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An Exploration Into Anxiety and How It Affects Risk-Taking in a Two Person Game

Paul J. Wolf
Loyola University Chicago

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AN EXPLORATION INTO ANXIETY AND HOW IT AFFECTS
RISK-TAKING IN A TWO PERSON GAME

by
Paul J. Wolf

A Thesis Submitted to the Faculty of the Graduate School of Loyola
University in Partial Fulfillment of the Require-
ments for the Degree of
Master of Arts

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LIFE

Paul Wolf was born in Quincy, Illinois, on March 24, 1935.

After completing high school at St. Bede Academy in Peru, Illinois, he attended St. John's University at Collegeville, Minnesota, where he was awarded the B.A. degree in Philosophy. He then was employed as a psychiatric social worker at the Lincoln State School for two years and served in the United States Army as a social worker for two years.

In June, 1963, he entered the Graduate School of Psychology at Loyola University. At present he is in training at the Loyola Child Guidance Center.

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CHAPTER I

INTRODUCTION

The purpose of this study was to attempt to determine how the taking of risk is affected by the personality variable of anxiety.

Studies on risk-taking have come to two seemingly impossible problems which must be solved before any mathematical models can be used to predict the amount of risk a person is willing to take in a given situation. These problems are also echoed in those studies which attempt to predict how people will play two-person and multiple-person games.

Edwards (1962) puts these problems in focus by dividing risk-taking theories into two categories, those which emphasize subjective utility and those which emphasize subjective probability. Utility can be considered as the reward a person might attain by choosing a particular method of play or the reward a person might gain by entering the situation. For example, if a person can win ten dollars or lose ten dollars by taking a particular risk, one of the things that has to be determined is whether ten dollars has the same value for this person as others in the same situation. Subjective probability concerns itself with the difference between an objective probability as determined by mathematics and the probability as the subject sees it. One person may consider a one-in-three chance as very risky whereas another may see it as quite safe. Scodel et alia (1959) consider the same problem when they state the assumptions; 1) that subjective or psychological probability is equal to mathematical probabilities,

and 2) that utility as a linear function of money, cannot be made to accurately predict behavior. They further assume that we can determine the utility function and can relate subjective to objective probability, but that theories of risk-taking must take into consideration personality variables.

Studies by Davits and Mason (1960) and an experiment by Sarason (1961) and Sarason's review of studies in manifest anxiety (1960) seem to indicate that persons who score high on tests which are designed to measure manifest anxiety tend to see themselves as different than other people and tend to perform with less ability on tasks which have some personal import than subjects who score low on these tests. Atkinson et alia (1957, 1960) have built a model which places people into those who are motivated toward achieving success and those who are oriented toward avoiding failure. In these studies they use two measures, achievement measures and manifest anxiety measures. Their evidence indicates that those people who are high in achievement and low in manifest anxiety tend to take moderate amounts of risk. Whereas, the low achievement, high anxious person takes either a small risk or high risk or a variety of both. Hancock and Teevan (1964) found that subjects who showed fear of failure made more irrational moves in taking risks than did subjects who showed hope of success. Their measurement of these variables was the TAT and "Hostile Press" indicators. Kogan and Wallock (1964) have completed an extensive study on risk-taking and decision making using manifest anxiety as one of their personality variables. Although they found no indication that manifest anxiety alone was a clear indicator of risk-taking, they did find that anxiety and a measure of defense would indicate significantly the type of risk a person would take. In this case the high anxious, low defense subjects tended to take extreme risks,

i.e., either high or low risks.

It is felt that Atkinson's studies, which employ a task where a person estimates his performance and then attempts to achieve what he estimates, may be studying the effects of anxiety in a personal threat and, therefore, not specifically connecting anxiety with willingness to take risk. Although Kogan's measure of risk-taking is a paper and pencil test, it is noted that there are various amounts which would be risked and that the problem of utility then enters the discussion.

It is the viewpoint of this study that risk-taking has to be explored first without the aspect of objective pressure to succeed. Secondly, subjective utility must be taken into consideration as much as possible. In order to do these things it was planned to use a simple competitive zero-sum game which has one method of play mathematically preferred. It was also planned to offer no reward other than that of playing the game itself. To measure anxiety, it was planned to use a paper and pencil test much like the Taylor Manifest Anxiety Test, but one which is relatively new and has subscales which are designed to measure specific types of Manifest Anxiety. This is the Nicolay-Walker Personal Reaction Schedule (PRS).

Anxiety is operationally defined in terms of scores on the PRS. High anxious subjects are defined as those who score a greater number of points on the test. Risk is defined as tactics available to the subject in a game. Three tactics are available to each subject, each tactic involving three distinct chances of gaining more or less points. The tactic which has the greatest chance of gaining some points is considered the safest tactic.

Following the findings of experiments completed by Atkinson and Kogan, the

following hypotheses are presented:

1. There will be no significant difference between the total amount of risk taken by high anxious and low anxious subjects.
2. There will be a significant difference between the variability of high-anxious and low-anxious subjects; high-anxious subjects will show more variability. High-anxious subjects will tend to play either the safest or riskiest tactics.
3. There will be a significant difference between high-anxious and low-anxious subjects in the amount of change that occurs during the game; high-anxious subjects will tend to change more than low anxious subjects. High-anxious subjects will not be consistent in the way they play, but will tend to change tactics as play proceeds.

CHAPTER II

REVIEW OF RELATED LITERATURE

Having as its heritage the study of gambling, the study of risk-taking has been predominantly one of attempting to find mathematical models which can explain the way people tend to take risks. Much of the research has to do with probability mathematics.

In an experiment where subjects were told to bet imaginary money and then given real money to bet, Edwards (1953) compared the study of gambling with a study of reinforcement. However, his results did not support his hypotheses and tended to show only that his subjects tended to take more risks when they were gambling with real money rather than imaginary money. Kaufman et alia (1961) found that subjects did not tend to play games according to optimal solutions which probability statistics and game theory would choose as optimal solutions. Dearnaley (1958) in an experiment where a task was interrupted found that subjects tended to take greater risks as their attempt at the task was delayed. Lieberman (1960) in an experiment where the optimal (minimax) solution was obvious and where the game was a simple 3×3 matrix game, found that half of his subjects did not use this solution exclusively from the beginning, but tended to follow it only after they determined if their opponent would be rational. Some of his subjects used other solutions, apparently irrationally, throughout the entire game. He attributes these variances to utility values.

One of the more consistent findings in all of the studies is the

differences between male and female risk-taking. Lipken et alia (1965) found this evident in a study where they attempted to predict an event at different levels of risk. Walloch and Kogan (1959) did a study of sex differences and found that although women tended to be more conservative when conditions were uncertain, they tended to take greater risks when they were more certain of their decisions. Another factor which influences risk taking seems to be the type of reward offered. Suydam and Myers (1962) discovered by using a two person game and money as reward that risk varied as the reward was positive or negative although the probability of receiving as negative was slight. A negative number in the matrix seemed to have some effect on the method of play.

The mathematical problem presented by risk-taking is raised by the studies of Coombs and Pruitt (1960, 1961). In their experiments the problem of risk-taking is studied from a mathematical approach with research carried out in an attempt to prove their models capable of predicting which probabilities will be preferred. Although their results indicate some slight success, the more clear cut result indicated that women had to be considered by a different model from men. Other researchers have investigated decision making and gambling when influenced by the group. One such study was that completed by Lonegrau et alia (1961) which indicated that members of a group tended to converge upon a common norm when making bets in a gambling situation. Suppes and Walsh (1959) developed three mutually exclusive and exhaustive probabilities for predicting risk taking and were able to predict significantly better than chance.

Ziller (1957) in a theoretical paper and in an experiment, attempted to find a method for testing utility for risks which he developed from test items skipped in an objective examination. This index supposedly indicates

cautiousness in a person and is derived by dividing the number of wrong answers by the number of unanswered questions. The test given must be of such difficulty that everyone in the game taking the test will not be able to pass some of the items. In an experiment based on the use of this ratio and a number of people who were studying for various professions it was found that the ratio was able to distinguish the various students by which profession they tended toward and assumed that some professions required the type of person who was willing to take greater risks. They also attempted to describe the person who is willing to take a risk and discovered that risk-taking correlates with such things as self confidence, physical and social adequacy, competitiveness, self expression and masculinity. Stone (1964) correlated "utility of risk" with scholastic performance, intelligence, anxiety and agreeing response set. He found no significant correlation with any of his variables.

Among the studies on risk-taking that are concerned with personality components are those which attempt to posit a basic trait in people which accounts for their willingness to take risks. Messick and Hills (1960) proposed such a trait and devised a questionnaire type test to determine this trait which they named cautiousness and related to it an intolerance for ambiguity. In the same manner, Brim (1957) developed a scale which supposedly measured a desire for certainty or desire to structure the environment. Strictland and Rodwan (1964) used the Marlowe-Crowne Social desirability Scale to determine if it could distinguish persons who would accept a signal in a guessing game. Rim (1964) found a relationship between risk-taking and scales which measured radicalism-conservatism and toughmindedness-tendermindedness. Subjects were tested in group situations where the group opinion had some effects upon the

results. Moss discovered that cautiousness and the tendency to fear failure was connected with the personality and with the situation. And along these lines, Tajfel et alia (1964) did a study which indicates that the willingness to take risks results from a complex relationship between the preferred mode of response and the risk structure of the situation.

Studies which equate willingness to take risks and the number of accidents in which a person is involved are one interest of industrial psychology and psychiatry. In this case, risk-taking is defined more as a trait which involves poor judgment. One of the more interesting studies along these lines was done by Conger et alia (1957). They used over 200 persons who were judged to be accident prone or risk-takers by the number of accidents in which they were involved. They correlated this measurement with the results of numerous tests and found that the measure of a value system was most significant, especially the Alport-Vernon aesthetic, religious and theoretical scales. Although the entire evaluation of the data was not completed, preliminary correlation with the Rorschach indicated that accident prone subjects showed an excessive dependence upon a rather regressive sort of wish-fulfilling fantasy and had little insight into their impulses and needs.

Slovic (1962) did a study to determine if some of the measure in use actually measured a risk-taking trait. He concluded that none or only a few of the variables analyzed actually measured such a trait or that the willingness to take a risk may not be a general trait but one that varies from situation to situation. In a later paper, Slovic (1964) discusses all the studies of risk-taking as a personality trait and all the studies which connect risk-taking to some personality variable. Using the concept of convergent validation from

Campbell and Fiske (1959) he indicated that at least one study in each theoretical framework is significant in the relationship of risk-taking and the variable in question. However, there is no validation across studies or across theories. Campbell and Fiske advocate a matrix of correlations among tests which represent at least two traits and are representative of at least two methods. They contend that measures of the same trait should correlate higher with each other than they do with measures of different traits assessed by the same method. Slovic did not find this among the personality variables or traits connected with risk-taking in the literature. Slovic feels that risk-taking is a multidimensional concept with probabilities and magnitudes entering into the situation. He states that arousal to risk also enters into the complexity and that conditions affect the arousal state of the individual which in turn affects the amount of risk he is willing to take.

Although this experiment's concern with anxiety and the studies conducted with anxiety is directed toward its connection with risk-taking, it is felt that some of the earlier studies conducted with the Taylor Manifest Anxiety Scale should be mentioned. It is also necessary to consider some of the affects of anxiety upon learning in order to get a clearer picture of the present problem.

Taylor (1951, 1953) with her scale which is reported to measure manifest anxiety has studied conditioning and anxiety. High-anxious subjects tend to condition easier. However, further studies indicate that as tasks become more complex, high-anxious subjects tend to perform worse than low-anxious subjects. (Taylor and Spence, 1952; Farber and Spence, 1953; Spielberger et alia, 1958).

Thus, anxiety has been considered as a drive in the sense that it is the

moving force of the organism in terms of a noxious stimulus (Spence, 1958; Mandler and Sarason, 1952). Malmö (1948) considers anxiety as a physiological interference with the relevant response which produces an irrelevant response. The interference may be reduced through a voluntary effort on the part of the subject. Child (1954) states that the studies by Mandler and Sarason with the Mandler-Sarason scale (1952) seem to indicate that subjects with high test anxiety differ from subjects with low test anxiety in the habits of responding to anxiety which have been built up through their life. High anxious subjects seem to respond with habits that are incompatible with efficient pursuit of a complex task and, therefore, do worse in situations which are designed to provoke anxiety. Sperber (1961) did a study with a measure of test-anxiety and found that high-anxious subjects do better under high stress. This may argue for specific anxiety areas or that there is a difference between anxiety as it is measured, whether it is induced from the outside or stems from internal stress.

Studies have attempted to connect anxiety with the Manifest Anxiety scale (MAS) and intelligence or ability. Spielberger (1959) found a small inverse relationship between MAS scores and grades, but only for the middle intelligence group. Alpert and Haber (1960) did a study attempting to correlate anxiety with aptitude and found no significant connection. Their comments concerning this indicated they felt that specific anxiety tests might be more appropriate in pointing out aptitude assuming there is such a relationship. Barrat (1959) used two scales, the MAS and a scale which measured impulsiveness (IS) in an experiment testing psychomotor efficiency. It was his findings that impulsiveness had a greater correlation with efficiency as measured by error time per

trial. Also impulsiveness seemed to have a longer lasting effect upon efficiency. Anxiety tended to interfere with impulsiveness in some instances. Fillenbaum and Joe Joeleman (1961) using a scale developed by Welsh (1952) to measure anxiety, found a very high correlation with dogmatism. This work followed the work of Rokeach (1960) who has done extensive studies of dogmatism. However, when they tested anxiety and performance on a problem which required a completely novel approach, they found no correlation between anxiety and performance. Barron (1953) found that by using a questionnaire type procedure, he could distinguish between subjects who had the trait of independence and subjects whom he called "yielders." Both groups were found to be equally stable but differed in their values and self-descriptions. Independents see themselves as original, emotional and artistic. This description, it seems, is somewhat similar to descriptions of high-anxious subjects. Block and Petersen (1955) used a number of assessments of personality and tests which indicated whether the subject was willing to take a chance or needed more information. He found that overly confident people tended to be rigid and dogmatic; that overly cautious people tended toward introspection and self-abasement and that realistic people were self-reliant and socially perceptive. Fast deciders were passive, suggestible, and conforming while slow deciders were self-assured and humorous. Finally the work by Wolff (1955) in which he examined anxiety and certainty should be considered. He stated that theories often posit that a lack of certainty accompanies anxiety. He felt that certainty must be divided into the subjects' degree of conviction and the amount of information he needs to make a decision. He also comments that one way of looking at anxiety is that it is something against which defenses are to be maintained. Therefore, any revealed

anxiety is a resultant of "basic anxiety" as modified by defensiveness. His experiment did not confirm this assumption. However, it is felt that his observation about decision-making has been taken up by these concepts of "utility for risk" and "subjective probability" which are so prominent in more recent studies of risk-taking.

CHAPTER III

DESIGN OF EXPERIMENT

Subjects:

Forty male students were chosen from 120 members of a freshman college class in general psychology at Loyola University. The entire class was administered the PRS, and the Taylor Manifest Anxiety Scale (MAS) as part of the class procedure at the beginning of the semester. Of the 120 students who took the tests, the 20 males who received the highest scores on the PRS and the 20 who received the lowest scores on the PRS were chosen to participate in the experiment.

In this manner, the subjects were separated into a high-anxious group and a low-anxious group. Table I indicates the means and standard deviations of the two groups on both the PRS and the MAS, the t value and level of significance between means.

TABLE I

Mean and Standard Deviation of 20 High Anxious and
20 Low Anxious Subjects scored on the PRS and the MAS

	PRS	MAS
High Anxious		
Mean	37.050	20.3000
SD	6.058	1.460
Low Anxious		
Mean	15.950	6.600
SD	2.880	3.577
T-test between Means	$t = 11.35$	$t = 10.70$
Level of Significance	$p < .001$	$p < .001$

It can be assumed that two groups have been chosen which scored significantly different on both the PRS and the MAS.

Only male students have been chosen because the literature has indicated a sex difference in risk-taking (Coombs and Pruitt, 1961; Wallach and Kogan, 1959).

Tests used:

1) Anxiety:

In order to measure anxiety both the Nicolay-Walker Personal Reaction Schedule (PRS) and the Taylor Manifest Anxiety Scale (MAS) have been used. Both of these tests are a true-false questionnaire type examination where the items are construed to indicate whether the subject feels or does not feel anxious. However, the PRS has some important differences from the MAS.

The PRS has been developed to include three scales which correspond to three isolated factors representing three types of anxiety. These three scales are defined as follows:

Anxiety Type M (Motor Tension)

"Type M anxiety is characterized by concern with external achievement coupled with physical tension which acts as a defense against feelings of inadequacy. When frustration occurs, energy is channeled somatically instead of psychically. Type M anxiety results in hyperactivity, physical and mental restlessness, or jumpiness."

Anxiety Type O (Object)

"Type O anxiety is characterized by concern that external demands and perceived expectancies may be overwhelming and one may suffer harm. It represents a protection or rationalization of one's personal inadequacy. It results in a magnification of personal problems out of proportion to objective reality. The emphasis is here on the external as a source of anxiety or unrest."

Anxiety Type P (Personal Inadequacy)

"Type P anxiety is characterized by the concern that one may not be capable of meeting the difficulties of life. The person himself feels inadequate and the inadequacy lies within himself. There is a certain helplessness and self-evaluation which may give rise to guilt feelings. The focus of the uncertainty is one's own inadequacy. (Walker and Nicolay, 1963)

The items in the PRS are mixed with 30 K-scale items from the MMPI. It is the purpose of this experiment to test the hypotheses from the total M-O-P score, but it is also expected that the results can be examined from the aspect of the separate scales. Table II represents normative data for males for the total and for the M-O-P subscales. (Walker and Nicolay, 1963).

TABLE II

The Mean and Standard Deviation on the Personal Reaction
Schedule for 717 Undergraduate Males

Scale	Mean	Standard Deviation
Total M-O-P	31.39	10.50
M	10.97	4.28
O	9.46	4.21
P	10.94	4.34

Pearson Product Moment Correlation between
Subscales and MAS and K

Subscale	MAS	K
M	.58	-.44
O	.54	-.50
P	.65	-.50
Total M-O-P	.71	-.59

Test-retest reliability for 197 college students.

M, $r = .79$; O, $r = .79$; P, $r = .85$; Total PRS, $r = .87$.

Pearson Product Moment Correlation between Subscales.

M with O, $r = .41$; M with P, $r = .55$; and P, $r = .60$.

It is noted that the PRS correlates significantly with the MAS and can be considered measuring much the same thing.

2) Risk:

In order to measure the amount of risk each subject is willing to take, a game that requires the following materials was used: 4 aces, 4 kings, 4 queens, 4 jacks, 4 tens, 4 nines from a deck of cards.

A printed card with the following payoff matrix on it and the following indicated positions of the subject and examiner was used.

		Examiner		
		J	10	9
Student	A	10	1	3
	K	0	14	0
	Q	5	4	6

This matrix is derived from a book by Luce and Raiffa (1957) and the following characteristics should be noted:

The Queen is the most likely choice of the student and the safest for two reasons; 1) he cannot gain less than 4 points, 2) if the examiner plays by chance, he will gain 15 points on three trials, whereas, he would gain only 14 if he played the Ace or the King.

The Ace has the aspect of greater risk, because he can gain 10 points but he can also only gain 1 or 3 points.

The King is the play of greatest risk since the subject can gain 14 points or 0 points.

These three plays are considered as three levels of risk; the Queen as the safe play, the Ace as the moderate risk play, and the King as the play of greatest risk.

No negative numbers were chosen for the matrix because of the different way that subjects react to negative values. (Suydam, 1962)

Procedure:

Approximately one month after the subjects had been given the PRS and the MAS in class, a list of 56 names was sent around the classroom with the following instructions:

"The names listed below are those chosen at random to participate in an experiment. We would appreciate your signing your name next to a specified time, if your name appears in the list. The experiment consists of a card game which we think you will enjoy. You will receive one credit point for participating. Thank you."

Upon entering the testing room each subject was given the following instructions:

"You have been chosen to participate in an experiment which is designed to study how people play games. You will notice that you have been given 4 aces, 4 kings, and 4 queens for a playing hand. I have in my hand 4 jacks, 4 tens, and 4 nines. On the table is a group of numbers of points you will get upon playing an ace, a king or a queen and depending upon which card I play. For example if you play an ace and I play a jack you will get 10 points, and if you play a king and I play a jack you will get no points. You will not know which card I am going to play and I will not know which card you are going to play. That is why there are four of each card so that we cannot guess which card from the position in the hand. The procedure will be as follows; we will both choose a card from our hand and lay it face down on the table. When both cards are down, they will be turned over and the amount of points you get will be determined by the pay-off matrix and the cards we have played. Then the cards will be placed back into the hand and another card chosen to be played the same way.

You may choose any card you wish. There will be 30 plays which will be the game. Your objective is to get the greatest amount of points you can.

You will notice in the payoff matrix that your playing of the Queens involves the least amount of risk on your part since you always will get some points although not a great many points on any one play. You will notice also that your playing the ace involves more risk than the Queen in that you can gain more points on one play if I should play the Jack, but less points if I should play either of the other cards. Your playing the King involves the greatest amount of risk in this game because you can win the greatest number of possible points if I should play the ten, but you gain no points if I should play either of the other two cards. Again I want to remind you that your objective is to get the most points you can. Are there any questions about how the game is played."

The game was played with a record kept of each of the subjects plays and the points he scored. The examiner played according to a set method of play for each subject which was taken from a table of random numbers. The plays of the examiner are listed in Table III and was printed on the face of one of his cards so he could look at it as he had the cards in his hand.

TABLE III

Number of Trial in Order and Card
Played on Each Trial by Examiner

Trial	Card Played	Trial	Card Played
1	10	16	9
2	J	17	10
3	J	18	J
4	10	19	9
5	10	20	10
6	10	21	10
7	9	22	9
8	9	23	10
9	J	24	J
10	9	25	9
11	J	26	9
12	9	27	J
13	J	28	10
14	J	29	10
15	9	30	J

The only requirement placed on the random order was that all three cards, Jack, ten, and nine be played ten times. This affected the last three trials in that 2 tens and a Jack had to be chosen to complete that requirement.

Scoring:

The game was scored, first by counting the number of Aces (A), Kings (K) and Queens (Q) the subject played. Secondly, a total risk score (TR) was obtained for each subject by the formula $3K + 2A + Q$. The total risk of the second 15 trials (TR_2) of each subject was subtracted from the total risk of his first 15 trials (TR_1) to obtain a measurement of tactic change. Finally, each change of tactic was counted for each subject, i.e. each time the subject played a different card from his preceeding play.

CHAPTER IV

RESULTS

Means and standard deviations of the high-anxious and low-anxious groups for the plays of the Ace, King and Queen, and for the different methods of scoring these plays, appear in Table IV. To establish whether any of the differences between means of the two groups were significant, a t test was performed. These results appear also in Table IV.

TABLE IV

Means and Standard Deviations for Scores on the Plays of
High-Anxious and Low-Anxious Groups with t and Sig-
nificance of their Differences at $p < .05$.

		High-Anxious N=20	Low-Anxious N=20	t	Significance $p < .05$
Total risk	M	56.95	56.95		
	SD	5.94	6.38	1.38	Not Significant
Kings	M	8.45	9.55		
	SD	2.84	3.11	1.20	Not Significant
Queens	M	11.50	9.80		
		3.39	3.67	1.52	Not Significant
Aces	M	10.05	10.60		
		1.97	2.97	0.70	Not Significant
K+A	M	18.50	20.15		
	SD	3.40	3.79	1.45	Not Significant
TR ₁ -TR ₂	M	0.15	-0.05		
	SD	2.95	2.41	0.002	Not Significant
Tactic changes	M	22.55	21.50		
	SD	2.62	3.31	1.11	Not Significant

No significant differences were found between the two groups. However, the low-anxious groups tends to take greater risk, as is suggested by their playing more Kings and fewer Queens than the high-anxious group, and by their having a higher TR score than the high-anxious group.

In order to test the hypothesis that the high-anxious group would vary significantly more in taking risk than the low-anxious group, an F-test between the variances was made (McNamara, 1962). Table V gives the results of these tests.

TABLE V

F-test between Variances of High-Anxious and Low-Anxious Groups for all Variables

Variable	F	Significance p = .05
Total Risk	1.15	Not Significant
Kings	1.21	Not Significant
Queens	1.17	Not Significant
Aces	2.32	Not Significant *
K+A	1.26	Not Significant
TR ₁ -TR ₂	1.53	Not Significant
Tactic changes	1.60	Not Significant

* p.<10

It is noted on Table IV that there are no significant differences ($p < .05$) between the variances of the two groups. The only variable which approached significance ($p < .10$) between the two groups is the play of the Ace.

It is possible that the variation in the play of the Ace is greater for the low-anxious group than the high-anxious group.

Although this experiment was not designed as a correlation study, Pearson Product Moment correlations were computed for each group between the scores on the game and the anxiety scores on the PRS and MAS. These correlations appear in Tables VI and VII with significant correlations noted.

TABLE VI

Correlations of High-Anxious Group $N=20$

PRS	TR	A	K	Q	AK	TR ₁ -TR ₂
M	.28	.17	.25	-.29	.30	.04
O	-.28	-.32	-.18	.34	-.34	-.17
P	.14	.35	.02	-.21	.21	-.11
T	.09	.12	.05	-.11	.11	-.11
MAS	.10	.21	.03	-.15	.15	-.12

TABLE VII

Correlations between scores on Game and PRS for Low-Anxious
Group N=20

PRS	TR	A	K	Q	AK	TR ₁ -TR ₂
M	.09	-.56*	.37	.14	-.14	.39
O	-.18	.21	-.21	.03	-.03	-.34
P	.08	-.23	.20	.02	-.02	-.27
T	.04	-.41	.25	.11	-.11	-.12
MAS	.40	.06	.37	-.34	.35	.18

* $p < .05$

Since only one correlation of sixty is significant at $p .05$ level, it is probable that this occurred by chance. Therefore, it is difficult to interpret why the M-scale on the PRS and the play of the Ace for low-anxious subjects correlate as highly as they do, ($r=.56$). As the M-score decreases in the low-anxious group, the play of the Ace increases.

The first hypothesis, that there would be no significant difference between the total amount of risk taken by high anxious and low-anxious subjects, is supported by the results. The second hypothesis, that there would be a significant difference between the variability of high-anxious and low-anxious subjects, and that high-anxious subjects would show more variability, is not supported by the results. The third hypothesis, that there would be a significant difference between high-anxious and low-anxious subjects in the amount of change that occurs during the game, and that high-anxious subjects tend to change more than low-anxious subjects, is not supported by the results.

CHAPTER V

DISCUSSION

The results indicate that there were no significant differences between the high-anxious group and the low-anxious group in the amount of risk taken or in the way risk was taken as measured by the game employed in this experiment. Although there may be some tendency for the high-anxious group to take the safer tactic, this tendency is not statistically significant; it cannot be known whether this tendency would be confirmed if the number of subjects were increased under the same condition or if the measurement of risk were taken in a different situation.

The results of this experiment, although not statistically significant, seems contradictory with the findings of Atkinson (1957, 1960) and Kogan (1961). The high-anxious group did not tend to vary more in the way it took risks than the low-anxious group; the high-anxious group showed some tendency to follow the safe tactic, which in this case is the mathematically preferred tactic. Some support for the latter behavior may be found in the experiments on anxiety and learning, (Taylor and Spence, 1952) when high-anxious subjects tended to learn simple tasks more quickly than low-anxious subjects. It may be that simplicity of tasks is not the issue in such experiments, but that the pressure to succeed may be less with simpler tasks. The studies by Davitz and Mason (1960) and by Sarason (1961) seem to support such a view.

It seems reasonable to assume that anxiety might have some affect on a

person's risk-taking behavior. The studies by Atkinson (1957, 1960) and by Kogan (1964) indicate that risk taking is some function of anxiety, although it may be a function of other variables besides anxiety. The literature on anxiety especially the experimentation of Taylor and Spence (1952, 1958) Spielberger, Goodstein and Dahlstrom (1958) and Farber and Spence (1953), seems to indicate that the effects of anxiety are manifest more in situations which require the subject to perform under some pressure. It seems possible that if this game had been played with similar high-anxious and low-anxious group under a condition which would demand some kind of success, a difference in performance might have been distinguished between the levels of no-pressure versus pressure to succeed, and between the high-anxious and low-anxious groups.

The game used in this experiment or a similar type of game has much to recommend it as an instrument in measuring risk-taking behavior. It allows for the tactics and the measurement of tactic changes. It is also possible with such an instrument to use various methods of scoring and analyzing the data obtained. However, it would be interesting to discover if persons take risks in other situations in the same way as they play the game. There may be a certain set about playing games which means that caution is either suddenly of importance or can be abandoned. It seems possible that validity of the game as an instrument in measuring risk could be established by further experimentation.

The correlations computed in this study, although not significant, indicate some possible trends. If the one significant correlation did not occur by chance, the correlation between the M-scale and the play of the Ace, it might indicate that the different sub-scales on the PRS measure variants of anxiety

as they affect different people in different situations. It is possible that an experiment which would be designed as a correlation study and which would include different degrees of pressure to succeed might indicate more about the way anxiety, as measured by the PRS sub-scales, interacts with risk-taking behavior.

Although the results of this experiment support only the hypothesis that high-anxious and low-anxious subjects do not differ in the amount of risk they are willing to take, the tendencies of the two groups as they played the game, seem to suggest that further research in this area may be profitable. It seems that if different degrees of pressure to succeed are included in the experimental design, there may be results which lend themselves to more clear interpretation.

CHAPTER VI

SUMMARY

Forty subjects from 120 were chosen according to their scores on Nicolay-Walker Personal Reaction Schedule, (PRS) 20 from the highest and 20 from the lowest. The PRS is a questionnaire type test of anxiety fashioned after the MAS and developed with three subscales which supposedly measure three types of anxiety. Each subject played a simple card game with the examiner. This game was scored according to three tactics, each of which indicated three levels of risk.

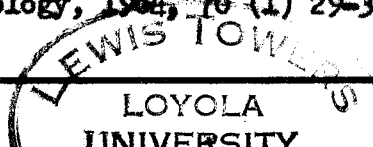
It was hypothesized that: 1) There would be no difference between the two groups in the amount of risk taken; 2) There would be a significant difference in the method of taking risk and that the high-anxious group would tend to take either the safe or the extreme risk tactics; 3) that the high-anxious group would significantly change tactics more than the low-anxious group. Only hypothesis one was supported by the results when examined by the differences between means and variances. None of the hypotheses were supported when the data was examined by correlation coefficients for the anxiety scores and the results of the game. However, there seemed to be a tendency for one subscale, anxiety, to correlate significantly with the performance of the low-anxious group. These results were discussed and suggestions were made for the further study of risk-taking as it is affected by anxiety and measured by the use of a game.

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APPROVAL SHEET

The thesis submitted by Paul J. Wolf has been read and approved by three members of the Department of Psychology.

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the thesis is now given final approval with reference to content, form, and mechanical accuracy.

The thesis is therefore accepted in partial fulfillment of the requirements for the Degree of Master of Arts.

May 31, 1966
Date

Paul J. von Thun
Signature of Adviser