem questionable. The assumption that involuntary withdrawals would balance out could have been controlled experimentally or the data could have been evaluated to see if this assumption was tenable. The second assumption, equal utility of the prizes across or within age groups, seems even more doubtful. A piece of candy would not seem to be equally valuable to a six and a sixteen-year-old child and may not even be of equal value to two children of the same age. If the prize is not as valuable to both, the risk would not be the same. Perhaps if Slovic had been able to control the hunger state of the children, his assumption would have been more tenable.

Slovic's experimental setting was naturalistic, in that he set up a booth at a county fair and offered children a chance to play his game for free. Thus he was in a position to gather a large sample (1,047 children: 735 males and 312 females). One problem with this experimental setting is that a strong selection factor may well have been operating. Since children had the option to play or not, this may have slanted the results in terms of risk taking in ways that are as yet unknown. One indication of this is the fact that girls were reported to refuse to play significantly more often than boys. Thus, rather than a truly random sample, Slovic may have tested only those children risky enough to play the game. If this was the case, the results may represent an over estimation of the risk-taking performance of a randomly selected group of children. Perhaps the most meaningful measure of risk was the decision to play or not to play.

Using the criterion of voluntary withdrawal from pulling the switch as a measure of risk, Slovic found that at ages 11, 14, 15, and 16, girls were less risky than boys, but that no sex differences appeared at other ages. His findings suggest that risk as a sex-related value does not occur in children 6-10 years old. After age 10, boys tended to become more risky with age, and girls, though consistently more conservative than boys, showed sharp fluctuations from year to year. Subjects were said to usually withdraw after pulling between five and seven switches. It is difficult to make developmental inferences based on cross-sectional data such as those in Slovic's study. Since he used different subjects at different ages, it is not possible to say how any one child would have behaved as he developed in chronological age.

Neither ethnicity nor socioeconomic class have been studied as variables in childhood risk taking. There has been only one study with adults (Munson, 1962) in which an attempt was made to manipulate the socioeconomic variable, and it was done in a rather casual manner. Munson set up a booth at a carnival in both high- and low-income areas of the city. In view of the subject was a container which held nine silver dollars, all painted red on one side. The container was shaken and the subject placed a five cent bet on the number of coins whose red side would appear. The amount of payoff was inversely related to the probability for the event. For example, if the subject bet on only one coin appearing red, a statistically improbable event, he could win considerably more than if he bet on four coins appearing red, a more likely occurrence. Munson found no differences in the chosen levels of risk taking as a function of the participants' income levels.

The Risky Shift

The rather extensive research on the risky shift has been reviewed in several major articles (Clark, 1971; Dion, et al., 1970; Kogan & Wallach, 1964; Pruitt, 1971a, b; Vinokur, 1971) and is the subject of a special supplement of the December, 1971, Journal of Personality and Social Psychology.

Research Paradigm

The research paradigm for studying the group-induced shift toward risk has generally followed a consistent pattern. A repeated measures design is usually utilized. Subjects are first, individually and privately, administered a task which establishes their own level of risk taking. The subjects are then placed in a group and asked again to choose a level of risk. In some cases, the subjects are asked to reach a group consensus on a risk choice and in other cases, they are asked to choose their own level of risk taking in the presence of others. Variations in some quality of the group or in the interactive process the group is to enact have been the major variables in risky-shift experiments. Originally, the difference between the mean individual risk score and the group consensus or the mean group score was the measure of risky shift (Stoner, 1961). Most investigators now add a third step, a post-group test of individual preferences, to determine if the group experience has affected individual risk taking.

When testing for the risky shift, a control or comparison group is typically used. Risky-shift subjects are measured first individually and then in groups as described above. Control group subjects receive the individual condition twice. In this way, the effects of choosing a level of risk taking, first individually and then in a group,

can be compared to choosing a level of risk taking twice individually. Other control groups are sometimes used, but the one described is the most common.

Measures of Risk

The most popular measure has been the Kogan-Wallach (1964) Choice-Dilemmas Questionnaire. This measure as Clark and Willems (1969a) describe it,

> requires the experimental subject to give advice to a set of hypothetical persons who are faced with choices between two alternative actions. In each choice, one alternative is more desirable but has a lower probability of success and the other is less desirable but has a higher probability of success (p. 216).

Less common risk-taking measures include having subjects choose among various levels of difficulty on IQ-type questions they wish to answer (Wallach, Kogan, & Bem, 1964) or dice throwing bets (Blank, 1968). As is apparent, the measures themselves simply assess risk preferences. It is when these tests are used within the risky-shift paradigm that they become measures of the risky-shift.

This brief and incomplete list of risk-taking tests suggests that several means of assessing risk levels are available. These measures have elicited risky shifts in adults, but all of them may be suspected of being too complicated for use with young children. The Kogan and Carlson study (1969) required fourth and fifth grade children to choose IQ-type questions at nine levels of difficulty. The complexity of the task may account, at least in part, for the absence of a risky shift in their subjects.

Generality of the Risky Shift

The risky shift, like most social phenomena, has been studied extensively with college students. However, the phenomenon has also been found with professional

groups (Siegel & Zajonc, 1967), business groups (Marquis, 1962; Rim, 1965; Stoner, 1961) and has been elicited in other cultures (Bateson, 1966; Lamm & Kogan, 1970; Kogan & Doise, 1969; Vidmar, 1970).

Dion, et al., (1970) point out that the sample groups have, for the most part, consisted of highly intelligent subjects. It might also be added that not only has high intelligence been selected, but that subjects have generally been from middle- and upper-middle class backgrounds. Subcultural or ethnic differences have not been explored.

There have been few investigations of the role of sex in the risky-shift phenomenon. Two studies which have compared the performances of adult male versus female groups on risky-shift tasks (Wallach, Kogan, & Bem, 1962; Wallach & Kogan, 1965) found no sex differences in the degree of risky shift.

Although the risky shift has been obtained in many studies, several experiments have found no shift or a shift away from risk (Attowe, 1960; Carlson & Davis, 1971; Hinds, 1962; Hunt & Rowe, 1960). These negative findings tend to occur when gambling measures are used to assess risk.

Some Parameters of the Risky Shift

Some of the early risky-shift studies gave the impression that the phenomenon was global and diffuse, but this is no longer the case. The risky shift is relatively circumscribed, although the task of determining its parameters has only begun.

Several experiments have provided a strong case for the notion that a risky shift can occur without group discussion to consensus (Clark & Willems, 1970; Wallach & Kogan, 1965) and even with no group discussion at all, but merely the awareness

of each others' risk choices (Blank, 1968; Teger & Pruitt, 1967).

Clark and Willems (1969a) and Willems and Clark (1969) demonstrated that the occurrence of the risky shift via the Kogan-Wallach (1964) Choice-Dilemmas Questionnaire was a function of the instructions accompanying the task. By instructing subjects to "check the probability . . . " rather than giving them the standard instructions to "check the lowest probability . . .," they found that they could eliminate the risky shift. The choice-dilemma questionnaire would appear to be a rather precarious instrument with which to assess risk preferences and the risky shift.

There are several theories which attempt to explain the risky shift. One of these, the risk-as-value hypothesis (Brown, 1965), has led to some interesting studies. This hypothesis explains the risky shift as a result of the presumed cultural values for the taking of chances and for appearing to others as willing to take risks. Brown suggested that when an individual sees that he is not as risky as others in a group, he changes his choice of risk level so as to make himself appear as risky as others. The hypothesis thus assumes that risk is a value and that one's adherence to it, relative to other members, is communicated within the group. Two investigations (Levinger & Schneider, 1969; Pilkonis & Zanna, 1969) found that individuals chose levels of risk higher than their own when asked to indicate the level of risk they most admired. Willems (1969) found that subjects tended to perceive themselves as riskier or as risky as their peers. Clark and Willems (in press) have further argued that for the risky shift to occur, the subjects must perceive themselves <u>at least as</u> risky rather than <u>more</u> risky than other group members (emphasis in the original). In line with their contention, they demonstrated that the risky shift would occur if the group

members' individual risk scores were heterogeneous but that no shift would occur if the members' individual risk scores were homogeneous. That is, if the individuals' pre-group risk preferences were identical, no shift was found in the group. If the individuals' risk preferences were different, the conservative members of the group would change their risk levels so as to appear at least as risky as the others.

It should be noted that, in addition to a shift toward risk, three other phenomena consistently occur: (a) most of the discussion in the group condition is focused on increased risk taking; (b) during the group session, be it discussion or mere communication of the others' risk-taking levels, a convergence toward a common risk-taking position occurs; (c) a "ceiling effect" takes place in which the shift toward risk does not exceed the initial level of the riskiest individual in the group (Clark, 1971; Willems, personal communication).

The Risky Shift in Children

There has been only one study of the risky shift in children. Kogan and Carlson (1969) attempted to measure risk taking, the risky shift, and some effects of competition in children, and used an IQ-type task to do so. These investigators conducted their study with a group of college students and a group of fourth and fifth grade children. Since the present study is primarily concerned with risk taking and the risky shift in children, the results from their college sample will not be reviewed. The methodology for their college sample was almost identical to that of the child sample.

One hundred and fifty children, acting first on an individual basis, were to choose from nine difficulty levels on IQ-test type questions they wished to answer.

They had to choose five questions from any one level or from different levels. The levels were described to them as questions which "4 out of 10 children would fail, 6 out of 10 children would fail, etc.," and were scored as the 40% level, and the 60% level, etc., respectively. The subjects were told that they would be rewarded with gift certificates for solving the problems and that the higher the level of difficulty they chose, the more expensive the gift certificate would be for correct solutions. Each subject was provided examples of different difficulty levels and no subject was aware of the individual choices of the others.

After the levels of difficulty were chosen, the appropriate IQ test items were not presented. Instead, the subjects were placed in groups of three, matched for age, sex, and IQ and then assigned to one of five conditions. The first was a control condition, in which the individuals chose difficulty levels a second time with no awareness of the choices of others. The second was a non-competitive group decision condition in which the group would reach a consensus as to what difficulty level to choose and would then select one member to represent them. That individual would answer the question and a correct solution would result in a reward for everyone in the group. Third, another non-competitive group decision condition differed from the previous one only in that the group as a whole, rather than one member, solved the problems. The fourth was an overt competition condition in which only one of the three group members could win a prize. The subjects would "bid" in the presence of others. Whoever had chosen the highest level of difficulty went first and if he failed to answer his question correctly, the next highest bidder would have a chance. In the case of tie bids, the tied children were both given problems simultaneously and both

could receive a prize. The fifth, a covert competition condition was identical to the previous procedure except that subjects were not aware of the others' bids. In all conditions, the difficulty levels for the individual and group procedures were selected and only then were the problems attempted and the gift certificates awarded.

There were two primary measures--the initial, individual difficulty level chosen, and the degree and direction of shift in difficulty level from the individual to the group condition. For both the individual and the group conditions, the level of difficulty chosen was converted into percentages to arrive at risk levels. For example, if an individual chose a question which was described as one which "4 out of 10 children would fail," his risk level was 40%. The mean initial difficulty level was 63.5% for male children and 59.4% for female children. The difference between male and female children at both the fourth and fifth grade levels was significant at the .05 level, males being riskier in both instances.

By comparing the difference between the difficulty levels chosen by the control group and the levels of the other four conditions, it was possible to determine if a shift in the choice of difficulty levels occurred under the group conditions. Although the investigators had found several significant differences between the control and the experimental groups in the college sample, this was not the case with the children. The only significant shift in risk was for the girls under the second condition, the non-competitive group decision, and the shift was toward less rather than more risk. The college sample had shown strong differences between the competitive and non-competitive conditions, but this was also not found in the children. In short, nothing resembling a risky shift occurred in the children.

There are several possible reasons for the absence of a significant change in risk preferences in the child sample. One is that the processes at work in adult groups do not operate in or affect children's groups and, therefore, children do not shift towards greater risk taking. However, there are other explanations for the results which would attibute the insignificant findings to an artifact of the methodology.

For example, asking children to choose among nine abstract levels of difficulty may have been too difficult a task. If a child is trying to make sense out of nine categories, he may not be able to devote much time to considerations of risk. A more plausible explanation, though, is that the lack of a risky shift in the children was a function of the task employed. Typically, risky-shift measures have required the subject to make a choice and then "cast his fate to the wind," i.e., the outcomes are subject to events largely outside the person's control. Ability or skill is seldom involved: one makes a choice and chance takes over. This is most clearly seen in the dice throwing task (Blank, 1968), but is even involved in the choice-dilemma questionnaire wherein the subject is never required to pursue the course of action he has chosen. A measure which makes demands on the subject's abilities, which involves risk, and which demands the subject to choose a level of risk and then undertake the task may arouse fear, anxiety, or in some way be threatening to the subject. What is being suggested is that the children responded to IQ-test items out of concern or fear and that the concern or fear superseded considerations of risk. The children, unlike most risky-shift subjects, were asked to choose a level of risk and then lay their abilities on the line. This interpretation would account in part for the negative shift in risk among girls in the second condition, the non-competitive group decision.

If the subjects were responding to the threat of the task, what could be more anxiety provoking than to be the one subject who, in the presence of the other group members, must answer questions and bear the responsibility for the whole group's reward? Subjects would conceivably respond to this fear by lowering the chance of failure.

There are indications that the IQ-type task did not threaten the college sample. The students came from two Eastern colleges known for their academic excellence and their students might be expected to have had much experience and proficiency with intelligence test questions. Some support for this expectation is found in the rather high initial difficulty levels of the college males (78%) and the investigators' statement that about half of the college students solved problems at the 85% level of difficulty. The investigators concluded that if half the sample could pass items on which supposedly 85% of the sample should fail, then something must have been wrong with the items. A more plausible hypothesis is that the investigators chose their sample from the top 15-30% of the population for which the IQ items had been designed. Thus there seems good reason to believe that IQ-test items do not constitute much of a threat to an elite college sample and that these subjects may well have responded more to the lure of the monetary prizes or the competition than to any fear of failure.

These arguments may be summarized as follows. From an adult's perspective, the IQ-type measure appears to require the children not only to make a choice but to demonstrate their skills and abilities as well. Risky-shift measures ordinarily require that the subject make a choice of risk level where no subsequent action is demanded (as in the choice-dilemma questionnaire) or a choice of risk level is followed by an act whose outcome is subject to chance, fate, or luck (as in dice throwing) rather than

the subjects' prowess. It is uncertain whether the children did in fact perceive the Kogan and Carlson measure as one which required skill and it is not certain that the task was threatening to them. If it was threatening, however, then the IQ measure itself elicited a kind of risk taking different from most risky-shift studies. Thus, the means of assessing risk-taking preferences may have contributed to the inability to find a risky shift in children.

Finally, even if the task was not threatening to the children, one other serious problem exists. If, as has been suggested, some ability is required to answer the IQ questions, then it is reasonable to assume that the children brought to the task various degrees of skill. It would also seem reasonable to argue that the greater the child's skill, the less risk he was taking on a difficult problem. If what is hard for one child is easy for another and both choose a problem at the same level of difficulty, can both be said to be taking the same level of risk? It would appear not. The risk in a task which requires ability is a function of the nature of the task and the skill of the subject. It is true that Kogan and Carlson matched their subjects for IQ, but the manner in which this was done was not reported nor does simply matching children on the basis of an IQ score eliminate the issue of skill. Children with identical IQ scores do not necessarily perceive themselves as having equal abilities and thus may not perceive the risk involved in a task the same. If, in the case of the child sample, the subjects were threatened by the task or the measure of risk was hopelessly confounded by the subjects' varying abilities, then it would be understandable that no shift toward greater risk was found.

In summary then, it seems that the single study of the risky shift in children contained a rather questionable methodology, and the issue of whether the risky shift

does occur in children has not been resolved. The procedures employed in the present study have eliminated the issue of skill in the determination of risk preferences. A gambling task was used in which the children, individually and in groups, were rewarded on the basis of guessing which switch on a panel was connected to a buzzer, a task involving no skill and the outcome of which appeared to be subject to chance. This procedure would thus seem to parallel more closely the risky-shift design in adult studies than would the Kogan and Carlson (1969) study and may thus constitute a better test of the risky shift in children.

CHAPTER III

METHOD

Design of the Study

A 2×3×2×2 design was used to assess the effects of four variables on four dependent variables, two measures of risk taking and two measures of prize preference: individual risk taking, shifts in risk from the first to the second trial, individual dime preference, and shifts in dime preference from the first to the second trial, respectively. Independent variables were sex, three levels of age, two levels of ethnicity, and two experimental conditions. Each experimental condition had two trials. The first trial measured each child's level of risk taking when alone. Then in condition one (I-G), the child was tested with two other children who as a group reached a consensus on the measure of risk taking; this condition was a test for the presence of the risky shift in children. In condition two (I-I), the child was tested alone again on the second trial; this condition served as a control. Each three-person group was homogeneous with respect to age, sex, and ethnicity.

Major dependent variables were risk scores on the first trial and the shift in risk scores from the first to the second trial. A measure of prize preference and shift in prize preference from the first to the second trial was also tabulated.

Subjects

Subjects for the study were 144 children, obtained from two neighborhood

day-care centers in Pasadena, Texas. One center provided Mexican-American children and the other center provided Anglo children. The subjects were evenly divided, male and female, and all the children came from families which earned less than $6000 a year.

The subjects were of both sexes, two ethnic groups, Mexican-American and Anglo, and received one of two conditions, I-I and I-G. There were three age groups: Age Level I, from 6-0 (six years) through 7-11 (seven years, eleven months); Age Level II, from 8-0 through 9-11; and Age Level III, from 10-0 through 11-11. The actual mean ages obtained from the sample were 7-1, 9-2, and 10-10, for Age Levels I, II, and III, respectively. Each cell of the design thus contained six subjects (tested in two groups of three) of the same sex, age level, ethnic group, and all of whom were tested under the same condition. For the entire sample, there were 72 children per sex, ethnic group, and condition, and 48 children at each age level.

Apparatus

Risk taking and the risky shift were measured for all groups by a modified version of Slovic's (1966) knife-switch task. The subject sat, facing a box, roughly the size of a shoebox. On the face of this box was encased a row of ten toggle switches. From the back of the box, it was possible to preset the apparatus so that when a particular switch was closed, a buzzer would sound. It was also possible to set the box so that no buzzer sounded, regardless of which switch was closed. The box was designed so that there was no danger of electrical shock. For the

purposes of discussion, this apparatus will be referred to as the Slovic Box. A schematic diagram of the box appears in Appendix A.

Procedure

There were two main experimental conditions, I-G and I-I, each containing 72 children, half from each ethnic group and sex, and a third of the 72 at each age level. Each condition consisted of two trials. For the first trial (I) in the I-G condition, each child was tested individually; on the second trial, the subject was tested as part of a group (G). On the first trial (I), the child was ushered into a room which had a large table and several chairs. On the table was a Slovic Box and the prize board, a large wooden board which colorfully displayed the gifts the child could win. Eleven different prizes were available--five kinds of chocolate, two types of gum, two types of lollipops, a balloon, and a dime (10¢). During the pilot study, these prizes were found to be highly coveted, particularly the dime. Cardboard boxes containing quantities of each prize were within sight of the child.

All subjects were tested by the same experimenter (E), a twenty-one year old Anglo female. Assistants to watch over the children and to help distribute the prizes were obtained at each center and were in all cases very familiar to the children.

E was well instructed on how to explain the task and how to answer any questions without suggesting a preferred response to the child. The task was fairly simple and standard instructions for most subjects sufficed. They were as follows:

> Hi, my name is Sandy, what's yours? Would you like to play a game with me? Okay, sit here

> please (indicating a chair to the right of E and in front of the Slovic Box). We are going to play a game using this box; on this box there are ten switches. Nine of them are "good" and one of them is "bad." When you flip a good switch like this (demonstrating) you hear no noise. That means you win and you get to pick a prize from this board here (pointing)--there are chocolate and lollipops, and balloons, and gum, and dimes. You can pick any prize you want and you can pick it as many times as you want. But if you choose the "bad" switch and the buzzer sounds, you lose and you have to give back all of your prizes. The bad switch is only one of the switches and it can be anywhere; it could be here, here, or here (demonstrating the buzzer at three different switches). So what you want to do is to be sure not to pick the bad switch because if you do, you lose everything you've won. Do you have any questions? Okay, I'm going to hide the buzzer in a secret place on one of the switches . . . remember it can be any one of them. You can pick any switch you want and can stop anytime you want but if you pick the bad switch, you have to give back all your prizes and stop playing. Okay? Good luck!

E adjusted the box so that no buzzer would sound and the child began to play. The E, not the child, manipulated the switches; the child only chose which switch E was to flip. After each successful switch, the child was allowed to select and hold his prize and was asked each time, "Do you wish to keep going or stop?" E would also remind the child after his first choice that he could obtain the same prize as often as he liked. Under no condition would the child ever be allowed to choose all ten switches; if nine switches were selected, the box was removed and the trial was over. E recorded the number of switches chosen before the subject withdrew. The number could be from 1 to 9 and it was taken as the measure of the child's initial, individual risk level. A tally was also kept of the quantity of each type of prize selected by the child.

After the child's individual trial (I), he was led into a small room and left alone with a wide assortment of toys, books, and art materials, to await the second trial. A second child was then tested in the individual trial and this child as well was put into a separate waiting room, alone. When the third child, matched for age level, sex, ethnic group, and from different families than the other two children, had been tested, the first two children, leaving their prizes from the first trial in their waiting rooms, were returned to the testing area where they met the third child, whose prizes had been removed from sight. The three children were seated and instructed for the group trial:

> We are going to play just one more time, only this time we're going to play together as a team. You see a box in front of you, the same as the last time except the bad switch is in a different place. The three of you must decide which switch to choose and when to quit. If you choose a good switch, each of you wins a prize but if you choose the bad switch, you all lose your prizes. Talk it over and decide as a team. Any questions?

E again set the box so that no buzzer would sound for any switch. The children were reminded that the prizes from the first game were not at stake. The number of switches which the group chose before withdrawing was taken as the measure of group risk taking. A tally was again kept of each child's preference for the prizes and the quantity of each taken.

Half of the subjects received the I-G condition as described above, while the other half received an individual-to-individual condition (I-I). In the I-I condition, subjects first received the individual trial (I) just as in the I-G condition. The I-I subjects were also isolated while waiting for the second trial, but when they

were brought back to the game, they played individually again. Thus, children in both conditions waited approximately the same amount of time between trials.

The children who were waiting to be tested and those who had already been tested were kept separate at all times.

Data Analysis

In both conditions, children were tested procedurally in clusters of three. Each cluster consisted of children of the same ethnic group, sex, and age level. The clusters of three were tested in random order. In the I-I condition, these clusters represented nominal groups, formed as a basis of comparison with the co-acting groups of the I-G condition.

All 144 children, those in the I-I and I-G conditions, first received the individual (I) trial. By examining the performance of all children on the first trial, the individual trial, it was possible to assess age, sex, and ethnic differences in the individual risk taking of children.

To test for the risky shift, it was necessary to compare the I-G with the I-I condition. In order for a risky shift to occur, there would have to be an increase in the number of switches chosen from the individual (I) to the group (G) trial of the I-G condition and the mean increase would have to be significantly larger than any possible increase found in the I-I condition, where there should be little or no shift from the first to the second trial.

With 11 different prizes for the child to choose from, it become possible to assess individual preferences for the prizes and any possible shifts in prize preference from the first to the second trial of each condition.

There were two reasons for using so many different prizes. First, it was necessary to find a prize which children aged six to twelve would find attractive and desirable. The prize was the stake in the gambling task and it had to be valued in order for its potential loss to constitute a risk. If the prize mattered little to the child, there would be no risk involved in the possibility of losing or gaining the prize. Since it seemed doubtful that any one prize would be equally desirable to all children, an assortment was used in the hope that each child would find at least one of the 11 prizes of value. The second reason for using so many different prizes was that the children's preferences themselves provided a variable which could be investigated.

Since dimes proved to be the overwhelmingly preferred prize, a percentage of dimes to total prizes was calculated for each trial and the shift in rate of dime preference from the first to the second trial was calculated. These percentage measures were used in an attempt to investigate the presence of any differences in prize selection as a function of condition (I-I or I-G), age, sex, or ethnic group and any effect of prize selection upon the risky shift.

Thus there were several dependent measures of interest: (a) initial, individual risk preferences, (b) initial, individual prize preferences, (c) shifts in risk preferences from the first to the second trial of both conditions, and (d) shifts in prize preference from the first to the second trial of both conditions.

The data were entered on computer cards and submitted to an analysis of variance and covariance. There was one data card per child. The first four columns of the card described the child's status with regard to the independent variables: sex,

age, ethnic group, and condition. These four items of information indicated the specific six-person cell to which the child belonged in the 2×3×2×2 design. Following this was a numeral one through six which identified in which of the two three-person groups of the cell the child was a member. Numerals one, three, and five indicated one group; numerals two, four, and six were the other group (the rationale for numbering the six cards in this way will be discussed below). The subject's age in months was recorded in case further age analyses were necessary. The child's scores on the risk measures followed. These scores included risk-taking preferences on the first and second trials. If the child had been in a co-acting group (in the I-G condition) on the second trial, the group's consensus score was the child's second trial score. In addition, the quantity of each prize taken and the percentage of dimes to total prizes was indicated for each trial.

Each child's data card then listed all the information for the three person group of which he was a member. These groups were nominal for the I-I subjects but co-acting in the case of I-G subjects. This information included: (a) group means for the first and second trial risk preferences, and (b) the mean shift in risk from the first to the second trial (calculated by subtracting the group mean of the first trial from the group mean of the second trial). A measure of the mean shift in percentage of dimes to total prizes from the first to the second trial was also calculated for each group.

Thus, to analyze the effects of age, sex, and ethnicity upon individual risk taking, first-trial scores of all 144 subjects were used. When submitting the data to the analyses of shifts in risk and dime preference from the first to the second

trial of both conditions, only 48 data cards were used, the first two of each six-person cell in the design. The first two cards of each cell represented one member of each of the two three-person groups of the cell. Since each of the three members had the identical group data, it made no difference which of the three cards was selected for the analyses, but by making the first two data cards (of the six in a cell) represent members of separate three-person groups, the computer programming was simplified.

CHAPTER IV

RESULTS

The independent factors of the design were (a) ethnic group of the subjects--Anglo or Mexican-American; (b) age of the subjects--six to eight years old (Age 1), eight to ten (Age 2), and ten to twelve (Age 3); (c) sex of the child--male and female; and (d) two treatment conditions, I-I and I-G. Each specific cell of this 2×3×2×2 design contained six children of the same age, sex, and ethnic group, and all of whom received the same condition.

Dependent measures were the subjects' risk scores (the number of switches chosen) for the first and second trial, three-person group means for the risk taking on both trials, percentage of dimes to total prizes for the individual subjects and three-person group averages for both trials, and the shift in risk and dime preference from the first to the second trial. These variables were all entered into a multifactor analysis of variance design and analyzed according to an unweighted means solution.

The findings are reviewed in terms of individual risk taking and the risky shift. Scores for the second trial of both conditions will not be discussed. The second-trial scores were important for this study only in determining shift scores, that is, changes in performance from the first to the second trial.

Individual, First-Trial Data

Individual Risk Taking, First Trial

The first-trial scores of all 144 subjects constitute the measure of individual risk taking. The scores were entered into a three-way analysis of variance. Main factors were age, sex, and ethnicity. Table 1 represents the group means and ranges for the twelve children in any one sex, age, and ethnic group while Figure 1 displays individual risk taking by age and sex. There were no significant differences in the risk scores of individuals on the first trial, the 1 trial, for any of the main factors. Most children chose around five switches, independent of their sex or age. The ethnic dimension approached significance ($F=3.88$, $df=1, 120$; $p < .10$), Mexican-American children tending toward more risk taking than Anglo children. There were no significant interactions among the main factors.

A Partial Replication of Slovic (1966)

Slovic's sample encompassed a larger age range than the present study so only portions of his data can be compared to the present findings. A more important problem in comparing the studies is a difference in the way the data are reported. When Slovic discussed age or sex differences, he was referring to differences in the percentage of subjects who stopped playing voluntarily as opposed to those who were involuntarily terminated (those who played until the buzzer rang). The present study did not have involuntary terminations and used the number of switches chosen before voluntarily withdrawing as the measure for comparing age, sex, and ethnic differences in risk taking. Thus the present study is not an exact replication of Slovic's and a

Table 1

Means and Ranges of First-Trial Risk-Taking Performance

By Ethnic Group, Sex, and Age

	Anglo		Mexican-American		Total
	Male	Female	Male	Female	
Age 1					
Mean	4.3*	4.1	5.6	4.8	4.7
Range	8	6	8	6	
Age 2					
Mean	4.7	5.3	6.0	5.4	5.4
Range	6	5	6	8	
Age 3					
Mean	5.3	4.8	5.1	5.0	5.0
Range	8	7	8	6	
Total	4.7	4.7	5.6	5.1	

*Represents the average number of switches chosen. Each cell has an N of 12.

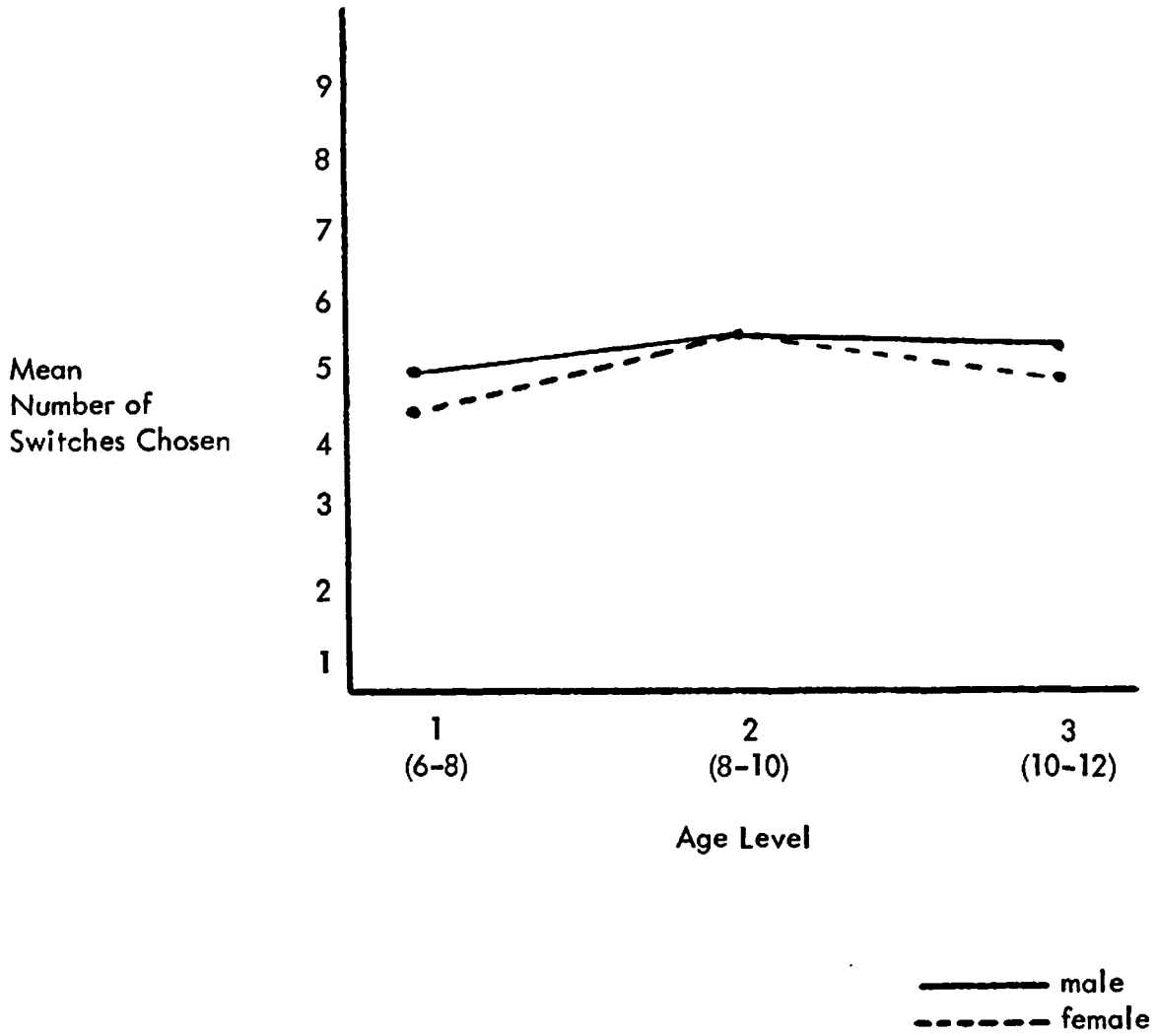


Figure 1

Sex by Age Differences in Individual Risk Taking--

First Trial Scores for 144 Subjects

comparison of the two should be undertaken with caution. Slovic found significant sex differences in risk taking at ages 11, 14, 15, and 16 but not at ages 6-10 and 12-13. The current study found no sex differences in risk taking at ages 6-12. Thus, Slovic's findings with respect to children only below age 10 have been supported.

Percentage of Dimes to Total Prizes, First Trial

There were strong differences in the types and quantities of prizes selected. Since dimes were the most favored prize, the percentage of dimes to total prizes was taken as a measure to compare the subjects' prize-taking behavior and this measure is referred to as dime preference.

During the first trial, wherein all children received the individual trial (I), significant sex and ethnic differences were found in the percentage of dimes to total prizes chosen. Table 2 displays the mean percentages of dimes to total prizes chosen by sex and age. Males chose more dimes than females ($F=6.71$, $df=1, 120$; $p < .025$), males averaging 56% dimes to total prizes compared to females 40%. Ethnicity was highly significant ($F=12.25$, $df=1, 120$; $p < .001$), Mexican-American children choosing dimes 59% of the time and Anglo children 37% of the time. The age dimension approached significance ($F=2.43$, $df=2, 120$; $p < .10$), and appeared to be a curvilinear function, children six to eight averaging 40% dimes to total prizes compared to 56% and 48% for the eight-to-ten and ten-to-twelve year old children, respectively. There were no significant interactions among the variables.

Table 2

Mean Percentage of Dimes to Total Prizes Chosen

for the First Trial (Individual) by Sex and Age

	Age 1 (6-8)	Age 2 (8-10)	Age 3 (10-12)	Total
Male	44	71	53	56
Female	36	42	43	40
Total	40	56	48	

Shift Scores

Risky Shift: Difference Between Trials

Children were tested in groups of three; the first child was tested and placed in a small anteroom, the second child was tested and placed in a second anteroom while the third child was tested. After these three children had completed the first trial (I), they would then either repeat the I trial, one at a time, or return to the testing area for the group trial (G). The children in the I-I condition (those tested individually both trials) were measured one after the other and were considered nominal, non-interacting, three-person clusters.

In order to assess shifts in risk from the first to the second trial of each condition, it was necessary to use the mean of each three-person group as the unit of analysis. A shift score was determined by subtracting the group mean of the first-trial scores from the group mean of the second-trial scores for each three-person group. The three-person groups of the I-I condition were nominal, whereas the three members of the I-G groups were co-acting, that is, the members participated with one another to arrive at a group consensus score during the second trial. Thus, when comparing the shift in risk scores from the first to the second trial of the I-I and I-G conditions, mean scores from groups are used, which are in some cases arbitrary (I-I) and in some cases co-acting (I-G).

If the subtraction of the first trial mean from the group mean results in a large and positive remainder for the I-G condition, relative to the I-I condition, a risky shift has occurred. Such was indeed the case. A four-way analysis of variance with the degree of shift as the dependent variable revealed a highly significant

treatment effect ($F=45.67$, $df=1, 24$; $p < .001$), with no other significant main effects. Table 3 presents the results of the analysis of variance for the risky shift while Figure 2 displays the degree of shift as it relates to age, sex, and treatment. The average shift in risk from the I to the G trial was 2.2 switches. For the I-I condition, the average shift was -.5 switches, that is, nominal groups when tested for risk preference a second time, shifted slightly in the negative direction, toward less risk.

Not only were there no significant differences in the degree of risky shift as a result of age, sex, or ethnicity of the subjects, but there were also no significant interactions among these variables.

A Failure to Support Kogan and Carlson (1969)

The present findings are in marked contrast to those of Kogan and Carlson (1969). They had found no evidence of a risky shift in children using an IQ-type task and several variations in group conditions. The present study has demonstrated quite dramatically that a group-induced shift toward risk occurs in children. The shift was found consistently with children of both sexes, ages six to twelve, Anglo and Mexican-American.

Dime Preference: Difference Between the Trials

For both the nominal groups of the I-I condition and the co-acting groups of the I-G condition, group averages for the percentage of dimes to total prizes for each trial were calculated. By subtracting the average percentage of the first trial from the average percentage of the second trial, it was possible to evaluate shifts in dime preference as a function of age, sex, ethnicity, and condition.

Table 3

Analysis of Variance of Shift in Risk

By Age, Sex, Ethnicity, and Treatment

Source	df	MS	F
Sex (A)	1,24	36.75	.19
Age (B)	2,24	38.58	.21
Ethnicity (C)	1,24	4.08	.02
Treatment (D)	1,24	8586.75	45.67*
A×B	2,24	379.74	2.02
A×C	1,24	52.08	.28
A×D	1,24	10.08	.05
B×C	2,24	10.58	.06
B×D	2,24	43.00	.23
C×D	1,24	14.08	.75
A×B×C	2,24	394.08	2.10
A×B×D	2,24	424.33	2.26
A×C×D	1,24	184.08	.98
B×C×D	2,24	38.58	.21
A×B×C×D	2,24	170.08	.90
Error	24	187.99	

*$p < .001$

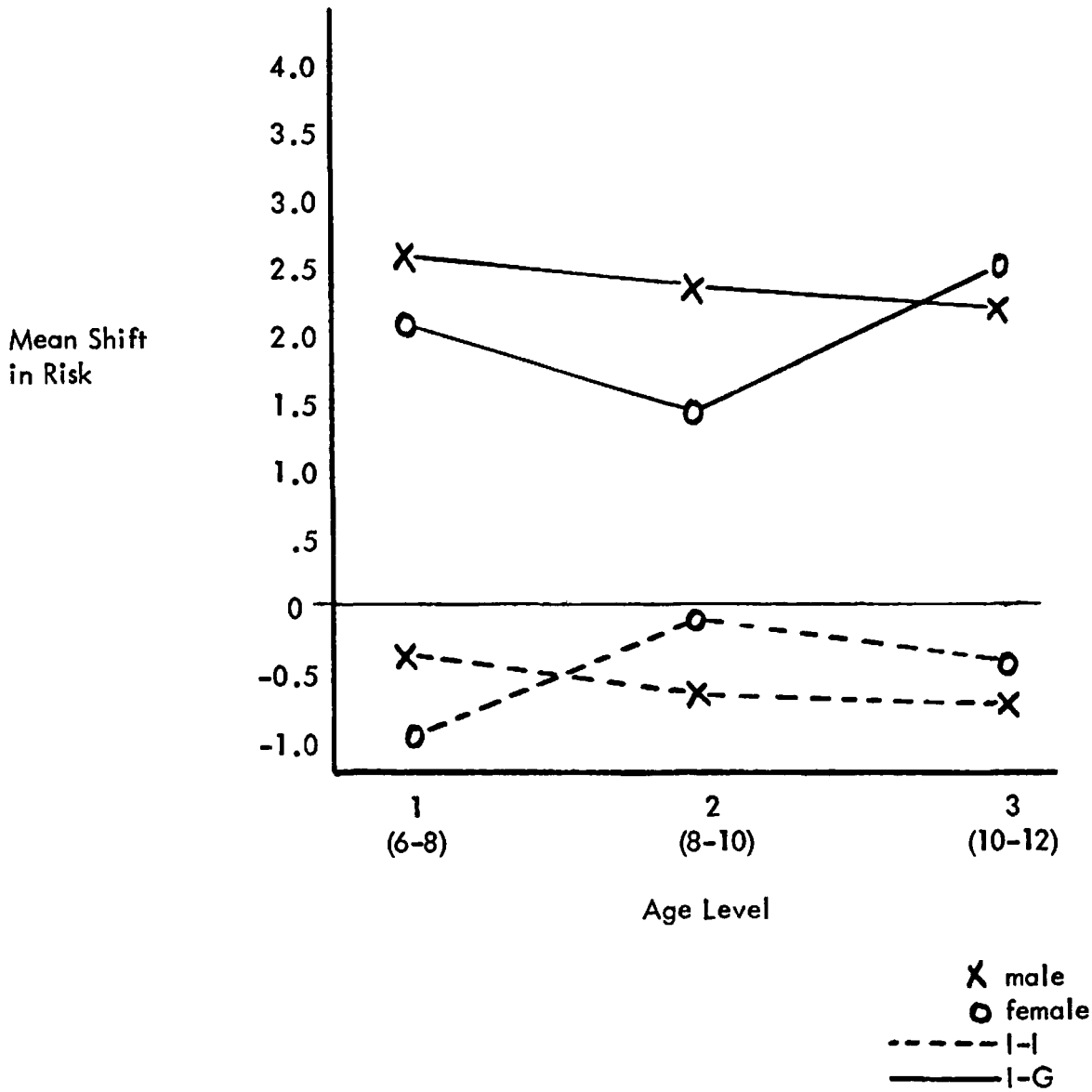


Figure 2

An Interaction of Sex, Age, and Treatment for the Risky Shift

A four-way analysis of variance, with shift in dime preference as the dependent variable, revealed no significant main effects or interactions. Subjects in the I-I condition averaged a 25% increase in dimes to total prizes from the first to the second trial compared with a 30% increase for the I-G subjects ($F=.36$, $df=1, 24$; $p < .40$).

Correlational and Covariance Analyses

Shifts in Dime Preference and Risk

Shifts in dime preference and its relation to the shift in risk was explored by means of Pearson product-moment correlations. The correlation between the I-G groups' average shifts in risk and their corresponding average shifts in dime preference was -.04, which was not statistically significant. The correlation between the degree of shift in risk for each age level, each sex, and each ethnic group, and their corresponding degree of shift in dime preference was also calculated. For none of these groups did the correlation approach significance. The changes in rates of dime preference do not seem to have related to the degree of the risky shift in any meaningful way.

As a further test, an analysis of covariance was executed in order to covary out the effect of dime preference on the risky shift. After the effect of shift in dime preference was removed, the shift in risk remained almost the same for the I-G condition relative to the I-I condition ($F=45.19$, $df=1, 24$; $p < .001$) with no other significant main effects or interactions. Thus, dime preference does not appear to have appreciably affected the presence of the risky shift in children.

Homogeneity-Heterogeneity and the Risky Shift

Willems and Clark (1971) found that, for a risky shift to occur, the group members must differ in initial risk preferences, and that the shift occurs when conservative members of the group shift their risk preferences so as to become at least as risky as the other members. This shifting by the less risky members is essential to the risk-as-value hypothesis.

With the Willems and Clark findings in mind, it was reasonable to expect in the present study that there would be a positive correlation between the degree of initial heterogeneity in the group and the amount of shift. This was indeed the case. Using the variance of the group members' individual risk scores as the index of heterogeneity and the group mean of the first trial subtracted from the group mean of the second trial as the index of the amount of shift, the Pearson product-moment correlation was +.44, which was significant ($t=2.31$, $df=22$; $p < .05$).

CHAPTER V

DISCUSSION

Individual Risk Taking

The individual risk preferences of children showed much consistency across age, sex, and ethnic groups. In the first trial (I), there was marked uniformity in responding across subjects. The average individual risk score for all 144 subjects was approximately five switches. There were no significant mean differences related to either sex, ethnic group, or the three age groups.

The present study provides a substantial improvement over Slovic's (1966) methodology and thus allows for a more refined measure of risk taking. Slovic reported his age and sex differences in terms of voluntary versus involuntary terminations of the risk task. This is a rather gross measure since involuntary termination does not really indicate a subject's risk-taking level, but rather how far he went before choosing the disaster switch. If the subject's third choice brought on the buzzer and ended the game, this can hardly be considered an accurate measure of risk since there is no way of knowing how risky the child would have been had he not been forced to stop.

In addition, Slovic's use of a single candy prize may have distorted the measure of risk. His assumption that the prizes would have the same utility value within an age group does not eliminate the problem, even if the assumption is valid. Unless the prize is valued equally by all the subjects, the risk is not the same and comparisons across age and sex groups may be confounded by variations in the

value of the prize. Are fourteen-year-old males more risky than same-aged females or did they just have less regard for the piece of chocolate and thus could play the game with little regard for the possible outcome? The present study eliminates the issue by allowing for eleven different prizes, one of which could reasonably be expected to be of value to a child. Thus the present study allowed for a more refined measure of risk than did Slovic's while also removing the possible confounding variable of the value of a single prize. Yet using a different and improved methodology, this study supports part of Slovic's findings, i.e., an absence of sex differences in individual risk taking for children six through ten years of age.

In the final analysis, there is still much doubt as to the nature of individual risk taking in children. Further, more extensive normative studies are clearly required.

Group-Induced Shift Toward Risk

The rather homogeneous individual risk preferences established a near-uniform baseline against which to assess shifts in risk from the first to the second trial of each condition. The results of the risky-shift analysis strongly suggest that a group-induced shift toward risk appears in children six to twelve years of age. The shift occurred consistently in males and females, Anglos and Mexican-Americans, and three age groups, with little variation in the amount of shift. The risky shift thus appears to be a rather powerful phenomenon in children, for it was not differentially affected by sex, age, or ethnicity.

This study thus constitutes a rather clear failure to replicate the Kogan and Carlson (1969) findings. Their inability to find a group-induced shift toward risk

among children may well have been due to their methodology. They required their subjects to select problems of varying levels of difficulty on an IQ-test type task with the understanding that the problems would be attempted and prizes awarded to those who performed successfully. They thus introduced the issue of skill into the risk measure which is atypical for risky-shift studies, and which may have been quite threatening to the subjects. The present study largely eliminated the issue of skill by using a game of chance in which ability was not a prominent factor as it was in the IQ-type task of Kogan and Carlson.

Another difference between the two studies is the manner in which the risk task was conducted. In the Kogan and Carlson study, both individual and group risk choices were made before any problems were attempted and thus before any prizes were awarded. The present study allowed for the immediate experiencing of the outcome of a risk decision, that is, the prizes were awarded as soon as the child decided to take the risk. While the immediate experiencing of the outcome of a risk choice does not seem to be necessary for adults (the choice-dilemma questionnaire is purely hypothetical yet the shift is obtained), it may well be critical in the case of children.

Prize Preference

The percentage of dimes to total prizes provided an intriguing and unanticipated measure. For the first trial, wherein all children were tested individually, significant sex and age differences appeared. Males chose a higher percentage of dimes to total prizes than did females and Mexican-American children chose a

higher percentage than Anglo children. It is noteworthy that these significant differences in dime preference for the first trial were not accompanied by any significant differences in risk preference. In other words, while subjects were relatively uniform in their risk preferences, considerable variation appeared in their desire for dimes relative to the other prizes. There are, at present, no theories or past studies against which to evaluate these findings. However, these findings provide some justification for the original hunch that variations in payoffs should be presented in order to allow for individual differences in valuation of prizes.

It was rather curious that, for both treatment conditions (I-I and I-G), there was an increase from the first to the second trial in the percentage of dimes chosen to total prizes. The increase was 25% for the nominal groups of the I-I condition and 30% for the co-acting groups of the I-G condition, a difference which was not significant. There was no reason to expect an increase in dime preference from the first to the second trial and again, these results seem rather difficult to interpret.

It is important to note that despite all of these fluctuations in prize preference, the risky shift appeared with remarkable consistency. From a methodological viewpoint, it may have been important to have many different prizes for the children to choose from, but the actual variations in prize preferences that occurred do not seem to have had any influence on the risky shift.

Risk-as-Value Hypothesis

The present study was not an attempt to test the risk-as-value hypothesis, but some of the findings have implications for the hypothesis. As Willems and Clark (1971) have demonstrated, heterogeneity of initial risk preferences is necessary for the risky shift to occur. This finding provided strong support for the risk-as-value hypothesis. According to the hypothesis, if all the group members show the same initial risk level, there would be no need for any member to shift his preference in order to appear as risky as the others. In the present study, no strict experimental control of homogeneity-heterogeneity was undertaken. Nevertheless, heterogeneity of the groups' initial risk preference was positively correlated (+.44) with the degree of shift.

Also related to the risk-as-value hypothesis is the ceiling effect, the consistent finding that the shift toward risk does not exceed the initial level of the riskiest individual in the group. This relates to the hypothesis because Brown (1965) states that the conservative group members shift their risk preference so as to appear at least as risky as the others. From this, one would expect that the initial preference of the riskiest individual would constitute a ceiling for the group's risk preference and this is in fact what normally occurs.

Of the twenty-four three-person groups in the I-G condition of the present study, eight exceeded the ceiling of the highest risk taken by one of its members in the I trial. These eight groups were almost equally divided by age, sex, and ethnic group. This deviation from the consistent finding with adult risky-shift subjects is striking and may cast some doubt on the risk-as-value hypothesis for understanding

the risky shift in children. However, there is one reason for caution in interpreting the deviation from the ceiling effect. Most previous studies have utilized pre-group and post-group measures to assess the risky shift as well as the ceiling effect. The present study used pre-group and the group consensus scores. This difference in measures may have contributed to the lack of a consistent ceiling effect in this study.

Comments on the Methodology

There has been considerable research directed at examining the processes by which the risky shift occurs and the conditions under which it fails to occur. Thus, it is possible to examine the present methodology in terms of whether the design favored or inhibited the likelihood of the occurrence of a risky shift. The size of the group has been found to strongly influence the shift. Teger and Pruitt (1967) found that the risky shift increased in magnitude with group size; three-person groups did not shift, four-person groups shifted a moderate amount, and five-person groups shifted considerably. If the Teger and Pruitt finding is reliable, then the present study, which utilized three-person groups, employed a group size which makes the amount of shift obtained even more dramatic because it used a group size that should have reduced the likelihood of the risky shift.

The nature of the task used to measure risk further inhibited the likelihood of obtaining a shift. Although the risky shift can be obtained through different kinds of tasks, gambling measures have provided the least shift toward risk. Several studies (Attowe, 1960; Hind, 1962; Hunt & Rowe, 1960; Lonergan & McClintock, 1961;

Zajonc, et al., 1968; Zajonc, et al., 1970) found no shift or a negative shift using gambling tasks. This background again makes the present findings rather striking because the use of a gambling task reduced the likelihood of obtaining a risky shift.

On the other hand, the chances of obtaining the shift were facilitated by allowing group discussion of risk taking among the children. Risky shifts can occur if the groups discuss risk taking, if the subjects watch others discuss risk taking (vicarious discussion), if the subjects exchange information without discussion, or if the subjects are merely allowed to observe others in the process of taking risks, but the shifts of greatest magnitude are found when face-to-face group discussions are employed (Kogan & Wallach, 1967). Thus in terms of the size of the group and the nature of the task, the experimental design reduced the likelihood of the shift occurring, whereas the use of the group discussion increased the likelihood of obtaining a shift.

There were some unusual aspects to the design of the present study. Most risky-shift studies bring together complete strangers. This study involved children in day-care centers where the children had known each other for a minimum of two weeks and, thus, were far from strangers. Using children who were, in varying degrees, familiar with each other, was done for purely pragmatic reasons, but it has a certain logic to it. There is a good deal of consistency in children's lives. They spend most of their time in the presence of friends and in settings familiar to them. It thus seems reasonable to examine their risk-taking behaviors in natural settings and with familiar companions. There is only one previous study which

dealt with the issue of familiarity of subjects and the risky shift. Chandler and Rabow (1969) compared the risk-taking behavior of family versus non-family groups and found that the families showed a significant but smaller risky shift than the non-family groups. Familiarity may well have been confounded with other variables when families were used, so that the question of familiarity on the risky shift remains unanswered.

The design was also somewhat unorthodox in that the measure of shift in risk was the individual trial score subtracted from the group trial score. Many risky-shift studies utilize a post-group individual measure and subtract the individual pre-group score from the individual post-group score to calculate the shift in risk. This was not done in the present study due to the limits on the amount of time any one child could be tested and because statistically, the groups should be the unit of analysis.

Another possible flaw in the design was the absence of a group-to-individual (G-I) or a group-to-group condition (G-G). These two conditions would have provided rather stringent controls for the I-G conditions. There were in the present study, however, some methodological constraints which made these two additional controls impractical. Even one of these controls would have required a substantial increase in sample size. Together, the two additional conditions would have made the demands on sample size such that the study would not have been possible. The I-I condition seemed to offer the minimal requirement for control. In addition, since the first trial offered a measure of individual risk taking as did the I-G condition, the entire sample population could be used to examine individual risk taking.

Another conceivable objection to the study might be that the magnitude of winnings prior to the group session were not strictly controlled. Kogan and Wallach (1964) have argued that there might be a relationship bewteen the amount of winnings in the I trial and the degree of risk in the G trial. This would be a genuine concern in this study except that no significant differences in risk taking in the I trial appeared across age, sex, or ethnic groups. Thus, the subjects, whether viewed in terms of age, sex, or ethnicity, all entered the second trial with roughly the same amount of prior winnings. The percentage of dimes to total prizes varied across groups, but not the total number of prizes. Furthermore, the fact that shifts in prize preference did not affect the risky shift suggests that variations in winnings may not be the crucial variable.

A unique advantage of this study was its use of children and, more specifically, children of lower socioeconomic class families. Only one previous study involved children (Kogan & Carlson, 1969) and it found no evidence of a risky shift. Most studies have involved older subjects, of high intelligence, from middle-class families (Dion, et al., 1970). The present study has, in terms of age and socioeconomic class, extended generalizability of the risky-shift phenomenon.

Finally, the use of the Slovic Box has further extended the measurement domain and generalizability of the risky-shift.

Conclusions

Further studies in childhood risk taking and the risky shift would appear to offer much promise. The present study has established the existence of risky shift in children and suggested a few of the parameters and influences upon individual risk taking and the risky shift. The ethnic and sex differences in dime preference and the shifts in dime preference from the first to the second trial of both conditions are puzzling and the inconsistency of the ceiling effect should be further explored.

The entire area of risk taking and the risky shift, both in adults and children, is in much need of naturalistic research. Even anecdotal accounts of risk taking in naturally-occurring groups are rare (Janis, 1971), but suggest that the phenomena are considerably more complicated than our laboratory simulations of risk. Children as individuals and in groups take risks daily in the classroom, on the playground, on the journey to and from school, etc., all of which we ignore in favor of experimental procedures. There are, admittedly, enormous methodological problems involved, but naturalistic studies would appear to offer an invaluable complement to our laboratory efforts.

BIBLIOGRAPHY

Anastasi, A. Differential psychology. New York: Macmillan, 1958.

Attowe, J. M. Types of conflict and their resolution: A reinterpretation. Journal of Experimental Psychology, 1960, 59, 1-9.

Bateson, N. Familiarization, group discussion, and risk taking. Journal of Experimental Social Psychology, 1966, 2, 119-129.

Blank, A. D. Effects of group and individual conditions on choice behavior. Journal of Personality and Social Psychology, 1968, 8, 294-298.

Brown, R. Social psychology. New York: Free Press, 1965.

Carlson, J. A., & Davis, C. M. Cultural value and the risky shift: A cross-cultural test in Uganda and the United States. Journal of Personality and Social Psychology, 20, 1971, 392-399.

Carney, R. E. (Ed.) Risk-taking behavior. Chicago: Charles C. Thomas, 1971.

Chandler, S., & Rabow, J. Ethnicity and acquaintance as variables in risk-taking. Journal of Social Psychology, 1969, 77, 221-229.

Clark, R. D. Group-induced shift towards risk: A critical appraisal. Psychological Bulletin, 1971, 76, 251-270.

Clark, R. D., & Willems, E. P. Where is the risky-shift? Dependence on instructions. Journal of Personality and Social Psychology, 1969, 213-221. (a)

Clark, R. D., & Willems, E. P. Risk preferences as related to judged consequences of failure. Psychological Reports, 1969, 25, 827-830. (b)

Clark, R. D., & Willems, E. P. Two interpretations of Brown's hypothesis for the risky-shift. Psychological Bulletin, in press.

Cohen, J., & Hansel, M. Risk and gambling. New York: Philosophical Library, 1956.

Collins, B. E., & Guetzkow, H. A. A social psychology of group processes for decision making. New York: Wiley, 1964.

Crandall, V. J., & Rabson, A. Children's repetition choices in an intellectual achievement situation following success and failure. Journal of Genetic Psychology, 1960, 97, 161-168.

Davies, C. M. Development of the probability concept in children. Child Development, 1965, 36, 779-788.

Dion, K. L., Baron, R. S., & Miller, N. Who do groups make riskier decisions than individuals? In L. Berkowitz (Ed.), Advances in experimental psychology, v. 5. New York: Academic Press, 1970.

Douglas, J. W. B., & Blomfield, J. M. Children under five. Fairlawn, New Jersey: Essential Books, 1956.

Edwards, W. Variance preferences in gambling. American Journal of Psychology, 1954, 67, 441-452.

Edwards, W., & Slovic, P. Seeking information to reduce the risk of decisions. American Journal of Psychology, 1965, 78, 188-197.

Goldberg, S. Probability judgments by preschool children: Task conditions and performance. Child Development, 1966, 37, 157-168.

Hinds, W. C. Individual and group decisions in gambling situations. Unpublished master's thesis. School of Industrial Management, Massachusetts Institute of Technology, 1962.

Hunt, E. B., & Rowe, R. R. Group and individual decision making in risk conditions. In D. W. Taylor (Ed.), Experiments on decision making and other studies. Arlington, Va.: Armed Services Technical Information Agency, 1960, 21-26.

Janis, I. L. Groupthink among policy makers. In N. Sanford and C. Comstock (Eds.), Sanctions for evil. San Francisco: Josey-Bass, 1971. Pp. 71-89.

Kass, N. Risk in decision making as a function of age, sex, and probability preference. Child Development, 1964, 35, 577-582.

Kogan, N., & Carlson, J. Difficulty of problems attempted under conditions of competition and group consensus. Journal of Educational Psychology, 1969, 60, 158-167.

Kogan, N., & Doise, W. Effects of anticipated delegate status on level of risk taking in small decision-making groups. Acta Psychologica, 1969, 29, 228-243.

Kogan, N., & Wallach, M. A. Effects of physical separation of group members upon group risk taking. Human Relations, 1967, 20, 41-49.

Kogan, N., & Wallach, M. A. Risk taking: A study in the cognition and personality. New York: Holt, Rinehart, & Winston, 1964.

Lamm, H., & Kogan, N. Risk taking in the context of intergroup negotiation. Journal of Experimental Social Psychology, 1970, 6, 351-363.

Levinger, G., & Schneider, D. J. Test of the "risk as value" hypothesis. Journal of Personality and Social Psychology, 1969, 11, 165-170.

Lonergan , B. G., & McClintock, C. G. Effects of group membership on risk-taking behavior. Psychological Reports, 1961, 8, 447-455.

Mandler, G., Mussen, P., & Wallach, M. A. New directions in psychology, III, New York: Holt, Rinehart, & Winston, 1967.

Marquis, D. G. Individual responsibility and group decisions involving risk. Industrial Management Review, 1962, 3, 8-23.

Munson, R. F. Decision-making in an actual gambling situation. American Journal of Psychology, 1962, 75, 640-643.

Piaget, J., & Inhelder, B. La genese de l'idèe de hasard chez l'enfant. Paris: Presses Universitè de France, 1951.

Pilkonis, P. A., & Zanna, M. P. The choice-shift phenomenon in groups: Replication and extension. Unpublished manuscript. Yale University, 1969.

Pruitt, D. G. Choice shifts in group discussion: An introductory review. Journal of Personality and Social Psychology, 1971, 20, 339-360. (a)

Pruitt, D. G. Conclusions: Toward an understanding of choice shifts in group discussion. Journal of Personality and Social Psychology, 1971, 20, 495-510. (b)

Pruitt, D. G., & Teger, A. I. The risky-shift in group betting. Journal of Experimental Social Psychology, 1969, 5, 115-126.

Rabow, J., & Pincus, F. Social organization and risk-taking. In R. E. Carney (Ed.), Risk taking behavior. Chicago: Charles C. Thomas, 1971.

Rim, Y. Leadership attitudes and decisions involving risk. Personnel Psychology, 1965, 18, 423-430.

Scodel, A. Probability preferences and expected values. Journal of Psychology, 1963, 56, 429-434.

Siegel, S., & Zajonc, R. B. Group risk taking in professional decisions. Sociometry, 1967, 30, 339-350.

Slovic, P. Risk taking in children: Age and sex differences. Child Development, 1966, 37, 169-176.

Stoner, J. A. F. A comparison of individual and group decisions involving risk. Unpublished master's thesis. School of Industrial Management, Massachusetts Institute of Technology, 1961.

Suchman, E. A., & Schertzer, A. L. Current research in childhood accidents. New York: Association for the Aid of Crippled Children, 1960.

Swineford, F. F. Analysis of a personality trait. Journal of Educational Psychology, 1941, 32, 438-444.

Teger, A.I., & Pruitt, D. G. Components of group risk taking. Journal of Experimental Social Psychology, 1967, 3, 189-205.

Vidmar, N. Group composition and the risky-shift. Journal of Experimental Social Psychology, 1970, 6, 153-166.

Vinokur, A. Review and theoretical analysis of the effects of group processes upon individual and group decisions involving risk. Psychological Bulletin, 1971, 76, 231-250.

Wallach, M. A., & Kogan, N. The roles of information, discussion and consensus in group risk taking. Journal of Experimental Social Psychology, 1965, 1, 1-19.

Wallach, M. A., Kogan, N., & Bem, D. J. Diffusion of responsibility and level of risk taking in groups. Journal of Abnormal and Social Psychology, 1964, 68, 263-274.

Wallach, M. A., Kogan, N., & Bem, D. J. Group influence on individual risk taking. Journal of Abnormal and Social Psychology, 1962, 65, 75-86.

Willems, E. P. Risk as a value. Psychological Reports, 1969, 24, 81-82.

Willems, E. P., & Clark, R. D. Dependence of the risky-shift on instructions: A replication. Psychological Reports, 1969, 25, 811-814.

Willems, E. P., & Clark, R. D. Shift toward risk and heterogeneity of groups. Journal of Experimental Social Psychology, 1971, in press.

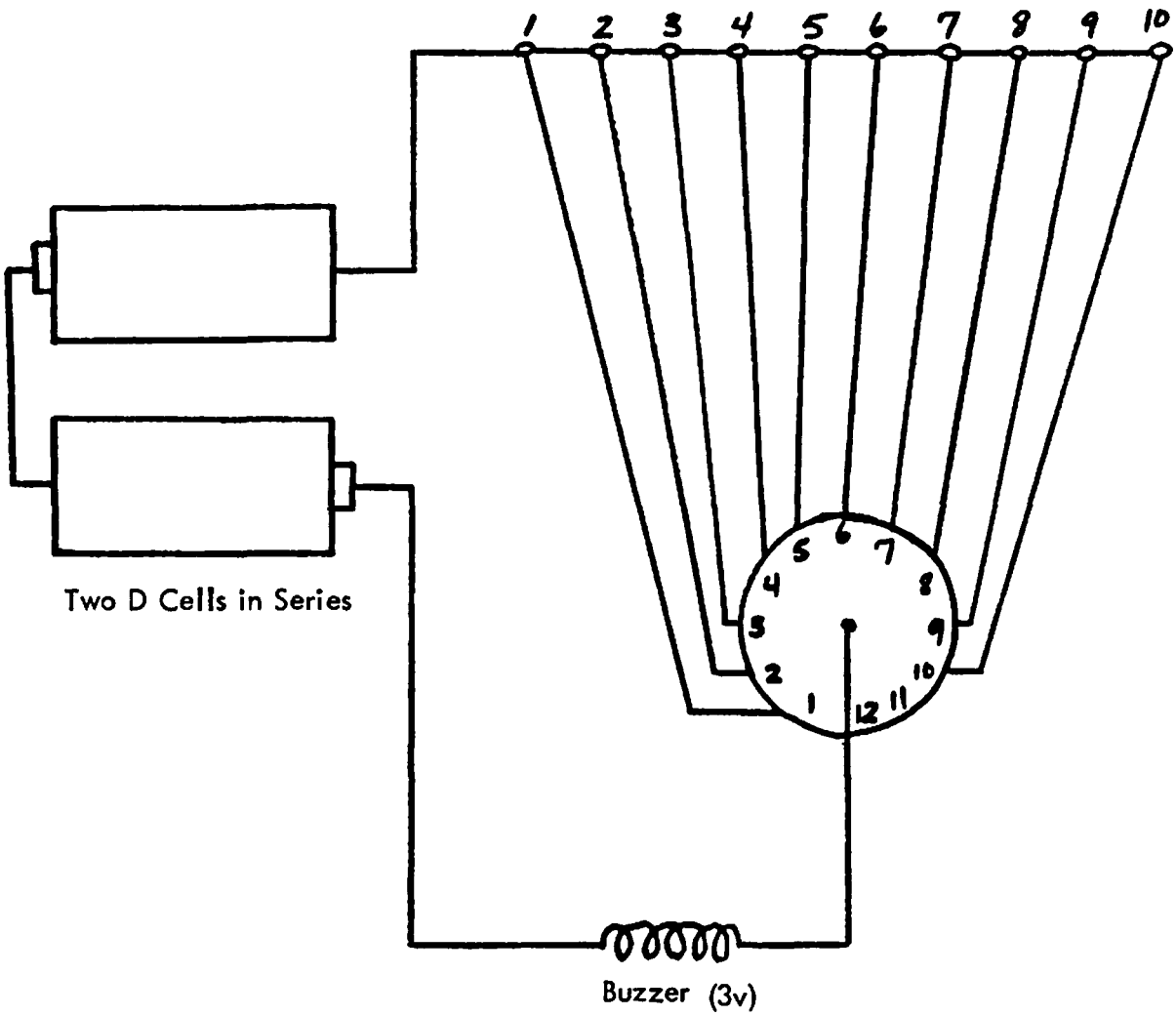
Yost, P. A., Siegel, A. E., & Andrews, J. Nonverbal probability judgments by young children. Child Development, 1962, 33, 769-780.

Zajonc, R. B. Wolosin, R. J., Wolosin, M. A., and Loh, W. D. Social facilitation and imitation in group risk taking. Journal of Experimental Social Psychology, 1970, 6, 26-46.

Zajonc, R. B., Wolosin, R. J., Wolosin, M. A., & Sherman, S. J. Individual and group risk taking in a two-choice situation. Journal of Experimental Social Psychology, 1968, 4, 89-107.

APPENDIX A

Schematic Diagram of the Slovic Box



Master control switch can be set to 1 through 10 and the selected number switch on the top panel will operate the buzzer. Setting the master switch on number 11 will make the buzzer inoperative regardless of which top panel switch is pushed.