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AN INVESTIGATION OF PERFORMANCE UNDER CONTINGENT AND ONE-STEP PATH CONDITIONS

by Alina Kawecki

Thesis presented to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Ph.D in Education

University of Ottawa

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CURRICULUM STUDIORUM

Alina Kawecki was born in Waltrop, West Germany on July 15, 1945. She obtained her Ontario Elementary School Teacher's Certificate in 1963. From the University of Toronto in 1969, she obtained her Bachelor of Arts Degree. Her Master of Education Degree was obtained from the University of Ottawa in 1975. The title of her interim report (1977) was, The Effects of Intrinsic and Extrinsic Reward on High and Low Need Achievers.

TABLE OF CONTENTS

Appendix Page

LIST OF TABLES

Table Page

LIST OF FIGURES

INTRODUCTION

The theory of achievement motivation has evolved over a period of thirty years. Much of the research has centered on the identification of the underlying determinants of achievement motivation. Future orientation has been identified as one of the determinants which is believed to influence the strength of an individual's achievement motivation for an achievement related activity. Recognition of the importance of future orientation has resulted in an elaboration of the theory. From this elaboration numerous predictions about achievement related behaviour have been generated.

One of these predictions is that an individual, when faced with the first activity in a series of activities that are contingently related, is more motivated at the beginning of this series of activities than at the end. Another is that an individual faced with the first of a series of contingently related activities is more motivated than when faced with just a single activity. The purpose of this study, therefore, is to test these predictions.

The report is divided into three chapters followed by a summary and conclusions. In the first chapter the theory of achievement motivation is presented together with a review of the studies relevant to future orientation. The chapter ends with a statement of the research problem and

the hypotheses. In the second chapter the research subjects are described and the measuring instruments discussed. Following is an elaboration of the experimental procedures and a description of the statistical procedures. In the third chapter the results of the study are presented and discussed and suggestions for further research are provided. The report is concluded with a summary and conclusions.

CHAPTER I

REVIEW OF THE LITERATURE

The theory of achievement motivation is presented in the first part of this chapter. The concept of future orientation as it relates to achievement motivation is described in the second part. In the third part, a number of studies related to future orientation are noted. The chapter ends with a statement of the problem and the research hypotheses.

1. Theory of Achievement Motivation.

The theory of achievement motivation originated with the work of McClelland[1] and co-workers who endeavoured to develop a valid instrument to measure human motivation. They adapted Murray's[2] Thematic Apperception Test (TAT) and used it to measure the need for achievement (n Ach). Their efforts culminated in the development of the projective n Ach Test.

Use of McClelland's n Ach Test became widespread among researchers. Some used the test to identify behavioural correlates of n Ach, while others tried to discover various personality characteristics of persons measured high or low

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1 D. C. McClelland et al., The Achievement Motive, New York, Appleton-Century-Crofts, 1976, p. xxii-386.

2 H. A. Murray et al., Explorations in Personality, New York, Oxford Press, 1938, p. 4-522.

on the test. On the basis of these and other studies, Atkinson[3] developed the theory of achievement motivation.

Atkinson's theory of achievement motivation is an attempt to explain the determinants of achievement-oriented behaviour such as persistence, level of performance, efficiency, level of aspiration, etc. A situation is said to be achievement-related when individuals expect that their performance will be evaluated by themselves or by others according to some standard of excellence, and that there will be a consequence of that evaluation which will be either favourable (success) or unfavourable (failure).

Various tendencies or inclinations to act in a particular manner, are assumed to be aroused in an achievement-related situation. These tendencies are: the tendency to achieve success; the tendency to avoid failure; the tendency to avoid success; and extrinsic tendencies. Inertial tendencies may also be present in an achievement-related situation.

The tendency to achieve success (T_s) is an excitatory or an approach tendency, aroused by the expectation of success in an achievement-related situation. According to

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3 J. W. Atkinson, An Introduction to Motivation, Princeton, New York, Van Nostrand, 1964, p. 240-241.

Atkinson,[4] T_s is a multiplicative function of three variables: the motive to achieve success (M_S), the subjective probability of success or expectancy of success (P_s), and the incentive-value of success (I_s). Expressed algebraically:

$$T_s = M_s \times P_s \times I_s \qquad (1)$$

M_S is defined as a disposition to strive for success and to feel pride in accomplishment. It is believed that M_S is a relatively stable personality characteristic which originates from early childhood experiences with success. Based on these early childhood experiences, some individuals develop a stronger M_S than others.[5]

P_s is the degree of belief that performance will be followed by success. Unlike M_S which is relatively stable within an individual, P_s varies depending upon the perceived difficulty of a task. P_s is low when a task is perceived to be difficult and high when a task is perceived to be easy.[6]

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4 J. W. Atkinson, "The Mainsprings of Achievement-Oriented Activity", in Motivation and Achievement, J. W. Atkinson and J. O. Raynor (Eds.), New York, Winston, 1974, p. 14.

5 J. W. Atkinson, "Motivational Determinants in Risk Taking Behaviour", in A Theory of Achievement Motivation, J. W. Atkinson and N. T. Feather (Eds.), New York, Wiley, 1966, p. 12-13.

6 Ibid., 1966, p. 12.

According to Moulton,[7] perceived task difficulty is in part a function of consensual difficulty, that is, the generalized difficulty level of a task as perceived by the general population, and competence judgement as defined by the degree to which an individual believes that he possesses the necessary skills to succeed in a given task.

I_s is the relative attractiveness of success in a particular activity.[8] The assumption is that

$$I_s = 1 - P_s \qquad (2)$$

Thus, when P_s is high (e.g., $P_s = .90$), I_s is low ($I_s = .10$). This assumption is based on the belief that an individual experiences more pride in accomplishment following success in a difficult task than in an easy one. While success in a difficult task may be very attractive, it does not arouse the strongest T_s. As can be derived from equation 1, a very difficult (e.g., $P_s = .10$) or a very easy (e.g., $P_s = .90$) task arouses a weak T_s, while a task of intermediate difficulty (e.g., $P_s = .50$) arouses the strongest T_s.

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7 R. W. Moulton, "Motivational Implications of Individual Differences in Competence", in Motivation and Achievement, 1974, p. 77-78.

8 J. W. Atkinson, "Motivational Determinants in Risk Taking Behaviour", 1966, p. 12.

As another source of incentive value of success independent of P_s, Raynor[9] has suggested the possible existence of achievement value. Achievement value of a task entails the cultural valuation an individual attributes to the possession of a competence or ability unique to a particular task. An individual will thus tend to attach a level of importance to a given accomplishment as a function of its cultural valuation. The relationship between achievement value and I_s has not been specified.

It should be noted that achievement value of a task need not be restricted to the cultural valuation attributed to it. Individuals may also attribute a personal valuation to a certain task which may be at odds with the concensual cultural valuation.

In addition to T_s, the tendency to avoid failure (T_{-f}) is aroused in an achievement-related situation. T_{-f} is an inhibitory tendency which functions to oppose and dampen the tendency to achieve success.[10] T_{-f} is also assumed to be a multiplicative function of three variables, the motive to avoid failure (M_{AF}), the subjective probability of

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9 J. O. Raynor, "Future Orientation in Achievement Motivation", in Personality, Motivation and Achievement, J. W. Atkinson and J. O. Raynor (Eds.), Washington, Hemisphere Publishing Corporation, 1978, p. 114-115.

10 J. W. Atkinson, "The Mainsprings of Achievement-Oriented Activity", 1974, p. 16.

failure (P_f), and the incentive value or repulsiveness of failure (I_f).[11] This assumption is expressed in a formula similar to equation 1.

$$T_{-f} = M_{AF} \times P_f \times I_f \qquad (3)$$

M_{AF} is defined as a disposition to avoid failure and a capacity for experiencing shame and humiliation as a consequence of failure M_{AF} is also believed to have originated from early childhood experiences with failure and is considered to be a relatively stable personality characteristic.[12] The strength of M_{AF} varies amongst individuals depending upon their previous experience with failure.

P_f is the degree of belief that performance will be followed by failure.[13] Since both success and failure are possible outcomes of performance, it is assumed that $P_s + P_f = 1.00$.[14] Thus,

$$P_f = 1 - P_s \qquad (4)$$

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11 Ibid., 1974, p. 17.

12 J. W. Atkinson, "Motivational Determinants in Risk Taking Behaviour", 1966, p. 13.

13 J. W. Atkinson, "The Mainsprings of Achievement-Oriented Activity", 1974, p. 17.

14 J. W. Atkinson, "A Theory of Achievement Motivation", in An Introduction to Motivation, 1964, p. 241.

I_f is described as the repulsiveness or unattractiveness of failure. The assumption relating I_f and P_s is

$$I_f = -P_s \qquad (5)$$

The repulsiveness of failure is greater (e.g., I_f = -.90) when an activity is perceived to be easy (e.g., P_s = .90) than it is (e.g., I_f = -.10) when an activity is perceived to be difficult (e.g., P_s = .10). The belief is that greater shame and embarrassment are felt when an individual fails at an easy task than at a difficult one, since few people are apt to fail at an easy task.[15]

As with I_s, Raynor's concept of achievement value may be an additional source of I_f. It is possible that achievement value may have a negative value. However, this has not been specified by Raynor.

The arousal of the two opposing tendencies, T_s and T_{-f}, results in an approach-avoidance conflict. It is assumed that these two conflicting tendencies combine additively and yield the resultant achievement tendency (also called resultant achievement motivation). Expressed algebraically

$$\begin{aligned} T_s + T_{-f} &= [M_S \times P_s \times I_s] + [M_{AF} \times P_f \times I_f] \\ &= [M_S \times P_s \times (1\text{-}P_s)] + [M_{AF} \times (1\text{-}P_s) \times (-P_s)] \\ &= [M_S \times P_s \times (1\text{-}P_s)] - [M_{AF} \times (1\text{-}P_s) \times (P_s)] \\ &= (M_S - M_{AF}) \times P_s \times (1\text{-}P_s) \\ &= (M_S - M_{AF}) \times P_s \times I_s \end{aligned} \qquad (6)$$

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15 J. W. Atkinson, "The Mainsprings of Achievement-Oriented Activity", 1974, p. 17.

Thus, it is assumed that resultant achievement motivation is a multiplicative function of the resultant achievement motive ($M_S - M_{AF}$), P_s and I_s.[16] This relationship is demonstrated in figure 1.

It is observed in figure 1 that the value of $T_s + T_{-f}$ may be either positive or negative. When $T_s + T_{-f}$ has a positive value, it means that $T_s > T_{-f}$ because $M_s > M_{AF}$. When $T_s + T_{-f}$ has a negative value, $T_{-f} > T_s$ because $M_{AF} > M_S$. Thus, positive values denote an approach (excitatory) type of resultant achievement motivation which is characteristic of individuals in whom M_S is greater than M_{AF} (success-oriented). Negative values denote an avoidant (inhibitory) type of resultant achievement motivation which is characteristic of individuals in whom M_{AF} is greater than M_S (failure-threatened).

The absolute value of the characteristic resultant achievement motivation (approach and avoidant) is larger when the absolute value of the resultant achievement motive is stronger (i.e., $M_S - M_{AF} = 3$) and when the value of P_s is intermediate. This implies that the more success-oriented individuals are, the more motivated they should be in an achievement related situation if they perceive their probability of success as .50. Also, the more failure-threatened

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16 Ibid., 1974, p. 18.

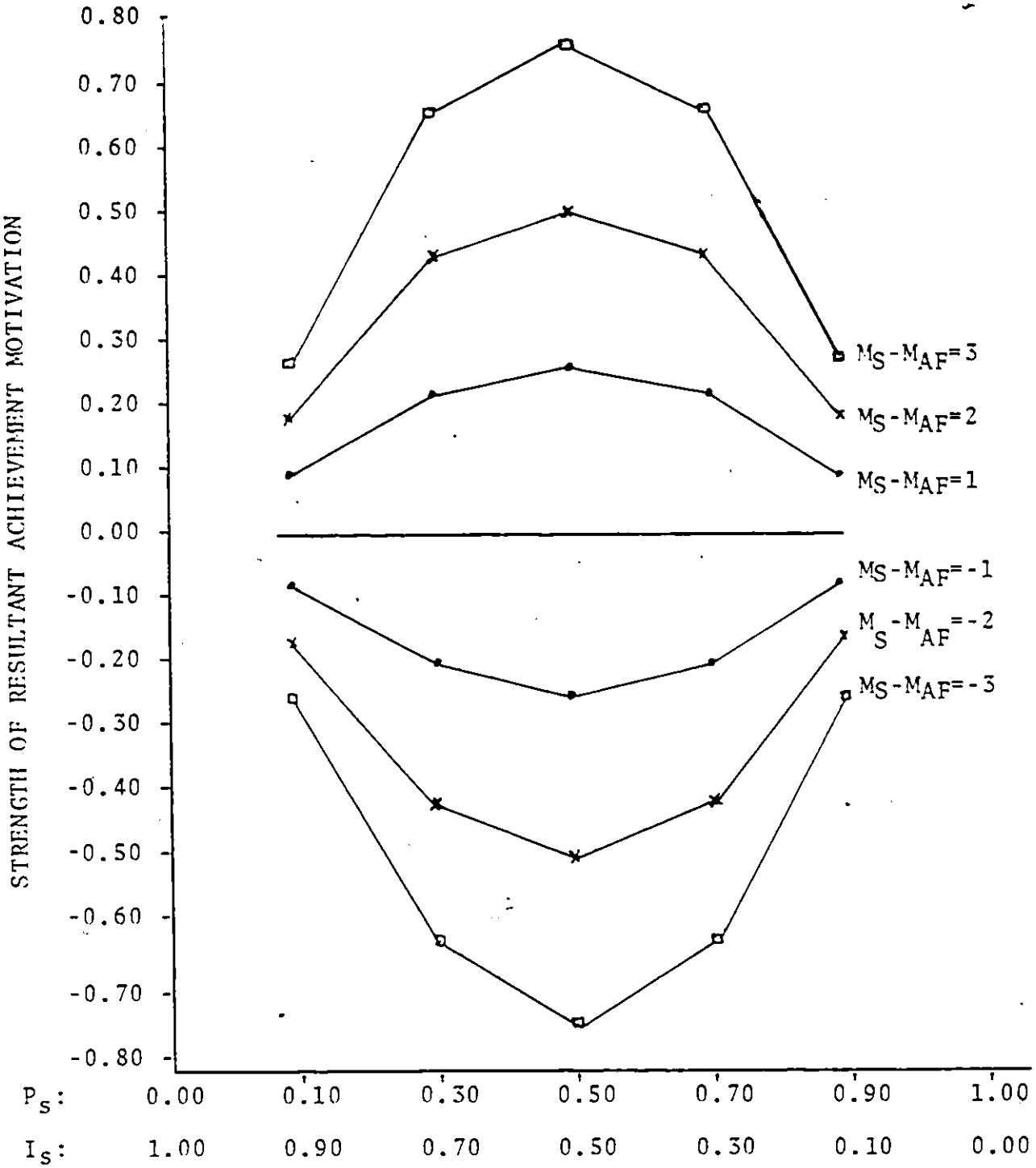

Figure 1.- Strength of Resultant Achievement Motivation as a Multiplicative Function of $M_S - M_{AF}$, P_s and I_s.

individuals are the more inhibited they should be in an achievement-related situation if they perceive their probability of success to be .50.

In an achievement-related situation, Horner[17] has noted that the tendency to avoid success (T_{-s}) may also be aroused, if an individual expects negative consequences as a result of success (i.e., loss of a friendship). T_{-s} is believed to be an inhibitory tendency which opposes and dampens the strength of T_s. Like the other tendencies, T_{-s} is also believed to be a multiplicative function of the motive to avoid success (M_{AS}), P_s and the negative incentive value of success (I_{as}). Expressed symbolically

$$T_{-s} = M_{AS} \times P_s \times I_{as} \qquad (7)$$

17 M. S. Horner, "Fear of Success in Women"; in Motivation and Achievement, 1974, p. 91-117.

Horner[18] originally postulated that T_{-s} was unique to females but recent studies[19,20,21,22,23] have indicated that T_{-s} exists in males also.

According to Atkinson,[24] extrinsic tendencies (T_{ext}), or extrinsic motivation, may also be aroused in an achievement-related situation if an individual expects consequences, in addition to success or failure, such as a material reward, approval, punishment, rejection, etc. When an individual expects positive consequences, positive extrinsic tendencies are aroused. When an individual expects negative consequences, negative extrinsic tendencies are aroused.

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18 Ibid., p. 98.

19 L. W. Hoffman, "Fear of Success in Males and Females, 1965 and 1971", in Journal of Consulting and Clinical Psychology, Vol. 42, 1974, p. 353-358.

20 C. Crealock, "Sex Vocational Stereotypes and Fear of Success in Faculty of Education Students", in The Ontario Psychologist, Vol. 42, 1974, p. 353-358.

21 J. P. Bishop, "The Motive to Avoid Success in Women and Men: An Assessment of Sex Role Identity and Situational Factors", Ph.D. Thesis, Cornell University, 1974, in Dissertation Abstracts International, Vol. 34, 1974, 6256B-6257B (University Microfilms No. 74-13, 744).

22 D. W. Tressmer, Fear of Success, New York, Plenum Press, 1977, v-245 p.

23 D. W. Tressmer, "The Cumulative Record of Research on Fear of Success", in Sex Roles: A Journal of Research, Vol. 2, 1976, p. 217-236.

24 J. W. Atkinson, "The Mainsprings of Achievement-Oriented Activity", 1974, p. 19.

In the presence of positive extrinsic motivation, success-oriented individuals become more motivated to achieve success. Failure-threatened individuals become less inhibited and may, if the extrinsic motivation is strong enough, undertake an achievement-related activity. In the presence of negative extrinsic motivation, success-oriented individuals become less motivated while failure-threatened individuals become more inhibited.

Originally, it was believed that failure-threatened individuals would not undertake an achievement-related activity without the presence of positive extrinsic motivation. However, according to Atkinson and Birch,[25] T_{-f} is now believed to be transitory and a failure-threatened individual may after some time undertake an achievement-related task even when no extrinsic motivation is present.

Extrinsic tendencies have generally been treated globally in achievement motivation studies. This is primarily because of the difficulty in identifying and measuring the motive associated with each extrinsic tendency and in manipulating and controlling these tendencies in empirical studies.

Finally, it is believed that inertial tendencies may also be present in an achievement-related situation. Inertial

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25 J. W. Atkinson and D. Birch, "The Dynamics of Achievement-Oriented Activity", in Motivation and Achievement, 1974, p. 299.

tendency is defined as a behavioural tendency which, once aroused, will persist in its present state until satisfied.[26] For instance, if in an achievement-related situation, a success-oriented individual fails, the resultant achievement tendency to achieve success should persist in a subsequent trial since it had been aroused but not satisfied in the previous trial. Thus, for the success-oriented individual, the strength of the resultant achievement tendency should be greater in the next trial. However, if in an achievement-related situation, a failure-threatened individual fails, the resultant achievement tendency to avoid failure should persist. Therefore, on a subsequent trial, the strength of the resultant achievement tendency to avoid failure is greater than that in the previous trial.[27]

While it was believed that inertial tendencies affect an individual's strength of achievement motivation, they were not included in Atkinson's formulation (equation 6). However, Weiner[28] who first studied the motivational effects of success and failure on performance, advocated that inertial

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26 J. W. Atkinson and D. Birch, "The Dynamics of Achievement-Oriented Activity", in Motivation and Achievement, 1974, p. 273.

27 Ibid., p. 310-311.

28 B. Weiner, "The Effects of Unsatisfied Achievement Motivation on Persistence and Subsequent Performance", in Motivation and Achievement, 1974, p. 347-357.

tendencies should be included in Atkinson's model (equation 6).

In addition, Revelle and Michaels[29] argued that inertial tendencies should be taken more seriously in the theory of achievement motivation. They purported that if inertial tendencies were considered, then predictions concerning the strength of achievement motivation would be altered. Instead of achievement motivation being strongest for tasks of moderate difficulty (as observed in figure 1), it would be strongest for difficult tasks. They argued that if an individual in an achievement-related situation failed on a particular achievement task, then motivation to succeed in the next trial should increase because of the inertial tendency. If in the next trial the individual failed again, motivation to succeed should further increase. In other words, achievement motivation is a linearly increasing function of the number of trials since the last success.[30] But the number of trials since the last success is a function of task difficulty. For an easy task, there would be fewer trials between successes, whereas for a difficult task, there would be more. Therefore, not only is motivation a linearly increasing function of the number of trials but it also

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29 W. Revelle and E. J. Michaels, "The Theory of Achievement Motivation Revisited: The Implications of Inertial Tendencies", in Psychological Review, Vol. 83, 1976, p. 394-404.

30 Ibid., p. 397.

increases faster for the more difficult tasks than for the easier ones.[31]

While Revelle and Michaels present a more general theory of achievement motivation, they do not appear to address achievement motivation with respect to the failure-threatened individual. In fact, they state that their theory of achievement motivation is particularly relevant for positively motivated indivuals and less so for negatively motivated individuals.[32]

All the aforementioned tendencies, T_s, T_{-f}, T_{-s}, T_{ext}, and inertial tendencies are assumed to combine additively to yield an individual's total achievement motivation to undertake an achievement activity.

The theory of achievement motivation has been supported by a number of empirical studies, many of which have been reported by Atkinson,[33] Atkinson and Feather,[34] Atkinson and Raynor,[35] and Heckhausen.[36]

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31 Ibid.

32 Ibid., p. 400.

33 J. W. Atkinson, An Introduction to Motivation, 1964, p. 240-323.

34 J. W. Atkinson and N. T. Feather (Eds.), A Theory of Achievement Motivation, 1966, p. v-392.

35 J. W. Atkinson and J. O. Raynor (Eds.), Motivation and Achievement, 1974, p. iii-479.

36 H. Heckhausen, The Anatomy of Achievement Motivation, New York, Academic Press, 1967, p. vxii-215.

In summary, in this section, Atkinson's theory of achievement motivation was presented. The discussion included the tendency to achieve success (T_s), the tendency to avoid failure (T_{-f}), the tendency to avoid success (T_{-s}), extrinsic tendencies (T_{ext}), and inertial tendencies. The determinants of these tendencies such as motives (M_S, M_{AF}, M_{AS}), subjective probabilities (P_s and P_f) and incentive values (I_s, I_f, I_{as}) were also presented and discussed. In the next section, Raynor's concept of future orientation and its implications, are presented along with his modifications of Atkinson's theoretical formulations.

2. Future Orientation.

From the foregoing discussion of achievement motivation, it is clear that an individual's expectation of the consequences resulting from engaging in an achievement-related activity and the incentive value of these consequences are important determinants of an individual's total motivation to undertake an achievement activity. However, Raynor[37] noted that in addition to the immediate consequences, an individual may also expect future consequences (future orientation), such as future success(es), future failure(s),

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37 J. O. Raynor, "Future Orientation in the Study of Achievement Motivation", in Motivation and Achievement, 1974, p. 126.

and/or future extrinsic consequences.

According to Raynor,[38] future orientation refers to an individual's belief that the immediate activity with which he is faced, is but one in a series of activities leading to some distant future goal. The individual also believes that there is a consequence associated with each of the activities and that that consequence may be either success or failure.*

Raynor[39] distinguished between two types of future orientation, contingent and noncontingent. The difference is based on an individual's perception of the relationship between the immediate activity and each of the future activities. Contingent future orientation (contingent path) refers to a situation where an individual perceives a series of activities and believes that success in the immediate activity guarantees the opportunity to strive for success in the future activities, while failure in the immediate activity guarantees future failure through loss of the opportunity to continue along the path.

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38 J. O. Raynor and R. M. Sorrentino, "Effects of Achievement-Related Motives and Task Difficulty on Immediate Performance in Contingent Paths", Unpublished Paper, State University of New York at Buffalo and The University of Western Ontario, 1972, p. 1.

39 J. O. Raynor, "Future Orientation in the Study of Achievement Motivation", 1974, p. 131-132.

* To simplify the discussion, expectation of extrinsic consequences will be excluded unless otherwise stated.

Noncontingent future orientation (noncontingent path) refers to a situation where an individual perceives a series of activities but believes that success or failure in any one activity has no bearing on the opportunity to engage in a subsequent activity in the path. Thus, future success or failure does not depend upon immediate success or failure.

Raynor[40] also refers to a one-step path situation where there is no future orientation because an individual perceives only one step (as assumed in Atkinson's theory).

In order to determine the strength of an individual's characteristic resultant achievement motivation for the immediate activity in any one of the three aforementioned achievement-related situations, Raynor made a number of assumptions and modified Atkinson's formulations accordingly.

Raynor[41] assumed the following: (a) an activity is the immediate next step in a path; (b) a path consists of a series of steps; (c) each step represents an activity and its expected consequences; (d) steps in a path are identified by their anticipated order of occurrence; and (e) the individual's knowledge of what activities will lead to what consequences within a class of incentives (i.e., achievement incentives) determines the effective length of the path.

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40 Ibid., 1974, p. 131-132.

41 Ibid., 1974, p. 127.

Raynor[42] also assumed that there is a component tendency to achieve success (T_{s_n}) associated with each step in a path. The summation of T_{s_n} is assumed to yield T_s for the immediate activity in the path. That is

$$T_s = T_{s_1} + T_{s_2} + \ldots + T_{s_n} + \ldots + T_{s_N} \quad (8)$$

$$\text{or} \quad T_s = \sum_{n=1}^{N} T_{s_n} \quad (9)$$

where the subscripts 1, 2, ... n ... N represent the anticipated order of steps (activities and consequences) in a path, from the (1) to the last (N) step, and n represents a general term for any particular position in this anticipated sequence.

Likewise, Raynor[43] assumed a component tendency to avoid failure (T_{-f_n}) to be associated with each step. The summation of T_{-f_n} is assumed to yield T_{-f} for the immediate activity in the path. That is

$$T_{-f} = T_{-f_1} + T_{-f_2} + \ldots + T_{-f_n} + \ldots + T_{-f_N} \quad (10)$$

$$\text{or} \quad T_{-f} = \sum_{n=1}^{N} T_{-f_n}$$

T_{s_n} is assumed to be a multiplicative function of the motive to achieve success, subjective probability, and incentive value of success. Expressed symbolically

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42 Ibid., p. 127.

43 Ibid.

$$T_{s_n} = M_S \times P_{1s_n} \times I_{s_n}{}^{44} \qquad (12)$$

where P_{1s_n} represents the subjective probability that immediate success (1) will lead on to future success (n). A special assumption is made concerning the subjective probability of success (P_{1s_n}) associated with T_{s_n}. When an individual believes that future success depends upon immediate success as in a contingent path situation, it is assumed that there is an associative link between success in the immediate step (1) and success in the future step (n). Therefore, P_{1s_n} is assumed to be a multiplicative function of the subjective probabilities of success perceived at each step (P_{ns_n}) in the path, prior to and including step n. That is

$$P_{1s_n} = P_{1s_1} \times P_{2s_2} \times \ldots \times P_{ns_n}{}^{45} \qquad (13)$$

where P_{ns_n} represents the subjective probability of success at a particular step (n).

Raynor[46] has questioned whether the P_{1s_n} is multiplicatively determined. He speculated that P_{1s_n} may be determined by averaging the P_{ns_n} values in a contingent path.

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44 Ibid., p. 127.

45 Ibid., p. 129.

46 J. O. Raynor, "Future Orientation, Self Evaluation and Motivation for Achievement", Research Proposal submitted to the National Science Foundation, State University of New York at Buffalo, 1976, p. 19.

This however, remains inconclusive.

In a noncontingent path situation, where an individual does not perceive that immediate success is necessary to engage in the future steps, there is no associative link between success in the immediate step (1) and success in the future step. Therefore, P_{1s_n} is not assumed to be a multiplicative function of all the P_{ns_n} values in the path prior to and including step n.[47]

I_{s_n}, which is the incentive value of success in a given step n, is assumed to be related to P_{1s_n} in the following way:

$$I_{s_n} = 1 - P_{1s_n} \quad [48] \qquad (14)$$

As can be derived from equation 12, when individuals perceive themselves in a noncontingent path, component tendencies associated with future steps in a path are not aroused because there is no associative link between the immediate step and the future steps. In a one step path, where there is only one step, no other component tendencies are aroused.

The assumptions regarding T_{-f_n} are the following:

$$T\text{-}f_n = M_{AF} \times P_{1f_n} \times I_{f_n} \quad [49] \qquad (15)$$

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47 J. O. Raynor, "Future Orientation in the Study of Achievement Motivation", 1974, p. 128.

48 Ibid., p. 130.

49 Ibid., p. 127.

$$P_{1f_n} = 1 - P_{1s_n} \tag{16}$$

$$I_{f_n} = -(P_{1s_n})^{50} \tag{17}$$

To determine the strength of resultant achievement motivation for the immediate step in a path, T_s and T_{-f} are assumed to summate. Following, are the formulations which lead to an achievement motivation equation which is more general than equation 6.

$$T_s + T_{-f} = \sum_{n=1}^{N} T_{s_n} + \sum_{n=1}^{N} T_{-f_n} \tag{18}$$

$$\text{but} \quad \sum_{n=1}^{N} T_{s_n} = M_S \sum_{n=1}^{N} (P_{1s_n} \times I_{s_n}) \tag{19}$$

$$\text{and} \quad \sum_{n=1}^{N} T_{-f_n} = M_{AF} \sum_{n=1}^{N} (P_{1f_n} \times I_{f_n}) \tag{20}$$

$$\text{but} \quad I_{s_n} = 1 - P_{1s_n}$$

$$P_{1f_n} = 1 - P_{1s_n}$$

$$I_{f_n} = -P_{1s_n}$$

$$\text{therefore } T_s+T_{-f} = M_S \sum_{n=1}^{N} \{P_{1s_n} x (1-P_{1s_n})\} + M_{AF} \sum_{n=1}^{N} \{(1-P_{1s_n}) x (-P_{1s_n})\}$$

$$= M_S \sum_{n=1}^{N} \{(P_{1s_n} x (1-P_{1s_n})\} - M_{AF} \sum_{n=1}^{N} \{(1-P_{1s_n}) x P_{1s_n}\}$$

$$= M_S - M_{AF} \sum_{n=1}^{N} \{P_{1s_n} x (1-P_{1s_n})\}$$

$$\text{or} \quad T_s+T_{-f} = M_S - M_{AF} \sum_{n=1}^{N} (P_{1s_n} x I_{s_n})^{51} \tag{21}$$

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50 Ibid., p. 130.

51 Ibid., p. 128.

As can be seen from equation 21, Raynor's formulation may be applied in a one-step path, noncontingent, or a contingent path situation. When applied in the former two situations, the predictions are similar to those when Atkinson's formulation (equation 6) is used. However, when applied in a contingent path situation, the predictions differ. In Table I, $T_s + T_{-f}$ is calculated for the first step of three four-step contingent paths.

As observed in Table I, the value of $T_s + T_{-f}$ for the first step of the four-step easy contingent path (i.e., $P_{n^S n} = .90$) is calculated to be .66. If this were the first step of an easy noncontingent or an easy one-step path situation, the value of $T_s + T_{-f}$ would be .09. Similarly, in the first step of the moderately difficult contingent path (i.e., $P_{n^S n} = .50$), $T_s + T_{-f}$ is .61, whereas in the first step of a moderately difficult noncontingent path or a moderately difficult one-step path, the value of $T_s + T_{-f}$ would be .25. Finally, while the value of $T_s - T_{-f}$ is larger in the first step of the difficult contingent path (i.e., $P_{n^S n} = .10$), it is not much larger than in the first step of a difficult noncontingent path or of a one-step path (.09).

The implication is that the strength of the characteristic resultant achievement motivation ($T_s + T_{-f}$) for the first step in a contingent path situation is stronger than for either the first step in a noncontingent path situation

Table I.- Calculation of the Magnitude of Resultant Achievement Motivation ($T_s + T_{-f}$) for the First of Four Steps of Easy ($P_{ns_n} = .90$), Moderately Difficult ($P_{ns_n} = .50$) and Difficult ($P_{ns_n} = .10$) Contingent Paths Assuming $T_s+T_{-f}=M_S-M_{AF}\sum_{n=1}^{N}(P_{ns_n}xI_{s_n})$ and $M_S-M_{AF}=1$.[a]

Type of Contingent Path	Step in the Path	Subjective Probability of Success at Each Step	Subjective Probability of Immediate Activity leading to Each Future Success	Incentive Value of Future Success	Component Tendency at Each Step	Resultant Achievement Motivation
	n	P_{ns_n}	P_{1s_n}	I_{s_n}	T_{s_n}	$M_S-M_{AF}\sum_{n=1}^{N}(P_{ns_n}xI_{s_n})$
Easy Contingent Path	1	.90	$.90^1 = .90$	1-.90 = .10	.90x.10=.09	
	2	.90	$.90^2 = .81$	1-.81 = .19	.81x.19=.15	
	3	.90	$.90^3 = .73$	1-.73 = .27	.73x.27=.20	1 x .66 = .66
	4	.90	$.90^4 = .66$	1-.66 = .34	.66x.34=.22	
					$\sum_{n=1}^{N} T_{s_n} = .66$	
Moderately Difficult Contingent Path	1	.50	$.50^1 = .50$	1-.50 = .50	.50x.50=.25	
	2	.50	$.50^2 = .25$	1-.25 = .75	.25x.75=.19	
	3	.50	$.50^3 = .12$	1-.12 = .88	.12x.88=.11	1 x .61 = .61
	4	.50	$.50^4 = .06$	1-.06 = .94	.06x.94=.06	
					$\sum_{n=1}^{N} T_{s_n} = .61$	
Difficult Contingent Path	1	.10	$.10^1 = .10$	1-.10 = .90	.10x.90 =.09	
	2	.10	$.10^2 = .01$	1-.01 = .99	.01x.99 =.01	
	3	.10	$.10^3 = .001$	1-.001= .999	.001x.999 =.00	1 x .10 = .10
	4	.10	$.10^4 = .0001$	1-.0001=.9999	.0001x.9999=.00	
					$\sum_{n=1}^{N} T_{s_n} = .10$	

a When $M_S-M_{AF}=-1$, the values in the last column are -.66, -.61, and -.10, respectively.

or a one-step path situation.

Thus success-oriented individuals who perceive themselves to be in the first step of a contingent path situation are more motivated to achieve success than those who perceive themselves to be in the first step of a noncontingent path or in a one-step path situation. Alternately, failure-threatened individuals should be more motivated to avoid failure under the same circumstances.

It is also observed in Table I that the value of $T_s + T_{-f}$ is largest (.66) in the first step of the easy contingent path (i.e., $P_{n}s_{n} = .90$), second largest (.61) in the first step of the moderately difficult contingent path (i.e., $P_{n}s_{n} = .50$), and smallest (.10) in the first step of the difficult contingent path (i.e., $P_{n}s_{n} = .10$). This implies that in the first step of a contingent path situation, success-oriented individuals should be most motivated to achieve success when the tasks are perceived to be very easy, moderately motivated to achieve success when the tasks are moderately difficult, and least motivated by difficult tasks. Failure-threatened individuals on the other hand, should be most inhibited (-.66) by easy tasks, moderately inhibited by moderately difficult tasks (-.61) and least inhibited by difficult tasks (-.10). These predictions differ from those in the one-step path situation as noted in figure 1 and from those in a noncontingent path situation. In these latter

two situations, the characteristic resultant achievement motivation is strongest when the task is perceived to be moderately difficult and weakest when the task is perceived to be either very easy or very difficult.

Paths need not have constant $P_{n}s_{n}$ values as illustrated in Table I. A path may be perceived as varying in level of difficulty, becoming more difficult or becoming easier. A path in which the tasks are perceived as becoming more difficult is called a decreasing subjective probability path (decreasing P_s path) and one in which the tasks are perceived as becoming easier is called an increasing P_s path. An example of the former is where $P_{n}s_{n}$ = .9.7.5.3.1 and an example of the latter is where $P_{n}s_{n}$ = .1.3.5.7.9.[52]

In a contingent path situation it can be derived from Raynor's formulation that the value of $T_s + T_{-f}$ is larger (.63) in the first step of the decreasing P_s contingent path (i.e., $P_{n}s_{n}$ = .9.7.5.3.1) than it is (.15) in the first step of the increasing P_s contingent path (i.e., $P_{n}s_{n}$ = .1.3.5.7.9). This implies that the first step of the decreasing P_s contingent path elicits stronger characteristic resultant achievement motivation than the first step of the increasing P_s contingent path. Accordingly, success-oriented individuals should be more motivated to achieve success in the first step

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52 Ibid., p. 151-152.

of a decreasing P_s contingent path than in the first step of an increasing P_s contingent path. Failure-threatened individuals, on the other hand, should be more inhibited under the same circumstances.[53]

However, this does not hold for all decreasing and increasing P_s contingent paths. For example in the first step of a decreasing P_s contingent path where $P_{n}s_{n}$ = 9.7.5, the value of $T_s + T_f$ is .54. In the first step of the increasing P_s contingent path where $P_{n}s_{n}$ = .5.7.9, the value of $T_s + T_{-f}$ is .70. In this case, the characteristic resultant achievement motivation is strongest in the first step of the increasing P_s contingent path and weakest in the decreasing P_s contingent path.

It can also be derived from Raynor's formulation that the first step in the longer of two contingent paths elicits stronger characteristic resultant achievement motivation, given that the $P_{n}s_{n}$ values at all steps in both paths are the same. Thus, a success-oriented individual should be more motivated to achieve success in the first step of a longer contingent path than when faced with the same step (i.e., same $P_{n}s_{n}$ value) of a shorter contingent path. On the contrary, the failure-threatened individual should be more inhibited under the same circumstances.[54]

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53 Ibid., p. 152.

54 Ibid., p. 150.

It should be noted, however that in the case of two difficult contingent paths (e.g., $P_{n}s_{n}$ = .10), the value of T_{s} + T_{-f} is not appreciably larger for the path with more steps (see Table I). Raynor[55] notes that when the value of $P_{1}s_{n}$ for a component tendency is .01 or less, it is assumed that the component tendency is not aroused. Consequently, there is no further contribution to the strength of the characteristic resultant achievement motivation as a result of a longer path.

From the foregoing discussion, it is clear that generalizing about the strength of the characteristic resultant achievement motivation from one situation to another similar situation (i.e., one type of increasing/decreasing P_{s} contingent path to another) is not always appropriate. It is necessary to determine the strength of motivation for each situation separately. One might question the utility of Raynor's formulation if it has to be applied to every new situation.

Another important characteristic of contingent paths is that they may be either open or closed. In a closed contingent path, it is assumed that there are a fixed number of

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55 J. O. Raynor, "Motivation and Career Striving", in Motivation and Achievement, 1974, p. 382.

steps with a well defined final step (goal).[56] In an open contingent path, the number of steps continue to increase because following success in step n, an individual may perceive a "new" final goal which is added on to the "old" final goal.[57] For example, a closed contingent path may be four years of college leading to a Bachelor's Degree. An open contingent path may be the four years of college leading to a Bachelor's Degree but at some step an individual may decide to obtain a Master's Degree. Thus, the original final goal, the Bachelor's Degree, becomes merely a step in a longer contingent path leading to a new final goal, the Master's Degree.

Thus, according to Raynor,[58] the strength of the characteristic resultant achievement motivation should be the same in the first step of both a closed contingent path and an open one provided they are the same length and have the same $P_{n}s_{n}$ values. However, following success, the individual in the second step of the open contingent path may be more motivated than the one in the second step of the closed contingent path. The reason is that the closed contingent path has decreased in length, while the open contingent path may have remained the same or

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56 J. O. Raynor, "Future Orientation in the Study of Achievement Motivation", 1974, p. 150.

57 Ibid., 1974, p. 149.

58 Ibid., 1974, p. 150.

increased in length because either one or more "new" steps had been added.

To this point, the calculation of the strength of an individual's characteristic achievement motivation has been restricted to the first step of contingent paths. However, it is possible to determine the strength of achievement motivation for successive steps in contingent paths. This can be done by reapplying Raynor's formulation (equation 21) to each successive step taking into account the $P_{n}s_{n}$ value at each of the remaining steps.[59] Raynor[60] cautions that, while it may be assumed that the remaining $P_{n}s_{n}$ values do not change as a function of continued success, this assumption may not be credible. He states that success will most likely increase the perceived chances of future success along the path. Although Raynor does not elaborate on this statement, the likelihood of an increase in $P_{n}s_{n}$ at each of the remaining steps may be explained by the cognitive learning effect.

According to Atkinson,[61] when an individual is successful at a particular activity, the perceived chances of

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59 J. O. Raynor, "Future Orientation in the Study of Achievement Motivation", 1974, p. 150.

60 Ibid.

61 J. W. Atkinson, "The Mainsprings of Achievement-Oriented Activity", 1974, p. 29.

success at that activity or at a similar activity will be greater than before success was experienced. The reason is that an individual should feel more confident and more competent when faced with an activity in which he was previously successful.

It is logical, then, to assume that this effect of cognitive learning applies in a contingent path situation as well, if it can be concluded that the activities in the path are similar (e.g., courses of study leading to a degree). On the other hand, if the activities in the path are different, then it is logical to assume that there may be no cognitive learning effect on $P_{n}s_{n}$ in the remaining steps of the path.

Assuming then, a closed contingent path with $P_{n}s_{n}$ values that do not change as an individual progresses along a contingent path, the strength of the characteristic resultant achievement motivation should be as illustrated in Table II. In Table II, the strength of an individual's characteristic resultant achievement motivation is calculated for each step in a three-step decreasing P_{s} contingent path (.9.7.5) and in a three-step increasing P_{s} contingent path (.5.7.9). $M_{S} - M_{AF}$ is assumed to be 1.

In Table II, it is seen that when an individual is at step 1, he is faced with a three-step contingent path. At step 2, he is faced with two steps, and at step 3, he is faced with only one step which is like being in a one-step

Table II.- Calculation of the Magnitude of Resultant Achievement Motivation ($T_s - T_f$) for Each "New" Immediate Step in a Three-Step Decreasing P_s Contingent Path (.9.7.5) and in a Three-Step Increasing P_s Contingent Path (.5.7.9) Assuming $T_s + T_{-f} = M_S - M_{AF} \sum_{n=1}^{N} (P_{nsn} \times I_{sn})$ And $M_S - M_{AF} = 1$.[a]

Type of Contingent Path	Step in the Path	Subjective Probability of Success at Each Step	Subjective Probability of Immediate Activity Leading to Each Future Success		Incentive Value of Future Success	Component Tendency at Each Step	Resultant Achievement Motivation
	n	P_{nsn}	P_{1sn}		I_{sn}	T_{sn}	$M_S - M_{AF} \sum_{n=1}^{N} (P_{nsn} \times I_{sn})$
Decreasing P_s Contingent Path	1	.90	.90	= .90	1 - .90 = .10	.90x.10=.09	
		.70	.90 x .70	= .63	1 - .63 = .37	.63x.23=.23	
		.50	.90x.70x.50	= .32	1 - .32 = .68	.32x.68=.22	
						$\sum_{n=1}^{N} T_{sn}$ =.54	1 x .54 = .54
	2	.70	.70	= .70	1 - .70 = .30	.70x.30=.21	
		.50	.70 x .50	= .35	1 - .35 = .65	.35x.65=.23	
						$\sum_{n=1}^{N} T_{sn}$ =.44	1 x .44 = .44
	3	.50	.50	= .50	1 - .50 = .50	.50x.50=.25	1 x .25 = .25
Increasing P_s Contingent Path	1	.50	.50	= .50	1 - .50 = .50	.50x.50=.25	
		.70	.50 x .70	= .35	1 - .35 = .65	.35x.65=.23	
		.90	.50x.70x.90	= .32	1 - .32 = .68	.32x.68=.22	
						$\sum_{n=1}^{N} T_{sn}$ =.70	1 x .70 = .70
	2	.70	.70	= .70	1 - .70 = .30	.70x.30=.21	
		.90	.70 x .90	= .63	1 - .63 = .37	.63x.37=.23	
						$\sum_{n=1}^{N} T_{sn}$ =.44	1 x .44 = .44
	3	.90	.90	= .90	1 - .90 = .10	.90x.90=.09	1 x .09 = .09

a When $M_S - M_{AF} = -1$ the values in the last column are -.54, -.44, -.25, -.70, -.44 and -.09 respectively.

path situation, according to Raynor's formulation. In addition, it is seen that the absolute value of $T_s + T_{-f}$ decreases as the number of steps in the path decreases. This implies that the characteristic resultant achievement motivation, if it is positive, decreases in strength as a function of the decreasing number of steps to be encountered in the path. If it is negative, the characteristic resultant achievement motivation increases in strength. Consequently, the strength of the characteristic resultant achievement motivation in the final step of the path is the same as it would be in a one-step path situation.

The assumption that the strength of the characteristic resultant achievement motivation at the end of the contingent path should decrease and be of the same magnitude as that in a one-step path is questionable. First of all, Raynor[62] notes that an individual may anticipate an extrinsic reward upon successful completion of the final step in a contingent path. In such a situation, Raynor[63] postulates that the positive extrinsic motivation and the characteristic resultant achievement motivation act independently of one another. As the end of the path is approached extrinsic

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62 J. O. Raynor, "Motivation and Career Striving", 1974, p. 382.

63 Ibid., p. 383.

motivation increases but the characteristic resultant achievement motivation decreases (as noted in Table II). Since, the rate of increase and the rate of decrease of extrinsic and resultant achievement motivation may vary in each step of the path, if is difficult to predict whether total motivation (resultant achievement motivation and extrinsic motivation) will increase, decrease, or remain the same as at the beginning of the path.

Second, Raynor[64] has speculated that maintenance of past successes or accomplishments might be a positive source of motivation for an individual faced with an immediate activity in a path. He suggests that while some people are motivated by the expectation of future successes, others might be motivated by the desire to maintain past successes. If this assumption is true, then one might question to what degree are these individuals future oriented. In addition, one might question how their desire to maintain their past success(es) affects their future orientation and hence their characteristic resultant achievement motivation. It seems logical to expect that if an individual were motivated to maintain past success(es), then he would not become less motivated at the end of a contingent path.

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64 J. O. Raynor, "Motivation and Career Striving", 1974, p. 218-219.

Finally, Gjesme[65] found that the closer a goal event is in time, the greater its motivational properties. That is, the closer one is to some future goal the stronger that individual's characteristic resultant achievement motivation should be. Accordingly, success-oriented individuals should be more motivated when they are within reach of a future goal while failure-threatened individuals should be more threatened when they are within reach of a future goal. It should be noted that Gjesme's work did not involve contingent path situations but rather noncontingent ones. Nonetheless, the effects of goal distance in time might be considered in contingent path situations also. Raynor[66] has noted this and has proposed that goal distance in terms of time and goal distance in terms of number of steps in a contingent path situation affect the arousal of the characteristic achievement motivation separately. This assumption has not yet been tested.

From the foregoing discussion, it becomes clear that there may be a number of factors in a contingent path situation which may influence the strength of an individual's

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65 T. Gjesme, "Goal Distance in Time and Its Effects on the Relations Between Achievement Motives and Performance", in Journal of Research in Personality, Vol. 8, 1974, p. 161-171.

66 J. O. Raynor, "Future Orientation, Self Evaluation and Motivation for Achievement", 1976, p. 18.

characteristic resultant achievement motivation in successive steps along the path. This makes it difficult to predict whether an individual's motivation will decrease or increase as he progresses along the path. Thus, it is questionable whether reapplication of Raynor's formulation at each successive step in a contingent path (assuming P_{ns_n} does not change as a function of continued success) is appropriate when the strength of the characteristic resultant achievement motivation is to be determined.

In summary, in this section, Raynor's concept of future orientation was presented along with the concepts of contingent, noncontingent and one-step paths. Raynor's propositions relating to future orientation together with the modifications of Atkinson's formulations were also presented. The various types of contingent path situations and their implications on achievement motivation were presented and discussed. Finally, reapplication of Raynor's formulation to successive steps in a path was illustrated and the implications of this were discussed. In the next section, a critical review of the research related to future orientation is presented.

3. Studies Related to Future Orientation.

A number of studies were conducted to validate the concept of future orientation. In two of his earlier studies,

Raynor[67] examined the relationships between achievement-related motives, future orientation, and academic performance. In the first study, the subjects were sixty-nine male and fifty-two female students enrolled in an introductory psychology course. It was hypothesized that success-oriented students who perceived the psychology course to be important to their future career success (high perceived instrumentality) would receive a higher grade on the course than success-oriented students who did not perceive the course to be important to their future career success (low perceived instrumentality). Furthermore, this difference in grades would be greater for success-oriented students than for failure-threatened students because the latter would be more inhibited under future orientation conditions and their performance would be worse.

Each subject's motive to achieve success (M_S) and motive to avoid failure (M_{AF}) were assessed by the n Ach Test and the TAQ (Test Anxiety Questionnaire) respectively. The n Ach Test is a projective measure wherein subjects are required to write imaginative stories in response to visual or verbal stimuli. The TAQ is a questionnaire in which subjects are required to respond to items describing feelings

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67 J. O. Raynor, "Relationship Between Achievement-Related Motives, Future Orientation, and Academic Performance", in Motivation and Achievement, 1974, p. 173-180.

of anxiety in testing situations. Subjects scoring above the median on the n Ach Test and below the median on the TAQ were assumed to have $M_S > M_{AF}$ and were designated as success-oriented. Those scoring below the median on the n Ach Test and above the median on the TAQ were assumed to have $M_{AF} > M_S$ and were designated as failure-threatened. This method of motive assessment is frequently employed in achievement motivation studies. It is henceforth referred to as the median split method.

Perceived instrumentality was assessed by a Student Plans Questionnaire. Two questions were asked, one to determine the importance of obtaining a good grade in the course for future career success and the other to determine the effect to which a high grade was perceived as instrumental to future career success. Responses to these questions were scored on a five- and four-point scale respectively. A total score was obtained by adding the scores. A low score indicated high perceived instrumentality (high PI) while a high score indicated low perceived instrumentality (low PI). Students scoring below the median on the Student Plans Questionnaire were assumed to face a contingent path (success in introductory psychology was related to future success) while these scoring above the median were assumed to face a noncontingent path.

The results of the study supported the hypotheses. Success-oriented students assumed to be in a contingent path received higher grades than those in the noncontingent path. The difference in grades between students in the contingent path and those in the noncontingent path was greater for the success-oriented students than for the failure-threatened students. Furthermore, success-oriented students obtained higher grades than the failure-threatened students but only in the contingent path condition.

In the second study, the subjects were eighty-one male college students from two introductory psychology courses. In this study, the hypotheses were similar to those stated for the first study except that the dependent measures included grade point averages in addition to grades on the psychology course.

Motives were assessed in the same way as described for the first study. Perceived instrumentality of the courses was assessed by asking students to list their courses and indicate for each on a five-point scale the importance of obtaining a good grade for their future career success.

The results were as follows: success-oriented subjects who gave high ratings to obtaining a good grade in their psychology course received better grades than those whose rating was low and this difference was greater than that for the failure-threatened subjects; when grade point

average was used as the dependent variable, both success-oriented and failure-threatened individuals obtained a higher grade point average on the courses where a good grade was perceived to be important to their future career success. However, this difference was not greater for the success-oriented than for the failure-threatened subjects.

The authors explained this latter result by stating that if a good grade were perceived to be important on any of the courses for extrinsic reasons rather than achievement-related reasons, then the expected interaction between motive groups and perceived instrumentality would be obscured. Furthermore, students may not be equally certain of their future career plans. This would then reduce the inhibitory effect of future orientation and consequently eliminate the expected interaction.

In the foregoing study, contingent future orientation was inferred from perceived instrumentality. That is, individuals who perceived that obtaining a good grade in a course was important to their future career success, were assumed to be in a contingent path situation. Those to whom a good grade was not important were assumed to be in a noncontingent path situation. However, there is no guarantee that the individuals actually perceived themselves to be in contingent or noncontingent situations. An individual may recognize that failure in the psychology course, for instance, does not

necessarily mean future career failure. Thus, the individual might not perceive a contingent path situation as inferred by the observer.

A number of studies were carried out where contingent future orientation was not inferred but rather created in laboratory type studies. One such study was conducted by Raynor and Rubin.[68] In this study, the performance of success-oriented and failure-threatened groups was compared in the first step of a moderately difficult ($P_{n}s_{n}$ = .50) four-step contingent path and in the first step of a moderately difficult noncontingent path. The sample consisted of fifty-eight university students enrolled in an introductory psychology course.

It was predicted that there would be a significant interaction between motive group (success-oriented and failure-threatened) and type of path (contingent and noncontingent). Specifically, success-oriented individuals would perform better in the first step of the contingent path condition than in the first step of the noncontingent path condition while failure-threatened individuals on the other hand, would perform better in the first step of the noncontingent path condition than in the first step of the contingent path condition. Also, the success-oriented individuals would perform better than the

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68 J. O. Raynor and T. S. Rubin, "Effects of Achievement Motivation and Future Orientation on Level of Performance", in Motivation and Achievement, 1974, p. 181-187.

failure-threatened individuals in both types of paths.

Subjects were classified as success-oriented or failure-threatened by the median split method. Following the assessment of motives each subject was assigned to either a contingent or a noncontingent path condition.

The contingent path condition was created by informing subjects that they had to successfully complete at least twenty out of twenty-five problems in two and one-half minutes on the first page before they were allowed to go on to the second page. Similarly, they would have to complete the same number of problems on the second page before they were allowed to go on to the third page and so on. If they failed to meet the stipulated criterion on any one of the pages, they would not be allowed to proceed to the next page, but would have to sit and wait until the experimental session was completed. In actual fact, subjects were required to solve only the first page of problems, since the investigators were interested in their performance in the first step of the path only.

The noncontingent path was created by telling subjects that they had two and one-half minutes to work on a page and that regardless of their performance on any page they would have the opportunity to work on all four pages. In this way a contingent and a noncontingent path were presented.

The subjective probability of success in each step of the path was induced in the following manner: first, subjects were required to submit information regarding their

mathematical score on the College Examination Board together with their cumulative grade point average; on the basis of this information, subjects were assigned to ability groups; each group was told that the test booklets were appropriate for their ability group and that on the basis of extensive pretesting their chances of solving twenty out of twenty-five problems in two and one-half minutes on each test were fifty percent; to maintain a $P_{n^s n}$ of .50 at each step, subjects were told that the tests subsequent to the first were adjusted for practice and learning effects. All this information however, was entirely fictitious.

In this study, as in many contingent path studies, performance was measured by means of an arithmetic task designed by Wendt.[69] Subjects were asked to solve a number of arithmetic problems in a given period of time. Each problem consisted of two lines containing three digits. Each line of digits was to be added. If the sum of the first line was greater than the sum of the second line, then the latter sum was to be subtracted from the former sum and the answer recorded. If, on the other hand, the sum of the first line was smaller than that of the second line, the sums were to be added and the answer recorded. The problems

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69 H. W. Wendt, "Motivation, Effort and Performance", in Studies in Motivation, D. C. McClelland (Ed.), New York, Appleton-Century-Crofts, 1955, p. 451.

were arranged twenty-five to a page in a test booklet with four pages.

Both the number of problems attempted and the number of problems solved correctly were the dependent measures. The results of the performance on both dependent variables supported the hypotheses with the following two exceptions: the difference in the number of problems attempted by the success-oriented groups in the contingent and noncontingent path conditions was not significantly different; the success oriented-group in the noncontingent path condition did not perform better (on both dependent variables) than the failure-threatened group.

The latter result may be explained by the fact that in the noncontingent path condition, subjects were told explicitly that they would have an opportunity to take each test (page) regardless of their performance on any one of them. It is possible that making an explicit remark such as "regardless of your performance" may have weakened the tendency to avoid failure in the failure-threatened individuals and the tendency to achieve success in the success-oriented individuals. Consequently, any differences in performance expected between the two groups would have been minimized.

In a second study, Entin and Raynor[70] investigated the performance of success-oriented and failure-threatened individuals in the first step of a two-step contingent and a two-step noncontingent path. Each of the two steps in both paths consisted of both a simple and a complex arithmetic task. The same hypotheses regarding performance of success-oriented and failure-threatened individuals were made in this study as in the Raynor and Rubin[71] study. The investigators were interested in determining whether the hypotheses would be supported in the first step of a contingent path with only two steps and concurrently whether they would be supported for the simple as well as the complex task. The sample consisted of one hundred and four freshman and sophomore male students enrolled in an introductory psychology course.

The motives of the subjects were assessed using the n Ach Test and the TAQ. Each of the two resulting sets of scores was converted to Z scores. For each subject, the Z score on the TAQ was subtracted from the Z score on the

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70 E. E. Entin and J. O. Raynor, "Effects of Contingent Future Orientation and Achievement Motivation on Performance in Two Kinds of Tasks", in Journal of Experimental Research in Personality, Vol. 6, 1973, p. 314-320.

71 J. O. Raynor and T. S. Rubin, "Effects of Achievement Motivation and Future Orientation on Level of Performance", 1974, p. 181-187.

n Ach Test and the resulting distribution was divided into thirds. Subjects in the top third of the distribution were assumed to have $M_S > M_{AF}$, while those in the bottom third were assumed to have $M_{AF} > M_S$. Those in the middle third were assumed to have $M_S \simeq M_{AF}$. This method of assessing M_S and M_{AF} is another commonly used procedure in achievement motivation studies and is henceforth referred to as the standard score method.

Subjects were assigned to either the two-step contingent path condition or the two-step noncontingent path condition. An arithmetic test booklet was given to each of the subjects. The booklet contained two parts. In each part, there were a set of simple arithmetic problems (simple task) and a set of complex arithmetic problems (complex task). The simple problems consisted of adding two, two-digit numbers, while the complex problems were the Wendt[72] arithmetic problems.

Subjects in the contingent path condition were told that the first part of the booklet was both a warm up and a screening session. Those who scored below the mean of that established by a norm group would not be allowed to go on to the second part. Thus, each part of the booklet constituted one step in the two-step contingent path.

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72 H. W. Wendt, Op. Cit.

Subjects in the noncontingent path condition were told that normative data were being gathered for both parts. Not as much data were required from the second part of the booklet, therefore, about half of the subjects would be asked, at random, to leave upon completion of the first part (step one).

In actual fact, data were not gathered on the second part of the test booklet. The purpose of the second part was to convey the idea of a two-step contingent path.

The results of this study were the following: first, the success-oriented group performed better in the contingent path condition than in the noncontingent path condition while the failure-threatened group performed better in the latter than in the former condition. This interaction was significant for the complex task but not for the simple task; second, the success-oriented group performed better than the failure-threatened group on both the simple and the complex tasks, but only in the contingent path condition.

The investigators explained the first result by noting that there may be a maximum level of performance for simple tasks. Consequently, increased motivation might not be manifested in better performance. While no explanation was given for the second result, it might be explained by the noncontingent path instructions. These instructions tended to be neutral in nature. That is, subjects were told that the investigators were interested in

obtaining norms for the two tasks. According to Atkinson,[73] it is assumed that neutral type instructions arouse less achievement motivation than achievement type instructions. Thus, it would appear that any differences existing between the two motive groups, would not be maximized.

In a third study, Raynor and Sorrentino[74] compared performance in the first step of three constant P_s contingent paths. One path consisted of four easy steps ($P_{ns_n} = .80$), the second consisted of four moderately difficult steps ($P_{ns_n} = .50$), while the third consisted of four difficult steps ($P_{ns_n} = .20$). The sample consisted of seventy-eight male students ranging in age from sixteen to twenty-one. The students were recruited from two summer employment offices and were paid for their participation.

Based on Raynor's formulation it was hypothesized that success-oriented individuals would perform best in the first step of the easy contingent path ($P_{ns_n} = .80$), least well in the first step of the difficult contingent path ($P_{ns_n} = .20$), and moderately well in the first step of the

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73 J. W. Atkinson, "The Effect of the Need for Achievement in Thematic Apperception", in Motives in Fantasy, Action and Society, Princeton, N.J., Van Nostrand, 1958, p. 67.

74 J. O. Raynor and R. M. Sorrentino, "Effects of Achievement Motivation and Task Difficulty on Immediate Performance in Contingent Paths", 1972.

moderately difficult contingent path ($P_{n}s_{n}$ = .50). The opposite ordering in level of performance was expected for the failure-threatened individuals. Finally, the expected superiority of the success-oriented over the failure-threatened individuals was predicted to be greatest in the first step of the easy contingent path condition.

Subjects were assigned to the appropriate motive group by the median split method. They were then assigned to one of the three constant contingent path conditions.

To induce the three contingent path conditions, procedures similar to those in the Raynor and Rubin[75] study were employed. The performance task utilized was the Wendt[76] arithmetic task.

The results of this study did not support all the predictions. The only significant results were that the success-oriented individuals performed better than the failure-threatened individuals but only in the easy contingent path condition. Also the failure-threatened individuals performed better in the difficult contingent path condition than in the easy contingent path condition.

An explanation offered by the investigators for such results was that the product of all the subjective

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75 J. O. Raynor and T. S. Rubin, Op. Cit., p. 181-187.

76 H. W. Wendt, Op. Cit.

probabilities in the four steps of the easy contingent path (total subjective probability) was closer to moderate risk (P_{1S4} = .41) than that in either the moderately difficult (P_{1S4} = .06) or the difficult (P_{1S4} = .00) contingent paths. They believed that the subjects may have been influenced by the total moderate risk (.41) in the easy contingent path condition rather than the high immediate subjective probability of success of the first task (.80).

It appears from their explanation that they are not taking into consideration the incentive value of P_{1S_n}. Also, it appears that the investigators are saying that the subjects were more influenced by knowing their chance for succcess in completing the whole path rather than knowing their chances for success in each step of the path. This implies that subjects may have regarded the path as one step rather than four separate steps.

A second study, with one hundred fifteen university students enrolled in an introductory psychology course, was conducted by Raynor and Sorrentino[77] for the same purpose as that of the former study. However, certain procedural changes were made in order to test further the validity of the predictions.

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77 J. O. Raynor and R. M. Sorrentino, Op. Cit., p. 15-20.

The changes included, first, the lengthening of the number of steps in each path from four to seven, and secondly, changing the value of the $P_{n}s_{n}$ in the easy contingent path from .80 to .90 and in the difficult contingent path from .20 to .10. Also achievement oriented instructions were given to all subjects. They were told that the purpose of the study was to evaluate how well students perform under pressure. In addition, they were also told that their performance would be taken as a full measure of their ability.

A procedure similar to that in the Entin and Raynor[78] study was used to induce the contingent path conditions. That is, subjects were not given a specific criterion for success, but rather, were told that they had to surpass a particular criterion or cutting score which was not revealed to them.

Also, rather than the subjects being told that they would have to sit through the remainder of the testing session if they failed to meet the criterion in any one of the steps, they were told instead that they would have to provide some information requested by the investigators. This was to avoid the uncomfortable situation of having to wait through the remainder of the testing period without anything to do, which was believed to affect resultant achievement motivation.

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[78] E. E. Entin and J. O. Raynor, Op. Cit., p. 314-320.

Finally, the number of problems in the Wendt[79] arithmetic task was increased from twenty-five to forty per page.

Although the foregoing procedural changes were expected to give some significant results, no significant results were found. While the procedural changes made in this study reflect the theory, the possibility that subjects perceived the contingent paths as one step still remains.

In another study, Wish and Hasazi[80] demonstrated that success-oriented individuals preferred an easy contingent path while failure-threatened individuals preferred a difficult contingent path. Using male college juniors (n = 142) enrolled in a school of management, the investigators predicted that success-oriented students would choose an easy program of study while failure-threatened individuals would choose a difficult program of study.

Subjects were classified as either success-oriented or failure-threatened based on their scores obtained on the n Ach Test and the Debilitating Anxiety Test (measure of M_{AF}). On the day the subjects were asked to choose their major program of study, they were also asked to note beside

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79 H. W. Wendt, Op. Cit.

80 P. A. Wish and J. E. Hasazi, "Motivational Determinants of Curricular Choice Behaviour in College Males", Paper presented at the Eastern Psychological Association, Boston, April, 1972. Also in J. W. Atkinson and J. O. Raynor (Eds.), Motivation and Achievement, 1974, p. 145-146.

it and the alternative programs the chances of students "much like themselves" obtaining a degree in that program. Subjects rated each program out of 100 on an eleven-point scale with increments of 10. The responses of each student were then categorized according to three levels of perceived difficulty, easiest, intermediate, and most difficult. An additional category, "other", was used presumably to categorize those programs of study not rated by the students.

Each program of study represented a contingent path, while the perceived level of difficulty (student's rating out of 100) of the program represented the $P_{n}s_{n}$ of the contingent path. With resultant achievement motivation and level of difficulty of the contingent path as the independent variables and major area of study as the dependent variable, a significant χ^2(chi squared) statistic was obtained ($\chi^2 = 74.41$, $df = 2$, $p < .001$). The research hypothesis was supported.

In another study, Raynor[81] used a sample of thirty-six university students to investigate performance in the first step of a decreasing P_s contingent path and in the first step of an increasing P_s contingent path. Raynor hypothesized that: success-oriented individuals perform

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81 J. O. Raynor, "Effects of Distant Future Goals on Achievement Motivation", Final Report to the National Science Foundation, Unpublished Report, New York State University at Buffalo, 1972, p. 15a-15b.

better in the immediate activity of the decreasing P_s contingent path; failure-threatened individuals, on the other hand, perform better in the immediate activity of the increasing P_s contingent path than in that of the decreasing P_s contingent path; finally, success-oriented individuals perform better than failure-threatened individuals in the immediate activity of both types of paths, but the difference is greatest in the decreasing P_s contingent path. Performance on the Wendt[82] arithmetic task was the dependent variable.

The decreasing P_s contingent path was induced in the following manner: subjects were told that if they were in the top ninety-five percent on the first test (first step in the path), they would be allowed to work on the second test (second step in the path); if they were in the top sixty-five percent on the second test, they would be allowed to work on the third test (third step); if they were in the top thirty-five percent on the third test, they would be allowed to work on the fourth test (fourth step); finally, if they were in the top five percent on the fourth test, they would be allowed to work on the fifth test (fifth step). The increasing P_s contingent path was induced in the same manner except that the probabilities of success were presented in the reverse order.

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82 H. W. Wendt, Op. Cit.

The pattern of results obtained was consistent with expectations. The success-oriented group performed better in the first step of the decreasing P_s contingent path than in the first step of the increasing P_s contingent path. The failure-threatened group performed better in the first step of the increasing P_s contingent path than in the first step of the decreasing P_s contingent path. In addition, the expected superiority of the success-oriented group over the failure-threatened group was significant in the decreasing P_s contingent path. However, contrary to expectation, no significant difference in performance was observed between the two motive groups in the increasing P_s contingent path.

While no explanation is offered by the investigator for the latter result, the reason may be the incongruence between the level of difficulty perceived by the subjects and the experimentally induced level of difficulty.

In a second study by Raynor,[83] the same hypotheses as noted in the foregoing study were tested with an increased sample size (n = 95). The results of the second study were found to be similar to those of the first study. A significant difference in performance between the two motive groups was found in the first step of the decreasing P_s contingent

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83 J. O. Raynor, "Effects of Distant Future Goals on Achievement Motivation", 1972, p. 15a-15b.

path, while there was little difference in performance in the increasing P_s contingent path. Here again, lack of congruence between the cue and the perceived difficulty of the task may explain the nonsignificant results.

In a third study of decreasing (.9.7.5.3.1) and increasing (.1.3.5.7.9) P_s contingent paths, Zimmerman[84] investigated the same predictions noted in the latter two studies. None of the hypotheses concerning decreasing and increasing P_s contingent paths was supported. Failure to support the hypotheses was explained by the belief that the subjects' performance was a reflection of their own estimated subjective probability of success rather than the subjective probability that had been experimentally induced.

Raynor, Entin, and Raynor[85] investigated the performance of success-oriented and failure-threatened individuals in the first step of a two-step contingent path and in the first step of a four-step contingent path. The sample consisted of one hundred and eleven male and female students in grades six and eight.

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84 J. L. Zimmerman, "The Effects of Achievement Motivation, and Increasing, Decreasing Probability of Success on Persistance in a Contingent Path", Unpublished Doctoral Thesis, in Dissertation Abstracts, Vol. 34(5-B), 1973, p. 2294.

85 J. O. Raynor, E. E. Entin, and D. Raynor, "Effects of n Achievement, Test Anxiety and Length of Path on Performance of Grade School Children", Unpublished Paper, State University of New York at Buffalo, 1972.

It was hypothesized that the success-oriented group would perform better in the first step of the four-step contingent path condition, while the failure-threatened group would perform better in the first step of the two-step contingent path condition. Furthermore, the expected superiority of the success-oriented group over the failure-threatened group would be greater in the longer of the two contingent paths.

Subjects were classified into their respective resultant achievement motive groups by the standard score method. The task consisted of simple arithmetic problems which involved the addition or subtraction of two two-digit numbers.

The idea of contingency for both types of paths was induced by telling the subjects that they had to score in the top fifty percent of their ability group in order to be able to proceed to the next step. Subjects had been previously told that they had been placed into ability groups on the basis of information regarding their general ability and intelligence and their grades in mathematics.

While the results were in the direction hypothesized, they were not significant. However, when the subjects were classified on the basis of the TAQ scores only, one of the hypotheses was supported. The low TAQ group (assumed to be success-oriented) performed better than the high TAQ group

(assumed to be failure-threatened) in the first step of the four-step contingent path condition. (The low and high TAQ groups were from the low and high thirds of the TAQ distribution respectively.) The nonsupport of the hypotheses when using the resultant achievement motivation scores was explained by the possibility of invalid n Ach scores obtained under difficult classroom conditions during testing.

Finally, a study conducted by Sorrentino[86] where the theory of achievement motivation was linked to leadership in group processes should be noted. It was found that the motive for affiliation (M_{AFF}) is an important factor to be considered when making predictions concerning subjects in contingent and noncontingent path situations.

Sixty-four subjects from a pool of introductory psychology students assessed by the n Ach Test, TAQ, and the n Aff Test* participated in a group problem-solving activity. The dependent measures were a number of behavioural measures observed during the problem-solving activity such as, quantity and quality of verbal interaction and performance, and also measures of self- and other's ratings of competence, self-confidence, interest, influence, etc. Half of the sixteen

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86 R. M. Sorrentino, "Extending Theory of Achievement Motivation to the Study of Group Processes", in Motivation and Achievement, 1974, p. 255-267.

* Need for Affiliation Test which is the same projective measure as the n Ach Test.

groups were in a contingent path condition, while the other half were in a noncontingent path condition. Each group contained four members: high in M_S, low in M_{AF}, and high in M_{AFF}; high in M_S, low in M_{AF}, and low in M_{AFF}; low in M_S, high in M_{AF}, and high in M_{AFF}; and low in M_S, high in M_{AF}, and low in M_{AFF}.

It was hypothesized that: success-oriented subjects would receive higher scores than failure-threatened subjects; the difference between the two groups would be greater in the contingent than in the noncontingent path condition; and while the pattern of interaction between achievement-related motives and conditions will occur at both levels of M_{AFF}, subjects also high in M_{AFF} will have higher scores than subjects low in M_{AFF}.

The expected difference between success-oriented and failure-threatened subjects occurred only for subjects low in M_{AFF} in the contingent path condition and only for subjects high in M_{AFF} in the noncontingent path condition. Also, while the predicted pattern of interaction between the achievement-related motives (M_S and M_{AF}) and contingent vs. noncontingent paths was obtained for subjects low in M_{AFF}, it was reversed for subjects high in M_{AFF}. Failure-threatened subjects who were also high in M_{AFF} obtained significantly higher means than success-oriented subjects also high in M_{AFF} in the contingent path condition while the opposite

ordering of means occurred in the noncontingent path condition.

Sorrentino[87] attributed the results to the effect of possible overmotivation. Given the group situation, the motive for affiliation was aroused in addition to the achievement-related motives. For the success-oriented subjects who were also high in M_{AFF}, the added motivation from a contingent path condition resulted in a decrement in their performance. On the other hand, the added anxiety resulting from the contingent path condition for failure-threatened individuals was overcome by the extrinsic motivation resulting from the arousal of the M_{AFF}.

The implication of this study is that motives such as M_{AFF} may need to be considered in studies of achievement motivation, since they may alter predictions based on the theory.

In summary, it is seen that some of the predictions arising from Raynor's theory have been supported. There is some evidence to support the hypothesis that the characteristic resultant achievement motivation is stronger in an activity which is the first step of a contingent path situation than in an activity which is the first step of a noncontingent path situation. Also, there is some support for

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87 Ibid., p. 264-267.

the hypothesis that the strength of the characteristic resultant achievement motivation is stronger in the first step of a decreasing P_s contingent path (i.e., $P_{n}s_{n}$ = .9.7.5.3.1) than in the first step of an increasing P_s contingent path (i.e. $P_{n}s_{n}$ = 1.3.5.7.9). However, support for the other hypotheses is not consistent.

Numerous explanations for the nonsupport of some of these hypotheses have been advanced by the investigators. In one study, the theory itself was questioned. The investigators speculated on the possibility that subjects perceived the contingent paths as one step rather than four separate steps. In some of the other studies, the procedures employed were questioned. For example, in one study, it was believed that achievement arousing instructions in addition to contingent path instructions would provide greater validity to the research. In another study, it was believed that the characteristic resultant achievement motivation may have been affected when subjects in the contingent path condition were told that if they failed to meet the criterion for success in any one of the steps, they would have to remain in their seats until the experimental session was over. The idea of remaining in one's seat following failure may have introduced an undesirable factor in the study. In another situation, it was believed that predictions may have been supported if subjects were led to believe that the contingent

path had a greater number of steps. Additional motives, such as M_{AFF}, have been thought to alter predictions based on the theory. Finally, it has also been suggested that hypotheses have not been supported because subjects acted according to their own estimation of their subjective probability of success rather than to the experimentally induced subjective probability of success.

This matter of congruency between the experimentally induced subjective probability of success and the subject's perceived probability of success is a critical factor in achievement motivation studies, especially in studies involving contingent future orientation. Not only is it important to establish high congruence between the induced P_{n^Sn} and the subject's perceived P_{n^Sn} in the immediate step, but in each of the subsequent steps of the path also. Valid tests of the theory cannot be made if the experimentally induced subjective probability of success in each step of the contingent path does not coincide with the subject's own estimation of the probability of success.

From an assessment of the empirical studies presented in this section, it appears that the prevalent procedure of inducing subjective probabilities in a contingent path condition involved the following: subjects were required to submit information regarding their level of intelligence, general ability, cumulative grade point average, mathematics score,

etc.; subjects were then told that on the basis of the information provided they were placed into ability groups; they were further told that each ability group received the task appropriate to its group; finally, the subjects were told that the investigators could assess quite accurately their chances of success on the task, because of extensive pretesting and experimentation with similar ability groups.

While the foregoing procedures appear to be appropriate for inducing subjective probability of success, they do not necessarily ensure a high congruence between the subject's perceived subjective probability of success and the induced one. First of all, the task used in most studies was an arithmetic task which usually consisted of simple addition and subtraction. It can be argued that the academic information obtained about each subject (that is, math scores, intelligence scores, etc.) need not necessarily be positively correlated with the subject's ability to add and subtract; that is, individuals low in mathematical ability or intelligence may perceive their ability to add and subtract equally as well as those who are high in mathematical ability (competence judgement). Secondly, although subjects were told that the tasks given to them were appropriate to their ability group, they were, in fact, the same for all subjects. Furthermore, whether P_{ns_n} was constant, decreased or increased at each step, the tasks presented were the same

for each type of path.

It, therefore, remains questionable whether the experimentally induced subjective probabilities of success were congruent with the subjects' own perceived chances for success. Consequently, there remains a need to search for new and improved ways of cueing in achievement motivation studies.

It should also be noted that for the most part, Raynor utilized performance (the Wendt arithmetic problems) as a measure of the strength of resultant achievement motivation. The use of performance to infer the strength of resultant achievement motivation is acceptable if one assumes an increasing monotonic relationship between level of performance and level of achievement motivation as Raynor and numerous other investigators have assumed in the past.

However, Atkinson[88] proposed that the relationship between level of achievement motivation and level of performance might not necessarily be an increasing monotonic one. This assumption is based on the belief that when a simple, overlearned task is used, an increasing monotonic relationship between motivation and level of performance may exist; when a more complex task is used, a curvilinear relationship may exist; and when a task which requires very

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88 J. W. Atkinson, "Strength of Motivation and Efficiency of Performance", 1974, p. 199-200.

cautious, deliberate or a relaxed approach is utilized, a decreasing relationship may exist. This may be an additional reason why some of Raynor's predictions were not supported. While the Wendt[89] problems appeared to be a simple arithmetic task, perhaps the subjects regarded them as a more complex task given the number of steps (three) it took to solve the problems and the limited time given to solve them.

In this section a critical review of some of Raynor's studies of future orientation was presented and possible reasons for the nonsupport of some of his hypotheses were advanced. In the next section, the research problem and the research hypotheses are presented.

4. Research Problem and Hypotheses.

While the theory concerning contingent future orientation has been developed to predict strength of the characteristic resultant achievement motivation in any one of the steps in a contingent path situation, the studies, to date, have been limited to a test of the theory in the first step only. The applicability of the theory in the steps subsequent to the first remains to be investigated. Consequently, the prediction that the strength of the characteristic resultant achievement motivation in the final step of a contingent path

89 H. W. Wendt, Op. Cit.

should be less than that in the first step has never been tested. Furthermore, while the strength of the characteristic resultant achievement motivation in the first step of a contingent path has been compared to that in the first step of a noncontingent path, it has never been compared to the strength of the characteristic resultant achievement motivation in a one-step path.

Therefore, the problem in this study is twofold: first, performance on a task in the first step of a contingent path should be compared to performance on the same task in the final step of a contingent path, to determine whether there is a decrease in the level of performance in the final task as compared to the initial task (see Table II); and second, the performance in the first step of a contingent path should be compared to that in a one-step path with a corresponding P_{ns_n} value.

To examine the problem posed in this study, two types of contingent paths are utilized. They are a decreasing P_s contingent path with P_{ns_n} = .9.7.5, and an increasing P_s contingent path with P_{ns_n} = .5.7.9. In addition two one-step paths are included with P_{ns_n} = .9 and .5, respectively.

If it is assumed that subjective probability values in a contingent path do not change as a function of cognitive learning or anticipation of an extrinsic reward, then according to the theory and as indicated in Table II, it follows

that: (a) success-oriented individuals perform better on the easy task in the first step of the three-step decreasing P_s contingent path (.9.7.5) than the success-oriented individuals in the last step of the three-step increasing P_s contingent path (.5.7.9); and (b) success-oriented individuals perform better on the moderately difficult task in the first step of the three-step increasing P_s contingent path (.5.7.9) than those in the final step of the three-step decreasing P_s contingent path (.9.7.5). Therefore, the first hypothesis is

> There is a disordinal interaction between type of contingent path (decreasing and increasing) and subjective probability of success.

Also, according to Raynor, the level of performance in the first step of a contingent path is greater than that in a one-step path situation (given the same P_{ns_n} values). Therefore, the second hypothesis is

(a) the success-oriented individuals in the first step of the increasing P_s contingent path (.5.7.9) perform better than the success-oriented individuals in the moderately difficult one-step path (.5).

(b) the success-oriented individuals in the first step of the decreasing P_s contingent path (.9.7.5) perform better than the success-oriented individuals in the easy one-step path (.9);

In summary, in this chapter, the theory of achievement motivation was presented. Raynor's concept of future orientation was also presented along with his modifications of the theoretical formulations. This was followed by a critical review of the research related to future orientation.

The chapter ended with a statement of the problem and the research hypotheses. In the next chapter the research design is presented.

CHAPTER II

RESEARCH DESIGN

In the first section of this chapter, a description of the research subjects is provided. In the second section, the measuring instruments are described. Studies assessing the reliability and validity of these measures are also noted. In section three, the procedures of the study are presented. The chapter ends with a description of the statistical procedures.

1. Research Subjects.

The research subjects were male and female grade nine students from twelve classrooms in the academic stream of a secondary school in southern Ontario. Two hundred and eighty-nine students with an average age of fifteen years participated at the beginning of the study. Of these, one hundred success oriented subjects, who qualified for the remainder of the study, were invited to participate. Three, who were absent on the testing days, did not participate.

In the next section, the measuring instruments used in this study are presented and discussed together with reliability and validity studies.

2. Measuring Instruments.

Five measuring instruments were used in this study. Two were measures of motive assessment while three were measures of performance.

(a) Motive Assessment Measures

The n Ach Test was used to assess the motive to achieve success (M_S). The high school form of the Test Anxiety Questionnaire (TAQ) was used to assess the motive to avoid failure (M_{AF}).

The n Ach Test is McClelland's[1] modification of the projective Thematic Apperception Test developed by Murray.[2] It is a group test which involves writing imaginative stories in response to visual (pictures or slides) or verbal (lead sentences) cues. The rationale for employing a projective measure of this type to assess the strength of the motive to achieve success is based on the idea that individuals tend to reveal the inner dynamics of their personality when asked to tell or write a story in response to visual or verbal cues.

The verbal cues are presented separately in the n Ach Test booklet (8½" x 14"). Each cue page is followed by a

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1 D. C. McClelland et al., The Achievement Motive, New York, Appleton-Century-Crofts, 1953, p. 97.

2 H. A. Murray et al., Explorations in Personality, New York, Oxford Press, 1938, p. 4-322.

page with four evenly spaced guiding questions. These questions ensure that a story, complete with plot and characters, is written in response to the cue. The stories are written on the page with the four guiding questions. Twenty seconds are given to read the cue. One minute is given to respond to each question. To ensure that each question is answered, the investigator announces at the end of every half minute that only half a minute remains before the next question is to be commenced. Four minutes are allowed to complete a story. Thus, the test takes approximately twenty to twenty-five minutes to administer.[3]

The stories are scored by first analyzing each for reference to an achievement goal (i.e., successful competition with another person or with oneself, a unique accomplishment and/or involvement in the attainment of a long term achievement goal).[4] If reference to an achievement goal is present, the story is scored +1 and then further analyzed for ten subcategories of achievement imagery. Each of the ten subcategories, if present, is scored +1. When reference to an achievement goal is doubtful, the story is scored zero,

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3 J. W. Atkinson, "Pictures Used to Elicit Stories and Other Considerations: Appendix II", in Motives in Fantasy, Action and Society, Princeton, N.J., Van Nostrand, 1958, p. 836-837.

4 D. C. McClelland et al., "Manual for Achievement Motive", in Motives in Fantasy, Action and Society, p. 832-834.

and not analyzed further. When a story is completely unrelated to achievement, it is given a score of -1 and not analyzed further. An individual's score on the test is the sum of the scores obtained for each story. The range of scores possible is from -4 to 44. This comprises a low to high continuum which represents the strength of the motive to achieve success. An elaboration of the foregoing scoring procedure is provided by Atkinson.[5]

For this study, it was decided to use verbal rather than visual cues (Appendix 1) because the test had to be administered in twelve different classrooms. This allowed for very little time to set up the visual cues required for the visual form of the test. The cues were descriptive titles drawn from a set of pictures recommended by Atkinson[6] for use in achievement motivation studies. Four cues are believed to be the most appropriate since motive scores obtained after the first twenty to twenty-five minutes of testing may be invalid.[7]

The n Ach Test with verbal cues is considered to be a valid measure of the motive to achieve success. According

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5 D. C. McClelland et al., The Achievement Motive, New York, Irvington, Halstead Press Division, Wiley, 1976, p. 179-204.

6 J. W. Atkinson, "Pictures Used to Elicit Stories and Other Considerations: Appendix II", 1958, p. 832-834.

7 Ibid., p. 831.

to McClelland,[8] verbal cues yield results which are highly comparable to those obtained through picture cues. Construct validity of the test has been demonstrated in several studies.

Lowell[9] conducted a study with twenty-one grade nine Navaho males in New Mexico to determine the validity of the n Ach Test and the scoring system in other cultures. He concluded that the test was valid. Achievement arousing instructions referring to intelligence and leadership were instrumental in increasing the n Ach scores of the Navaho males just as they had been for Caucasian males. Also, the scoring system discriminated successfully among those high and low in the motive to achieve success.

Winterbottom,[10] with a sample of twenty-nine eight year old boys and their mothers, tested several hypotheses based on the idea that early training in independence and mastery contributes to the development of strong achievement motivation. The results of the study supported the idea.

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8 D. C. McClelland, "Methods of Measuring Human Motivation", in Motives in Fantasy, Action and Society, 1958, p. 34.

9 E. L. Lowell, The Achievement Motive, New York, Irvington, Halstead Press Division, Wiley, 1976, p. 168-172.

10 M. R. Winterbottom, "The Relationship of Need for Achievement to Learning Experiences in Independence and Mastery Training", in Motives in Fantasy, Action and Society, 1958, p. 453-478.

O'Connor, Atkinson and Horner[11] conducted a study with four hundred and thirty-nine male and female students to test whether homogeneous ability grouping was better than heterogeneous ability grouping for success-oriented individuals, while for failure-threatened individuals, the opposite pattern of ability grouping was better. The criterion variables were growth in scholastic achievement and interest in schoolwork. The results of the study supported their hypothesis.

Construct validity has also been demonstrated in the Raynor and Rubin study and the Entin and Raynor study, described in Chapter I.

Thus, it appears that the n Ach Test with verbal cues is a valid measure of the motive to achieve success.

While there has been doubt expressed regarding the validity of the n Ach Test with female populations, there is, nevertheless, support for its validity as evidenced in the work of O'Connor, Atkinson, and Horner,[12] Raynor,[13]

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11 P. O'Connor, J. W. Atkinson, M. Horner, "Motivational Implications of Ability Grouping in Schools", in A Theory of Achievement Motivation, J. W. Atkinson and N. T. Feather (Eds.), New York, Wiley, 1966, p. 231-248.

12 Ibid.

13 J. O. Raynor, "Relationships Between Achievement-Related Motives, Future Orientation, and Academic Achievement", 1974, p. 173-180.

Fu,[14] Simon and Bibb,[15] Ollendick,[16] and Kagan and Moss.[17]

Furthermore, McClelland et al.[18] have stated that individual differences in n Ach scores have shown the same relation to performance in women as in men. That is, women who score high in n Ach perform better than those who score low in n Ach. Alper[19] speculates that previous findings of a sex difference in achievement motivation as measured by the n Ach Test may have been moderated because recently females may have recognized that achievement is an appropriate trait for the female role.

There appear to be no studies in the literature where the reliability of the n Ach Test utilizing verbal cues has

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14 L. L. W. Fu, "An Experimental Investigation of the Interaction Between Resultant Achievement Motivation and Experimentally Induced Probability of Success", Doctoral Dissertation presented to the University of Ottawa, 1975, p. 168.

15 R. H. Simons and J. J. Bibb, "Achievement Motivation, Test Anxiety and Underachievement in the Elementary School", in Journal of Educational Research, Vol. 67, 1974, p. 366-369.

16 T. H. Ollendick, "Level of n Achievement and Persistence Behaviour in Children", in Developmental Psychology, Vol. 10, 1974, p. 457.

17 J. Kagan and H. A. Moss, "Stability and Validity of Achievement Fantasy", in Journal of Abnormal and Social Psychology, Vol. 58, 1959, p. 357-364.

18 D. C. McClelland et al., "The Effects of the Need for Achievement on Thematic Apperception", in Motives in Fantasy, Action and Society, 1958, p. 77.

19 T. G. Alper, "Achievement Motivation in College Women: A Now-You-See-It-A-Now-You-Don't Phenomenon", in American Psychologist, Vol. 29, 1974, p. 195-203.

been examined. However, there are studies reporting the consistency and stability of the n Ach score obtained by visual cues. It may be useful to note the reliabilities reported in these studies, since according to McClelland,[20] the two versions of the test (verbal and pictorial) yield highly similar results.

Atkinson[21] reported a split-half reliability coefficient of .65 (N = 32). A split-half reliability coefficient of .27 (N = 173) was reported by Weinstein.[22] A test-retest reliability of .26 (N = 169) over a nine week period has been reported by Krumboltz and Farguhar.[23] Two retests given at three year invervals yielded reliability coefficients of .32, .16, and .22 (N = 86) in a study carried out by Kagan and Moss.[24] Lowell[25] reported a reliability of .22 (N = 21)

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20 D. C. McClelland, "Methods of Measuring Human Motivation", 1958, p. 35.

21 J. W. Atkinson, in D. C. McClelland et al., The Achievement Motive, 1976, p. 191.

22 M. S. Weinstein, "Achievement Motivation and Risk Preference", in Journal of Personality and Social Psychology, Vol. 13, No. 2, 1969, p. 161.

23 J. D. Krumboltz and W. W. Farguhar, "Reliability and Validity of the n-Achievement Test", in Journal of Consulting Psychology, Vol. 21, 1957, p. 226-228.

24 J. Kagan and H. A. Moss, Op. Cit., p. 359.

25 E. L. Lowell, "A Methodological Study of Projectively Measured Achievement Motivation", Unpublished Master's Thesis, Wesleyan University, 1950.

resulting from two parallel forms administered one week apart. With a three week interval, Haber and Alpert[26] obtained a reliability coefficient of .54 (N = 26) using two parallel forms. With three parallel forms, each administered five weeks apart, Morgan[27] reported reliabilities of .56 (N = 39) and .64 (N = 62). Over a two year period, Birney[28] found reliability coefficients ranging from .03 (N = 46) to .56 (N = 26) with three parallel forms.

Various reasons have been advanced for the low to moderate reliability of the n Ach Test. According to McClelland[29] some of these reasons are: changes in conditions of testing from one occasion to the next; unwillingness of subjects to cooperate on the second occasion, and the sensitivity of the product moment correlation coefficient to extreme shifts in a few scores from one occasion to the next. Atkinson[30] contends that in a test-retest situation or even

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26 R. N. Haber and R. Alpert, "The Role of Situation and Projective Cues in Projective Measurement of the Achievement Motive", in J. W. Atkinson, Motives in Fantasy, Action and Society, 1958, p. 644-663.

27 H. H. Morgan, "Measuring Achievement Motivation with Picture Interpretations", in Journal of Consulting Psychology, Vol. 17, 1953, p. 289-292.

28 R. C. Birney, "The Reliability of the Achievement Motive", in Journal of Abnormal Social Psychology, Vol. 58, 1959, p. 266-267.

29 D. C. McClelland, The Achievement Motive, 1976, p. 193-194.

30 J. W. Atkinson, in Motives in Fantasy, Action and Society, 1958. p. 681-682.

in a situation where a split-half reliability is computed, the scores will not be highly related because subjects may feel that they do not want to be repetitious when writing creative stories. He also notes that the lack of adequate knowledge regarding the effects of the number and serial order of the picture cues in the n Ach Test poses a problem in studies assessing the reliability of the n Ach scores.

Reported score-rescore and interscorer reliabilities have been higher. Feld and Smith[31] conducted an evaluation of the objectivity of the n Ach scoring procedure. They found interscorer reliability coefficients which ranged from .66 to .96 and score-rescore reliability coefficients from .88 to .95.

Notwithstanding the weakness of the n Ach Test with respect to its reliability, it was decided to use this test primarily because of its construct validity and its extensive use by Atkinson and Raynor.

The high school form of the TAQ (Appendix 2) developed by Cowen[32] is a self report measure assessing feelings of anxiety before, during, and after taking tests such as

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31 S. Feld and C. P. Smith, "An Evaluation of the Objectivity of the Method of Content Analysis", in J. W. Atkinson, Ed., Motives in Fantasy, Action and Society, 1958, p. 234.

32 J. E. Cowen, "Test Anxiety Questionnaire in High School Students and Its Relationship to Performance on Group Tests", Unpublished Doctoral Dissertation, School of Education, Harvard University, Boston, 1957.

scholastic aptitude tests, teacher made tests, and tests in general. According to Atkinson,[33] it is assumed that the amount of anxiety experienced by an individual in a test situation is proportional to the strength of the tendency to avoid failure. From the amount of anxiety measured by the TAQ, the strength of the motive to avoid failure can be inferred. Thus, the TAQ is deemed an appropriate measure in achievement motivation studies.

In this study, because of insufficient testing time, the short form (32 items) of the TAQ was used. This form correlates .946 with the long form (54 items). The items are statements of attitudes, opinions, and feelings about tests and taking tests. Below each item is a scale with a midpoint and two opposing phrases at the extreme. The subject responds to the item by marking an X at any point on the scale. While the questionnaire has no time limit, twenty minutes were allowed for the administration. Given that the items were read aloud to the subjects, there was sufficient time to complete the questionnaire.

The items are scored on a nine point scale with the use of an overlay, where a score of nine indicates a high level of anxiety. An individual's total score on the TAQ is

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33 J. W. Atkinson, in Motivation and Achievement, J. W. Atkinson and J. O. Raynor (Eds.), New York, Winston, 1974, p. 21.

the sum of the scores on each item. The range of possible scores is from 32 to 288 with a midpoint of 160.

Cowen[34] argued for the validity of the high school TAQ by noting the following: the similarity of the questionnaire to those constructed by Mandler and Sarason[35] and Sarason et al.[36] for college students and elementary school students, respectively; the items are consistent differentiators of high and low anxiety groups of high school subjects; a predictive validity coefficient of -.185 ($p < .02$) between the TAQ and the Otis Gamma. While this relationship is significant, it is not very strong.

Construct validity of the high school TAQ is demonstrated in a study by Moulton.[37] There appear to be relatively few studies where Cowen's high school TAQ has been used.

Cowen[38] notes a split-half reliability coefficient of .90 obtained with a group of 286 male and female high school

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34 J. E. Cowen, Op. Cit.

35 G. Mandler and S. B. Sarason, "A Study of Anxiety and Learning", in Journal of Abnormal and Social Psychology, Vol. 47, 1952, p. 166-173.

36 S. B. Sarason et al., Anxiety in Elementary School Children, New York, Wiley, 1960, p. 127.

37 R. W. Moulton, "Effects of Success and Failure on Level of Aspiration as Related to Achievement Motives", in A Theory of Achievement Motivation, 1966, p. 147-159.

38 G. Mandler and J. E. Cowen, "Test Anxiety Questionnaire", in Journal of Consulting Psychology, Vol. 22, No. 3, 1958, p. 228-229.

subjects. No measure of the test-retest reliability of the instrument had been reported to provide evidence of the instrument's consistency over time.

Although very little evidence to support the validity and reliability of the high school TAQ is found in the literature, it was decided to use this measure because of its similarity to the college and elementary school forms. These forms have been used extensively in studies of achievement motivation and have acquired a measure of construct validity.

In the next section, a justification for use and a description of the performance measures are provided.

(b) Performance Measures

The performance measures were three motor tasks, the tapping board, the nuts and bolts task, and the pursuit rotor. Motor tasks have been successfully used in a number

of achievement motivation studies.[39,40,41,42] Such tasks were chosen rather than some type of paper and pencil task because it was believed that subjects would have had very little or no previous experience with them. Thus, they would be more inclined to believe the experimentally induced subjective probabilities of success. It was believed that this would ensure greater congruence between the experimentally induced subjective probability of success and the subjects' own probability of success. In a pilot study (N = 17), it was confirmed that subjects had had no previous experience with such tasks.

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39 G. H. Litwin, "Motives and Expectancy as Determinants of Preference for Degrees of Risk", Unpublished Master's Thesis, University of Michigan, 1958.

40 J. W. Atkinson et al., "The Achievement Motive, Goal Setting, and Probability Preferences", in Journal of Abnormal and Social Psychology, Vol. 60, 1960, p. 26-36.

41 J. W. Atkinson and G. H. Litwin, "Achievement Motive and Test Anxiety Conceived as Motive to Approach Success and to Avoid Failure", in Journal of Abnormal and Social Psychology, Vol. 60, 1960, p. 52-63.

42 W. T. Weinberg, "Perceived Instrumentality as a Determinant of Achievement-Related Performance for Groups of Athletes and Nonathletes", Unpublished Doctoral Dissertation, University of Maryland, 1975.

It was also necessary that the three motor tasks selected be sufficiently different so that cognitive learning effects might be controlled. Furthermore, to effectively induce decreasing and increasing paths, the tasks had to vary in difficulty level. The pursuit rotor was chosen to represent the moderately difficult task (i.e., $P_S = .50$), the tapping board, the easy task (i.e., $P_S = .90$) and the nuts and bolts, the intermediate difficulty task ($P_S = .70$). These relative difficulty levels were congruent with comments made by subjects in the pilot study (N = 17).

The tapping board is a wooden board approximately eighteen inches long, four inches wide, and one inch thick with a stainless steel plate at each end. The task is to tap back and forth on the stainless steel plates, with a stylus, as quickly as possible. Each tap is recorded on an impulse counter and the total number of taps recorded in a fifteen second interval is the individual's score. The higher the score, the better is the performance.

The nuts and bolts device is an 8" x 24" board with one hundred small holes in the centre of the board and two circular depressions at each end. The object of the task is to take a nut from the left depression and a bolt from the right depression, assemble them, and place them in the hole in a left to right and top to bottom sequence. The total number of seconds taken to assemble ten nuts and bolts

represented an individual's score. The less time taken, the better the performance. Thus, in this case, a low score represented good performance.

The pursuit rotor, technically known as the photo electric rotary pursuit apparatus, is a box-like apparatus equipped with the following: a rotating disc which can be set for speeds from 10 to 100 RPM (revolutions per minute) in forward or reverse directions; a photo electric pursuit wand; and a stop clock which measures time on and time off target. The task is to pursue an illuminated target on the rotating disc with the pursuit wand in an effort to maximize time on target and minimize time off target. An individual's score on the pursuit rotor was the number of seconds on target in a thirty second time interval with the speed of the rotating disc set at 30 RPM. In a pilot study (N = 17), this speed was found to be appropriate for grade nine subjects.

Since no reliabilities on the three motor tasks were found in the literature, these were estimated from a pilot study (N = 17). Test-retest reliability coefficients of .89, .48 and .80 with an interval of five minutes were obtained for the tapping board, the nuts and bolts task, and the pursuit rotor, respectively. These reliability coefficients were believed to be adequate for the purposes of this study.

In summary, the n Ach Test and the Test Anxiety Questionnaire (TAQ) were presented and discussed. The reliability

and validity of these measures were presented along with related studies. The three performance measures, the pursuit rotor, the nuts and bolts task, and the tapping board were also presented and discussed. In the next section the experimental procedure is presented.

3. Experimental Procedures.

The n Ach Test and the TAQ were administered to twelve classes of grade nine students (N = 289) in three days during the second week in May. Depending on the length of the class period, some classes completed both the n Ach and the TAQ in the same period, while others completed them separately in different periods, and in some cases on different days. Prior to the administration of the two measures, the subjects were told that a study was being conducted and that the purpose of the study was first to learn about the kinds of imaginative stories grade nine students could write and second how grade nine students felt about tests and taking tests (Appendix 3).

The n Ach Test was administered under neutral conditions following the standard procedures described in section two with one exception. One and one half minutes were allowed to answer each of the four guiding questions rather than the standard one minute. As a result, subjects had six minutes to write each story. It was felt that grade nine students would require more time than college students to write their

stories. The administration of the test took approximately thirty minutes.

The tests were scored according to the procedure described above by the investigator whose scoring reliability with the n Ach practice materials[43] was 0.89. Following an interval of ten days, the tests were rescored. A score-rescore reliability estimate of 0.96 was obtained. The tests were also scored by another expert scorer whose scoring reliability with the n Ach practice materials was 0.91. An inter-scorer reliability of 0.88 was obtained. The score-rescore and inter-scorer reliability estimates found in this study are acceptable in studies of achievement motivation.[44]

Next, the TAQ was administered. Subjects were first briefed on the three types of tests (scholastic aptitude tests, teacher made tests, and tests in general) to be identified in the TAQ and then instructed on the method of responding. The instructions on the cover page of the TAQ (Appendix 2) were read to the subjects and when all student

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43 C. P. Smith and S. Feld, "How to Learn the Method of Content Analysis for n Achievement, n Affiliation, and n Power", in J. W. Atkinson (Ed.), Motives in Fantasy, Action, and Society, Princeton, N.J., Van Nostrand, 1958, p. 685-735.

44 S. Feld and C. P. Smith, "An Evaluation of the Objectivity of the Method of Content Analysis", in J. W. Atkinson (Ed.), Motives in Fantasy, Action, And Society, 1958, p. 234-235.

questions had been answered, the subjects proceeded to complete the questionnaires. To ensure that the questionnaire was completed in twenty minutes, the investigator read each item to the class, allowing approximately ten seconds for subjects to respond. The TAQ, including the instructions, was completed in twenty minutes. The questionnaires were scored by the investigator.

The success oriented subjects were identified by the Z score method described in Chapter I. Those subjects scoring highest (0.53 to 5.05) were assumed to be success oriented. This group, approximately one third of the total group, consisted of sixty males and forty females.

The one hundred success oriented subjects were first stratified on the basis of their resultant achievement motivation scores into twenty-five strata with four subjects each. Stratum one represented the highest resultant achievement motivation scores while stratum twenty-five represented the lowest. The subjects in each stratum were then randomly assigned to one of four treatment groups: a three-step decreasing P_s contingent path; a three-step increasing P_s contingent path, a one-step path ($P_s = .9$) and a one-step path ($P_s = .5$). The purpose of the stratification was to ensure that each group had similar levels of resultant achievement motive scores.

An additional sixteen subjects from the middle third of the Zn Ach - ZTAQ distribution were selected and equally assigned to the two contingent path treatments. These subjects were included because it was believed that the experiment might be suspect if the subjects realized that everyone was succeeding on all three tasks. Thus, to make the study more realistic the sixteen subjects served as those who failed at one of the tasks in the contingent paths. Their scores were not used in the statistical analysis.

Prior to receiving one of the four treatments, all subjects were pretested individually on each of the motor tasks. The purpose of the pretest was to acquaint the subjects with the tasks and to obtain a record of their performance on each task. By obtaining a record of performance for each subject, it was hoped to establish a greater congruence between the P_s and the experimentally induced P_s. Subjects in the treatment sessions would be led to believe that the induced P_s were based on their own previous performance.

Each subject was issued an appointment slip on the day prior to the pretest session. The sessions were conducted in a small room and lasted approximately ten minutes. During the first four minutes subjects were told that this session was another part of the study in which they had participated earlier and that in this part, information on how

well grade nine students perform on the three motor tasks was desired (Appendix 4). Subjects were also shown how to perform on each of the three tasks and were given a chance to try each of them. Following this, each subject listened to the taped (male voice) pretest instructions (Appendix 5). The instructions were designed with the intention of not arousing the achievement related motives (M_S and M_{AF}). Therefore, each subject was told that normative data were being gathered on the three tasks. Following the instruction, each subject was pretested on the three tasks and the performance was scored. All pretest sessions were completed in five days.

One week later, the treatment sessions began. Subjects were tested individually in the same small room as the pretest. The treatment sessions lasted ten minutes each. During the first two minutes, subjects were given the opportunity to try each task again, in case they had forgotten how to perform on each of them. Following this, each group received the appropriate instructions (Appendix 6) taped with the same male voice that was used in the pretest instructions.

The treatment instructions were designed to create an achievement related situation, to induce the subjective probability of success, and in the case of the contingent path groups, to convey the idea of contingency. In order to

create an achievement related situation, subjects in all treatment groups were told that the motor tasks were tests of certain abilities. Relating tasks to tests of abilities is assumed to arouse the achievement-related motives.[45] Furthermore, subjects were told that they would be required to meet performance standards set for them by a computer on the basis of their previous performances. However, the performance standards were not specified because it was believed that subjects would accept more readily the induced subjective probabilities of success, thereby guarding against any discrepancy which might otherwise occur.

The subjective probability of success was induced by telling the subjects that their chances of meeting their prescribed performance standards had also been calculated using the computer. The subjects in the two contingent path groups were told by the investigator* that their chances of success on the pursuit rotor, the nuts and bolts task, and the tapping board were 5 out 10, 7 out of 10, and 9 out of 10, respectively. In order that the subjects would not forget, the stated probabilities were on cards which were placed

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45 J. W. Atkinson, "A Systematic Study of Human Motivation", in An Introduction to Motivation, 1958, p. 225.

* These probabilities were stated by the investigator rather than taped, so that the induced subjective probabilities of success would appear to be more personal and therefore more believable.

by the appropriate task. The one-step path subjects were told that their chances of success on either the pursuit rotor or the tapping board were 5 out of 10 or 9 out of 10, respectively. A card with the stated probability was placed by the appropriate task.

The idea of contingency for the two contingent path groups was conveyed using Raynor's[46] method where subjects were told that they would be able to try each subsequent task only if they were successful in the prior one. They were also told that they had to be successful in the final task in order to consider themselves successful in the session (see Appendix 6).

Following the treatment instructions, subjects were asked to perform on the motor tasks. Those in the decreasing P_s contingent path (.9.7.5) were asked to start with the tapping board followed by the nuts and bolts task and the pursuit rotor, while those in the increasing P_s contingent path (.5.7.9) were asked to start with the pursuit rotor followed by the nuts and bolts task and the tapping board. Subjects in the one-step path groups were asked to perform only on the pursuit rotor or the tapping board.

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46 J. O. Raynor and T. S. Rubin, "Effects of Achievement Motivation and Future Orientation on Level of Performance", in Motivation and Achievement, 1974, p. 184.

All subjects were given two trials on each task because it was felt that the average of two measures would be more representative of their true score than a single trial. All success-oriented subjects were told that they were successful following the second trial of each task. The extra sixteen subjects were told they they were unsuccessful following the second trial of either the first, second, or third task and, where appropriate, they were not allowed to go on to the next task.

Following all data collection, the teachers of the experimental subjects were completely debriefed and were asked to relate the purpose of the experiment to their students.

Performance on each task was scored according to the procedures described above. All treatment sessions were completed in six days.

One of the major concerns in the design of this study was to effectively induce the subjective probability of success and try to improve upon some of the procedures used in the studies noted in Chapter I. Steps taken to accomplish this were the following: rather than using familiar tasks, such as addition and subtraction, with which subjects may have preconceived ideas of their P_s, motor tasks which were unfamiliar to high school students were used. Use of unfamiliar tasks would tend to reduce the

problem of preconceived P_s, since subjects would have no idea of their competence in these tasks. Consequently they would tend to believe the experimentally induced P_s; rather than use the same task while inducing different P_s values, tasks which actually varied in level of difficulty were used; to reinforce subjects' belief of the induced P_s, they were allowed to try each task during a pretest session and experience the consensual difficulty of each task; subjects were tested individually rather than in a group, thereby providing them with an occasion to note that the investigator was observing their individual performance and recording it. This would tend to make the induced P_s during the treatment session more believable because subjects were led to believe that the stated P_s was based on their own performance rather than on some group norm; mention of "computer assessment" was also intended to make subjects believe that their performance had been objectively and validly evaluated. The foregoing procedures were believed to be an improvement over some of the procedures criticized in Chapter I.

In this section, the administration and scoring procedures of the measuring instruments and the experimental conditions were presented and discussed in detail. In the next section, the statistical procedures are discussed.

4. Statistical Procedures.

Since neither of the two hypotheses involved the .70 subjective probability of success level, the scores* on the nuts and bolts task were excluded from the hypothesis tests. Only the scores obtained on the pursuit rotor ($P_{n}s_{n}$ = .50) and on the tapping board ($P_{n}s_{n}$ = .90) were utilized.

Hypothesis one, where it was stated that there is a disordinal interaction between type of contingent path (decreasing and increasing) and subjective probability of success ($P_{n}s_{n}$ = .50 and $P_{n}s_{n}$ = .90) was tested in the null form by a four-factor analysis of variance with repeated measures. Three of the independent factors were grouping factors: type of contingent path (decreasing and increasing); level of resultant achievement motive (high and low)--the scores above the median (1.27) of the resultant achievement motive scores were designated as high while those below were designated as low; and sex of the subjects (male and female). The fourth independent factor was the repeated measure, the level of subjective probability of success ($P_{n}s_{n}$ = .50 and $P_{n}s_{n}$ = .90). The dependent variable was the level of performance on each task.

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* The means and standard deviations of these scores are presented in Appendix 8.

Prior to testing the first hypothesis, the scores (mean score of the two trials) obtained by subjects in the two contingent path groups on the pursuit rotor were pooled and transformed into Z scores. The tapping board scores (mean score of the two trials) were standardized in the same manner. The transformations were necessary because an analysis of variance with repeated measures requires that the dependent measures are on the same scale.

Hypothesis two, where it was stated that success-oriented subjects in the first step of a contingent path perform better than those in a one-step path (given the same $P_{n_s n}$ values), was tested in the null form by a four factor analysis of variance test. The four independent factors were type of contingent path (first step and one-step), level of resultant achievement motive (high and low), sex (male and female), and subjective probability of success ($P_{n_s n} = .5$ and $P_{n_s n} = .9$). The dependent factor was level of performance on the motor tasks.

Prior to testing the second hypothesis, the scores (mean score of the two trials) were standardized. This was done by pooling the scores obtained on the pursuit rotor by the increasing P_s contingent path group (.5.7.9) and the one-step path group (.5) and transforming these scores into Z scores. The scores obtained on the tapping board by the decreasing P_s contingent path group (.9.7.5) and the one-step

path group (.9) were standardized in the same manner.

Although the sex factor and the resultant achievement motive factor were not included in the research hypotheses, it was decided to control for them in the statistical design. While differences in performance between male and female subjects have not been consistently found in the literature, it was decided to control for such possible differences should they occur.

Also, according to the theory, it was expected that subjects with a stronger resultant achievement motive would perform better than those with a weaker resultant achievement motive. Therefore, it was decided to control for this possible difference by including in the statistical design two levels of the resultant achievement motive factor. Two levels rather than twenty-five (the number into which the one hundred subjects were stratified) were used.[47]

Given the statistical designs used to test the two hypotheses, unequal cell sizes resulted. Since there was no reason to believe that cell sizes were related to any of the independent factors, an unweighted means analysis was used in testing both hypotheses.

Prior to the hypothesis tests, the assumption of homogeneity of variance was tested using a modification of

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47 J. L. Myers, Fundamentals of Experimental Design, Boston, Allyn and Bacon, 1979, p. 153.

Bartlett's test statistic (Approximate F).[48]

All tests were carried out at the 0.05 level of significance.

In summary, in this chapter, the research subjects were identified. The research instruments were described and their reliabilities and validities discussed. The manner in which the instruments were administered and the experimental conditions induced were described next. The chapter ended with a discussion of the statistical procedures utilized in testing the research hypotheses. In the next chapter, the results are presented and discussed.

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48 W. J. Dixon and F. J. Massey, Jr., Introduction to Statistical Analysis, New York, McGraw-Hill, 1969, p. 308-310.

CHAPTER III

PRESENTATION AND DISCUSSION OF RESULTS

In this chapter, the results of the study are presented and discussed. First descriptive information on the measures used in this study are presented and discussed. Second, the results of the hypotheses tests are presented. Third, a discussion of these results follows and suggestions for future research are advanced. The chapter ends with a summary and conclusions.

1. Descriptive Statistics.

In this section, reliability estimates, means, and standard deviations of scores obtained by the research subjects on the measuring instruments are presented.

A reliability coefficient was obtained for each of the measures used in this study, with the exception of the nuts and bolts task since it was not used in the statistical analyses. The reliability coefficients are presented in Table III.

An alpha reliability coefficient was computed to estimate the reliability of the n Ach Test. It was decided to use the alpha rather than the split-half reliability coefficient because of the difficulty in obtaining two equal halves of the n Ach Test. It is observed that the internal

Table III.- Reliability Estimates of Scores Obtained by the Research Subjects on the n Ach Test, TAQ, Pursuit Rotor, and Tapping Board.

Test	Subjects	Type of Reliability	Reliability Estimate
n Ach	All Research Subjects n = 289	Alpha	0.37
TAQ	All Research Subjects n = 289	Alpha	0.90
Pursuit Rotor	Decreasing Contingent Path Group (.9.7.5) n = 22	Split-half	0.93
	Increasing Contingent Path Group (.5.7.9) n = 25	Split-half	0.90
	One-Step Path Group n = 25	Split-half	0.87
	Total n = 72	Split-half	0.90
Tapping Board	Decreasing Contingent Path Group (.9.7.5) n = 22	Split-half	0.68
	Increasing Contingent Path Group (.5.7.9) n = 25	Split-half	0.76
	One-Step Path Group n = 25	Split-half	0.76
	Total n = 72	Split-half	0.56

consistency of the n Ach Test is low (alpha = .37). This is similar to internal consistency coefficients obtained for the n Ach Test in previous studies.[1]

The alpha coefficient obtained for the TAQ was found to be high (.90). This is similar to the high split-half coefficient found by Cowen.[2]

Since the performance scores on each of the two motor tasks were the average of the scores from trial one and from trial two, it was decided to find a reliability estimate of the scores from both trials combined. The two trials were treated as split-halves of a longer test. A split-half reliability estimate was found for each motor task. These estimates were then corrected for length by the Spearman-Brown[3] formula. The reliability coefficients obtained for the pursuit rotor were similar to that obtained in the pilot study. Those for the tapping board were somewhat lower, but considered adequate for this study. Fluctuations in the correlation statistic are expected when the

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1 M. S. Weinstein, "Achievement Motivation and Risk Preference", in Journal of Personality and Social Psychology, Vol. 13, No. 2, 1969, p. 156.

2 J. E. Cowen, "Test Anxiety in High School Students and Its Relationship to Performance on Group Tests", Unpublished Doctoral Dissertation, School of Education, Harvard University, Boston, 1957.

3 R. L. Ebel, Essentials of Educational Measurement, Englewood Cliffs, N.J., Prentice-Hall, 1972, p. 413.

sample sizes are small.

The raw scores on the n Ach Test and the TAQ obtained by each subject in the total sample (n = 289) are presented in Appendix 7. The scores on the n Ach Test ranged from -4 to 19. The mean and standard deviation of these scores are presented in Table IV. The positively skewed distribution (skewness = 0.89) of the n Ach scores is similar to the distributions obtained in other achievement motivation studies. The scores on the TAQ ranged from 56 to 269. The mean and standard deviation of these scores are also presented in Table IV. The distribution of the TAQ scores approximates a normal distribution ($\chi^2_{12} = 6.54$).

It is observed that the mean score on the n Ach Test is higher for females than for males. This difference was tested by use of the Mann-Whitney U Test which is appropriate when the assumption of normality is not met. The difference was found to be insignificant (large sample statistic Z = -.33).

Also the mean score of the females on the TAQ was higher than that of the males. This difference was found to be significant ($t = 5.28$; $df = 287$; $p < 0.05$). Significant differences between males and females on the TAQ have been

Table IV.- Means and Standard Deviations of Scores Obtained on the n Ach Test and the TAQ by Males, Females, and Total Group.

Test		Males n = 142	Females n = 147	Total n = 289
n ACH Test	M	1.72	2.05	1.89
	SD	4.76	4.57	4.67
TAQ	M	157.97	181.61	169.99
	SD	35.85	39.76	39.69

reported before in the literature.[4] The explanation generally offered for this difference is that females tend to react more emotionally and that they have stronger anxiety responses than males in situations where there is a possibility of negative consequences. Males, on the other hand, tend not to show their anxiety.

A Spearman correlation coefficient was calculated between the scores on the n Ach Test and the TAQ to ascertain if a relationship existed. According to Atkinson,[5] the two sets of scores are assumed not to be correlated. Persons scoring high or low on one test are equally as likely to score high or low on the other test. A correlation coefficient of .0026 was found between the two measures in this study, indicating that no relationship existed.

The raw scores of each subject on the three motor tasks are presented in Appendix 7. It is noted that three of the subjects in the decreasing P_s contingent path group (.9.7.5), who were scheduled for the posttest session, did not attend because of illness.

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4 M. S. Horner, "Fear of Success in Women", in J. W. Atkinson and J. O. Raynor (Eds.), Motivation and Achievement, Washington, D.C., Winston, 1974, p. 97.

5 J. W. Atkinson, "Motivational Determinants of Risk-Taking Behavior", in J. W. Atkinson and N. T. Feather (Eds.), A Theory of Achievement Motivation, New York, Wiley, 1966, p. 23.

In Table V, the means and standard deviations of the performance scores on the pursuit rotor and the tapping board are presented by type of contingent path, level of resultant achievement motive, sex, and subjective probability of success. As noted, two sets of Z score statistics are shown. The first set was used in the test of hypothesis one, while the second set was used in the test of hypothesis two. In Table VI, the means and standard deviations of the performance scores on the two dependent measures are presented by type of contingent path and subjective probability of success, so that the results associated with the hypotheses of interest may be observed. The means in Table VI are unweighted means, that is, they are the mean of the means which appear in Table V.

An examination of Table VI indicates that the means are only partially consistent with the first hypothesis. While the subjects in the increasing P_s contingent path (.5.7.9) obtained a higher mean score on the moderately difficult task than the subjects in the decreasing P_s contingent path (.9.7.5), the latter group did not obtain a higher mean score than the former group on the easy task. Therefore, a disordinal interaction was not obtained. For the second hypothesis, the mean score of the increasing P_s contingent path group (.5.7.9) is higher than that of the one-step path group (.5). Also the mean score of the decreasing P_s

Table V.- Means and Standard Deviations of Performance Scores on the Motor Tasks by Type of Contingent Path, Level of Resultant Achievement Motive, Sex, and Subjective Probability of Success.

Type of Contingent Path	Level of Resultant Achievement Motive	Sex		Subjective Probability of Success $P_{nSn} = .50$ Pursuit Rotor (Time in sec.) Raw Scores	Z^1 Scores	Z^2 Scores	Subjective Probability of Success $P_{nSn} = .90$ Tapping Board (Number of Taps) Raw Scores	Z^1 Scores	Z^2 Scores
Decreasing P_s Contingent Path (.9.7.5)	High	Male (n=9)	M	20.89	0.19		66.11	0.08	0.27
			SD	1.34	0.31		11.73	1.47	1.44
		Female (n=3)	M	16.42	-0.84		71.50	0.76	0.93
			SD	4.77	1.10		3.04	0.38	0.38
	Low	Male (n=6)	M	21.83	0.41		59.42	-0.76	-0.55
			SD	4.57	1.05		5.06	0.64	0.62
		Female (n=4)	M	13.19	-1.58		64.38	-0.14	0.06
			SD	3.62	0.83		3.25	0.41	0.40
Increasing P_s Contingent Path (.5.7.9)	High	Male (n=5)	M	20.35	0.07	0.15	60.20	-0.66	
			SD	2.67	0.61	0.65	6.09	0.77	
		Female (n=8)	M	20.00	-0.01	0.06	67.25	0.22	
			SD	5.15	1.18	1.25	7.92	1.00	
	Low	Male (n=7)	M	23.32	0.75	0.86	67.29	0.23	
			SD	2.62	0.60	0.63	8.12	1.02	
		Female (n=5)	M	19.35	-0.16	-0.10	68.70	0.41	
			SD	4.59	1.05	1.11	4.32	0.54	

Table V.- Continued

Type of Contingent Path	Level of Resultant Achievement Motive	Sex		Subjective Probability of Success $P_{n}s_{n} = .50$ Pursuit Rotor (Time in sec.) Raw Scores	Z^1 Scores	Z^2 Scores	Subjective Probability of Success $P_{n}s_{n} = .90$ Tapping Board (Number of Taps) Raw Scores	Z^1 Scores	Z^2 Scores
One-Step Path (.5)	High	Male (n=7)	M	18.18		-0.38			
			SD	4.72		1.14			
		Female (n=5)	M	17.40		-0.57			
			SD	2.63		0.64			
	Low	Male (n=6)	M	18.92		-0.20			
			SD	4.11		1.00			
		Female (n=7)	M	19.71		-0.01			
			SD	4.24		1.03			
One-Step Path (.9)	High	Male (n=9)	M				63.83		-0.01
			SD				8.41		1.03
		Female (n=3)	M				63.67		-0.03
			SD				2.57		0.32
	Low	Male (n=9)	M				68.83		-0.01
			SD				9.10		1.12
		Female (n=4)	M				60.00		-0.48
			SD				7.56		0.93

1 Z scores used in test of Hypothesis One.
2 Z scores used in test of Hypothesis Two.

Table VI.- Means of Performance Scores on the Motor Tasks by Type of Contingent Path and Subjective Probability of Success.

Type of Contingent Path		Subjective Probability of Success					
		P_s = .50 Pursuit Rotor (Time in Sec)			P_s = .90 Tapping Board (Number of Taps)		
		Raw Scores	Z^1 Scores	Z^2 Scores	Raw Scores	Z^1 Scores	Z^2 Scores
Decreasing P_s Contingent Path (.9.7.4) n = 22	M	18.08	-0.46		65.35	-0.02	0.18
Increasing P_s Contingent Path (.5.7.9) n = 25	M	20.76	0.16	0.24	65.86	0.05	
One-Step Path (.5) n = 25	M	18.55		-0.29			
One-Step Path (.9) n = 25	M				62.83		-0.13

1 Z scores used in test of Hypothesis One.
2 Z scores used in test of Hypothesis Two.

contingent path group (.9.7.5) is higher than that of the one-step path group (.9). These results are in the expected direction.

In this section, reliability estimates, obtained in this study, were reported for the two motive measures (n Ach and TAQ) and for two motor tasks (pursuit rotor and the tapping board). Means and standard deviations were reported for scores on the n Ach Test, the TAQ, and on the pursuit rotor and the tapping board. In the next section, the results of the tests of hypotheses are presented.

2. Results of the Tests of Hypotheses.

A modification of Bartlett's test statistic (Approximate F)[6] was used to test the homogeneity of variance assumption prior to testing the first hypothesis. The test was performed on the difference between the Z scores of the moderately difficult and the easy tasks. The results of the test indicated that the assumption was not rejected (M = 8.79; Approx. F = 1.15; df = 7, 1052; p = 0.33).

The first hypothesis, where a disordinal interaction was predicted between type of contingent path and subjective probability of success, was tested in the null form by a four-factor analysis of variance test with repeated measures.

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6 W. J. Dixon and F. J. Massey, Jr., Introduction to Statistical Analysis, New York, McGraw-Hill, 1969, p. 308-310.

The results of this test are presented in Table VII.

The hypothesized interaction between type of contingent path and subjective probability of success (AD) was not supported. This indicates that the difference in performance between the two contingent path groups on the moderately difficult task is not significantly different from the difference in their performance on the easy task.

Also as noted in Table VII, a significant type of contingent path by level of resultant achievement motive interaction (AB) and a sex by subjective probability of success interaction (CD) were obtained. These results were not anticipated.

The second hypothesis, where it was predicted that success-oriented subjects in the first step of a contingent path would perform better than those in a one-step path (given the same $P_{n s_n}$ value), was tested by a four-factor analysis of variance test.

Prior to testing the second hypothesis, the approximate F statistic[7] was used to test the homogeneity of variance assumption. The results of the test (M = 18.03; Approx. F = 1.11; df = 15, 2356; p = 0.34) indicated that the assumption of homogeneity of variance was not rejected.

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7 Ibid.

Table VII.- Results of the Analysis of Variance Test with Repeated Measures with Type of Contingent Path, Level of Resultant Achievement Motive, Sex, and Subjective Probability of Success as Independent Variables and Performance on the Motor Tasks as the Dependent Variable.

Source of Variation	Sum of Squares	df	Mean Square	F	
Between Groups					
A Type of Contingent Path (.9.7.5 and .5.7.9)	2.40	1	2.40	2.06	n.s.
B Level of Resultant Achievement Motive	0.14	1	0.14	0.12	n.s.
C Sex	0.88	1	0.88	0.75	n.s.
AB	4.89	1	4.89	4.19	*
AC	1.04	1	1.04	0.89	n.s.
BC	2.13	1	2.13	1.83	n.s.
ABC	0.09	1	0.09	0.08	n.s.
Error	45.43	39	1.17		
Within Groups					
D Subjective Probability of Success (.5, .9)	0.56	1	0.56	1.10	n.s.
AD	1.58	1	1.58	3.08	n.s.
BD	0.15	1	0.15	0.29	n.s.
CD	13.24	1	13.24	25.81	*
ABD	1.00	1	1.00	1.96	n.s.
ACD	1.66	1	1.66	3.24	n.s.
BCD	0.34	1	0.34	0.67	n.s.
ABCD	0.20	1	0.20	0.39	n.s.
Error	20.01	39	0.51		

* $\alpha = 0.05$.

The results of the analysis of variance test is presented in Table VIII. The second hypothesis was not supported at the 0.05 level of significance. However, the difference in performance of the subjects in the first steps of the two contingent paths and those in the two one-step paths approached significance ($p = 0.0545$). As noted in Table VIII, there was also an unexpected level of resultant achievement motive by subjective probability of success interaction (BD).

The lack of support for the hypotheses is a cause for further examination of the experimental procedures. First of all, it may be argued that the n Ach Test was not administered under neutral conditions because it followed the instructions concerning the TAQ. This procedure may have sensitized subjects to tests and taking tests such that an achievement-oriented atmosphere rather than a neutral one may have been created. According to Scott,[8] the expression of achievement-related imagery in the content of n Ach stories may be inhibited under achievement-oriented conditions, whereas this may not occur under neutral conditions. Thus, one might question the validity of the n Ach scores. Second, the low test-retest reliability of the n Ach test

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8 W. A. Scott, "The Avoidance of Threatening Material in Imaginative Behaviour", in Journal of Abnormal and Social Psychology, Vol. 52, 1956, p. 338-346, quoted by J. W. Atkinson, An Introduction to Motivation, New York, Van Nostrand, 1964, p. 248.

Table VIII.- Results of the Analysis of Variance Test with Type of Contingent Path (First Step vs. One-Step) Level of Resultant Achievement Motive, Sex, and Subjective Probability of Success as Independent Variables and Performance on the Motor Tasks as the Dependent Variable.

Source of Variance	Sum of Squares	df	Mean Square	F	
A Type of Contingent Path (First Step, One-Step)	3.82	1	3.82	3.81	n.s.
B Level of Resultant Achievement Motive	0.24	1	0.24	0.24	n.s.
C Sex	0.22	1	0.22	0.02	n.s.
D Subjective Probability of Success	0.05	1	0.05	0.05	n.s.
AB	0.68	1	0.68	0.68	n.s.
AC	0.17	1	0.17	0.17	n.s.
AD	0.33	1	0.33	0.33	n.s.
BC	0.27	1	0.27	0.27	n.s.
BD	3.98	1	3.98	3.96	*
CD	1.11	1	1.11	1.11	n.s.
ABC	0.25	1	0.25	0.25	n.s.
ABD	0.38	1	0.38	0.38	n.s.
ACD	2.65	1	2.65	2.64	n.s.
BCD	0.00	1	0.00	0.00	n.s.
ABCD	0.92	1	0.92	0.91	n.s.
Error	81.27	81	1.00		

$\alpha = 0.05$.

leads one to question whether the subjects were appropriately classified on the basis of their resultant achievement motive scores.

Given the possibility that the n Ach scores were not valid or that they may not have been reliable, it was decided to reclassify the subjects on the basis of their TAQ scores only and reanalyze the data.

The one hundred subjects assumed to be success-oriented were reclassified according to their test anxiety scores. Those falling above the median (mdn = 137) were classified as high in test anxiety (high TA) while those falling below the median were classified as low in test anxiety (low TA).

According to Atkinson,[9] a group of subjects classified as low in test anxiety should, on the whole, have a stronger resultant achievement tendency to approach success than a group of subjects classified as high in test anxiety. The reason is that the former group is not as affected by the inhibitory effects of M_{AF} as is the latter group. Thus, it is expected that the low TA group should perform better than the high TA group.

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9 J. W. Atkinson, "The Theory of Achievement Motivation", in J. W. Atkinson, An Introduction to Motivation, 1964, p. 250.

Another procedural problem may have been the use of the tapping board task. It is possible that the task was such that very little achievement motivation was aroused in the subjects for that task. If that were the case, then that might explain why the second hypothesis was not supported. Given that the dependent measure consisted of two different motor tasks, it was felt that one might be justified to use two separate analyses of variance tests to test the second hypothesis. For one test, the dependent measure would be level of performance on the pursuit rotor, while for the other test, the dependent measure would be level of performance on the tapping board.

Thus, the second hypothesis was tested by two separate analyses of variance tests.* A three-factor analysis of variance test with type of contingent path (increasing P_s contingent path (.5.7.9) and one-step path (.5)), level of test anxiety (low and high), and sex (male and female) as the independent factors and level of performance on the moderately difficult task as the dependent factor, was used to test the prediction that subjects in the first step of the increasing P_s contingent path (.5.7.9) perform better than those in the one-step path (.5). A second three-factor analysis of variance test with type of contingent path (decreasing P_s contingent

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* Results of a test of this hypothesis using one analysis of variance test are shown in Appendix 9.

path (.9.7.5) and one-step path (.9)), level of test anxiety (low and high), and sex (male and female) as the independent factors and level of performance on the easy task as the dependent factor was used to test the prediction that subjects in the first step of the decreasing P_s contingent path (.9.7.5) perform better than those in the one-step path (.9).

The data were reanalyzed by unweighted means analyses even though cell sizes may be related to the test anxiety factor. It has been noted that female subjects are more likely to be test anxious than male subjects (Chapter II). However, this is not consistently so, as reported by Mandler and Cowen.[10] When it cannot be assumed that a particular pattern of cell frequencies obtained in a study is proportional to the pattern of cell frequencies that would be expected to occur in the treatment populations, Timm and Carlson[11] suggest that an unweighted means analysis is preferable to a weighted means analysis. Furthermore, an unweighted means analysis provides a more powerful test of the hypothesis.[12]

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10 G. Mandler and J. E. Cowen, "Test Anxiety Questionnaires", in Journal of Consulting Psychology, Vol. 22, No. 3, 1958, p. 229.

11 N. H. Timm and James E. Carlson, Lectures on the Analysis and Interpretation of Experimental Designs with Unequal Cell Frequencies, University of Pittsburgh, p. 122.

12 Ibid., p. 128.

The means and standard deviations of the dependent variables for the second analysis are shown in Table IX. The means related to the hypotheses are shown in Table X. These statistics have changed somewhat from those reported in Tables V and VI because subjects were reclassified according to their test anxiety scores only and unweighted means analyses were used. Also, a second set of Z score statistics are not shown in these tables since two separate analyses of variance tests were used to test the second hypothesis and no transformations were required.

As expected for the first hypothesis, the subjects in the increasing P_s contingent path group (.5.7.9) obtained a higher mean score than those in the decreasing P_s contingent path group (.9.7.5) on the moderately difficult task. However, contrary to expectation, the latter group did not obtain a higher mean score than the former group on the easy task. Therefore, no disordinal interaction was obtained and the first hypothesis could not be supported. In accordance with the second hypothesis, the increasing P_s contingent path group (.5.7.9) obtained a higher mean score than the one-step path group (.5) on the moderately difficult task. Also, the decreasing P_s contingent path group (.9.7.5) obtained a higher mean score than the one-step path group (.9) on the easy task.

Table IX.- Means and Standard Deviations of Performance Scores on the Motor Tasks by Type of Contingent Path, Level of Test Anxiety, Sex, and Subjective Probability of Success.

Type of Contingent Path	Level of Test Anxiety	Sex		Subjective Probability of Success $P_{nsn} = .50$ Pursuit Rotor (Time in sec.) Raw Score	Z Score	Subjective Probability of Success $P_{nsn} = .90$ Tapping Board (Number of Taps) Raw Score	Z Score
Decreasing P_s Contingent Path (.9.7.5)	Low	Male (n=7)	M	20.21	0.04	65.57	0.01
			SD	1.18	0.27	9.15	1.15
		Female (n=4)	M	14.56	-1.26	68.25	0.35
			SD	3.98	0.91	3.30	0.42
	High	Male (n=8)	M	22.19	0.49	61.56	-0.49
			SD	3.76	0.86	10.87	1.37
		Female (n=3)	M	14.58	-1.26	66.33	0.11
			SD	5.26	1.21	7.01	0.88
Increasing P_s Contingent Path (.5.7.9)	Low	Male (n=7)	M	22.64	0.59	64.50	-0.12
			SD	2.80	0.64	7.92	1.00
		Female (n=4)	M	24.06	-0.92	69.75	0.54
			SD	4.19	0.96	5.42	0.68
	High	Male (n=5)	M	21.30	0.28	64.10	-0.17
			SD	3.28	0.75	8.86	1.11
		Female (n=9)	M	17.83	-0.51	66.94	0.19
			SD	3.72	0.85	7.17	0.90

Table IX.-Continued

Type of Contingent Path	Level of Test Anxiety	Sex		Subjective Probability of Success $P_{nsn} = .50$ Pursuit Rotor (Time in sec.) Raw Score	Z Score	Subjective Probability of Success $P_{nsn} = .90$ Tapping Board (Number of Taps) Raw Score	Z Score
One-Step Path (.5)	Low	Male (n=9)	M	18.36			
			SD	5.02			
		Female (n=6)	M	18.71			
			SD	3.98			
	High	Male (n=4)	M	18.88			
			SD	2.42			
		Female (n=6)	M	18.79			
			SD	3.79			
One-Step Path (.9)	Low	Male (n=10)	M			62.65	
			SD			8.06	
		Female (n=1)	M			67.00	
			SD			0.00	
	High	Male (n=8)	M			65.31	
			SD			9.35	
		Female (n=6)	M			60.67	
			SD			5.89	

Table X.- Means of Performance Scores on the Motor Tasks by Type of Contingent Path and Subjective Probability of Success.

Type of Contingent Path		Subjective Probability of Success			
		P_s = .50 Pursuit Rotor (Time in Sec)		P_s = .90 Tapping Board (Number of Taps)	
		Raw Scores	Z Scores	Raw Scores	Z Scores
Decreasing P_s Contingent Path (.9.7.5) (n= 22)	M	17.89	-0.50	65.43	-0.01
Increasing P_s Contingent Path (.5.7.9) (n = 25)	M	21.46	0.32	66.32	0.11
One-Step Path (.5) (n = 25)	M	18.69			
One-Step Path (.9) (n = 25)	M			63.91	

Prior to testing hypothesis one, the assumption of homogeneity of variance was tested using the Approximate F statistic based on Bartlett.[13] The assumption was not rejected ($M = 14.94$; Approx. $F = 1.96$; $df = 7, 1000$; $p \not< 0.06$).

The results of the first hypothesis test are presented in Table XI. There is a significant type of contingent path by subjective probability of success (P_s) interaction (AD) but as noted in Table X and figure 2, the interaction is not disordinal.

A simple main effects test[14] indicated that the increasing P_s contingent path group (.5.7.9) performed better than the decreasing P_s contingent path group (.9.7.5) on the moderately difficult task but not on the easy task. The results were $F = 9.64$; $df = 1, 39$; $p < 0.05$ and $F = 0.03$; $df = 1, 39$; $p > 0.05$ respectively.

However, there is also a significant type of contingent path by level of test anxiety by P_s interaction (ABD). This second order interaction is presented in figure 3. Clearly, it is at the low level of the test anxiety factor that the AD interaction is significant.

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13 W. J. Dixon and F. J. Murray, Jr., Op. Cit.

14 R. E. Kirk, Experimental Design: Procedures for the Behavioural Sciences, Belmont, California, Brooks/Cole, 1968, p. 289-291.

Table XI.- Results of the Analysis of Variance Test with Repeated Measures with Type of Contingent Path, Level of Test Anxiety, Sex, and Subjective Probability of Success as Independent Variables and Performance on the Motor Tasks as the Dependent Variable.

Source of Variation	Sum of Squares	df	Mean Square	F	
Between Groups					
A Type of Contingent Path (.9.7.5 and .5.7.9)	4.47	1	4.47	3.68	n.s.
B Level of TAQ	1.89	1	1.89	1.56	n.s.
C Sex	0.78	1	0.78	0.64	n.s.
AB	1.10	1	1.10	0.91	n.s.
AC	2.26	1	2.26	1.86	n.s.
BC	0.83	1	0.83	0.68	n.s.
ABC	0.49	1	0.49	0.41	n.s.
Error	47.40	39	1.22		
Within Groups					
D Subjective Probability of Success (.5, .9)	0.40	1	0.40	0.83	n.s.
AD	2.57	1	2.57	5.33	*
BD	0.01	1	0.01	0.01	n.s.
CD	9.59	1	9.59	19.89	*
ABD	2.07	1	2.07	4.29	*
ACD	1.99	1	1.99	4.13	*
BCD	0.75	1	0.75	1.56	n.s.
ABCD	0.004	1	0.004	0.01	n.s.
Error	18.81	39	0.48		

$\alpha = 0.05$

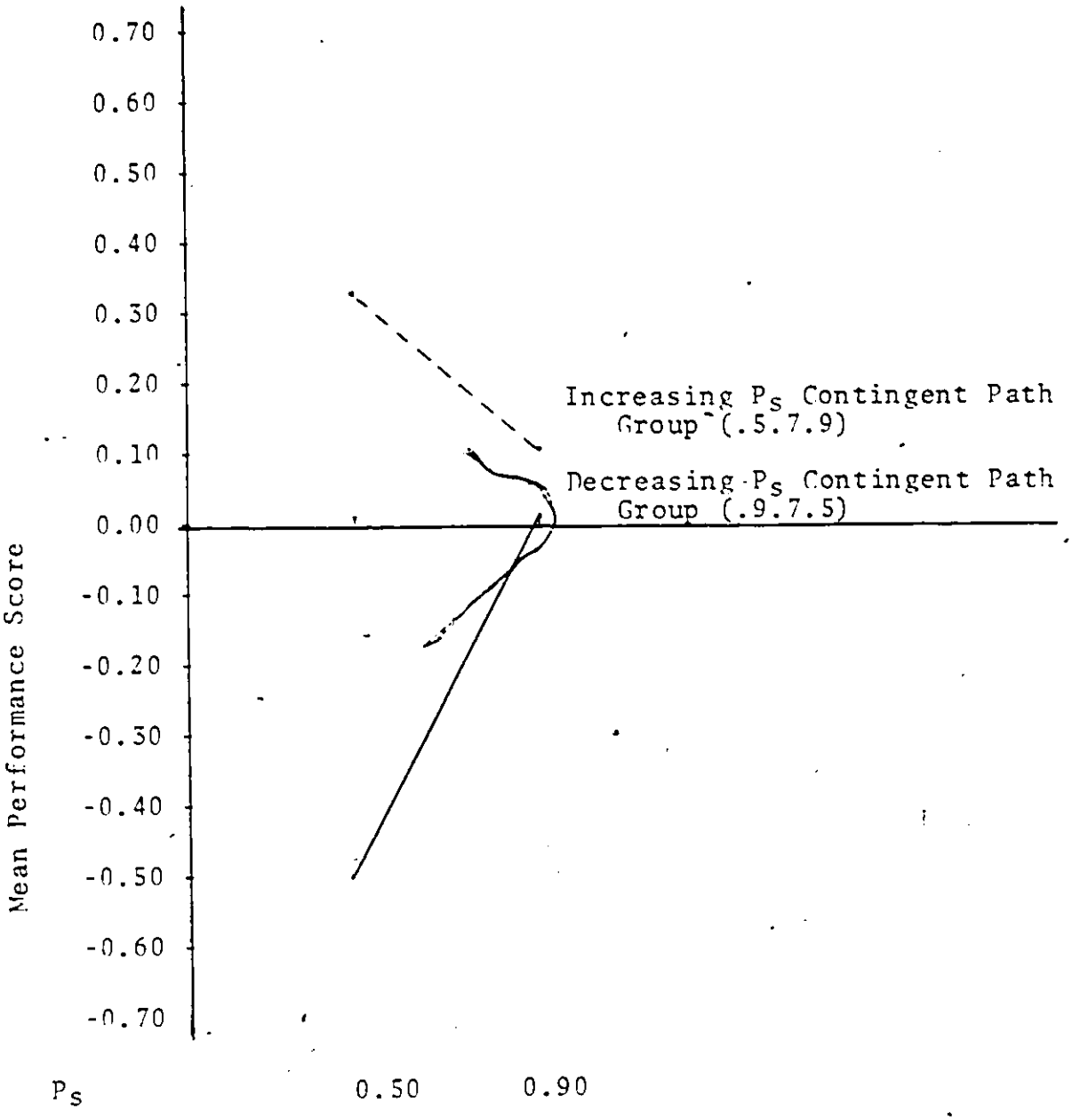

Figure 2.- Mean Performance Scores of the Decreasing P_s Contingent Path Group (.9.7.5) and the Increasing P_s Contingent Path Group (.5.7.9) on the Moderately Difficult and the Easy Tasks.

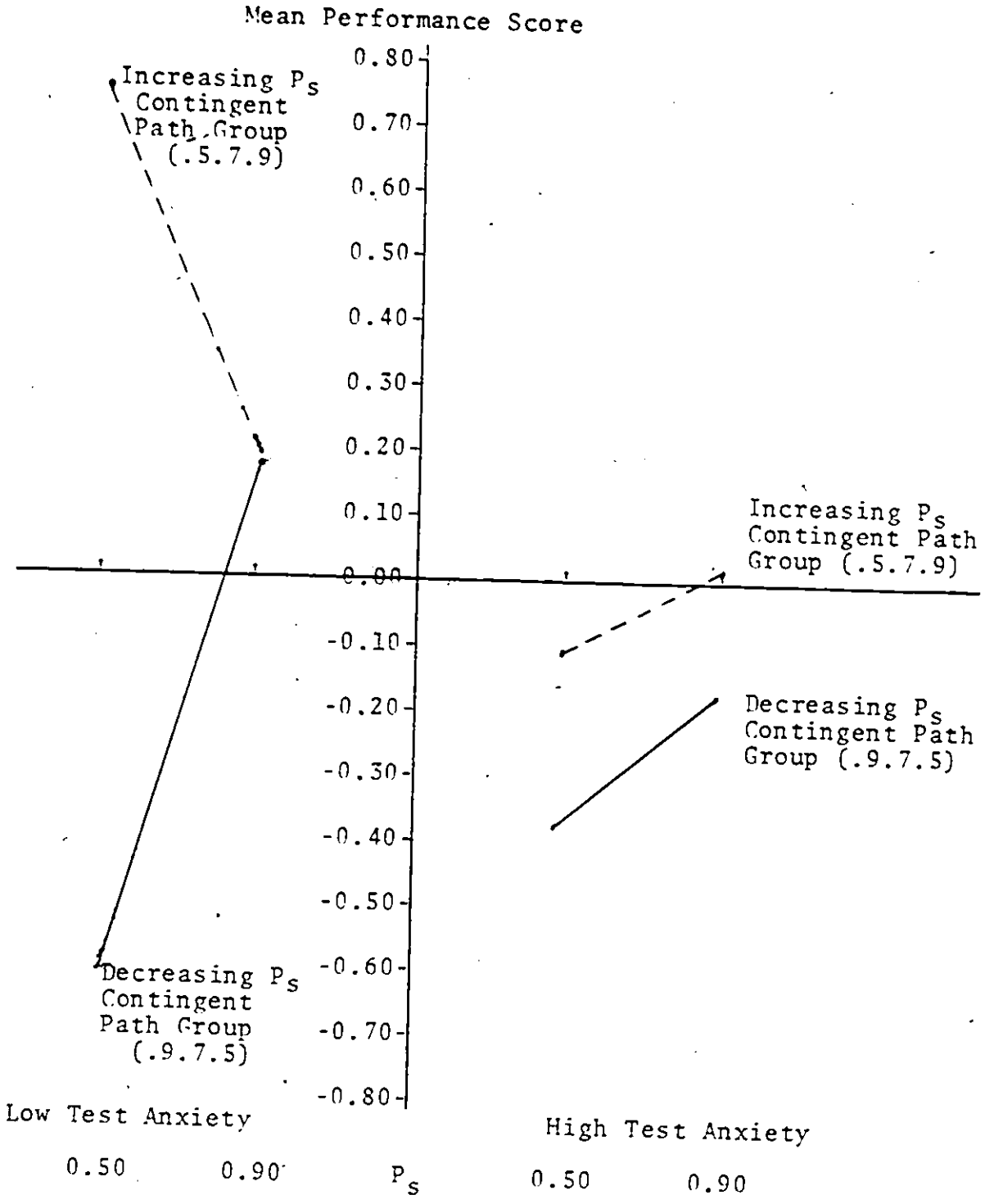

Figure 3.- Interaction Effect of Type of Contingent Path by Level of Test Anxiety by Subjective Probability of Success (ABD) on the Mean Performance Scores.

The superior performance of the increasing P_s contingent path group (.5.7.9) compared to that of the decreasing P_s contingent path group (.9.7.5) on the moderately difficult task is a result of the very high mean score obtained by the low TA subjects in the former path and the very low mean score obtained by the low TA subjects in the latter path (Table IX). On the easy task, the low TA subjects in the increasing P_s contingent path (.5.7.9) performed only slightly better than the low TA subjects in the decreasing P_s contingent path (.9.7.5).

It should also be noted that for the low TA group in the increasing P_s contingent path (.5.7.9), performance is higher in the first step (i.e., on the moderately difficult task) than in the final step (i.e., on the easy task). Similarly, for the low TA group in the decreasing P_s contingent path (.9.7.5), performance is higher in the first step (i.e., on the easy task) than in the final step (i.e., on the moderately difficult task). This result is in accordance with Raynor's theory.

For the high TA group, however, the pattern of results is different (figure 3). The high TA group in the increasing P_s contingent path (.5.7.9) performed better overall than the high TA group in the decreasing P_s contingent path (.9.7.5). However, contrary to the low TA group in the increasing P_s contingent path (.5.7.9), the performance of the high TA

group in the same type of contingent path was better in the first step of the path (i.e., on the moderately difficult task) than in the final step of the path (i.e., on the easy task). Also, their performance, in general, was lower than that of the low TA group. The pattern of results for the high TA group in the decreasing P_s contingent path (.9.7.5) however, was similar to that for the low TA group in the same type of contingent path.

As noted in Table XI, there is also a significant sex by P_s interaction (CD). This interaction is demonstrated in figure 4. The male subjects obtained a higher mean score than the female subjects on the moderately difficult task, while the latter obtained a higher mean score than the former on the easy task. A similar CD interaction was found when subjects were classified according to their resultant achievement motive scores (see Table VII).

The results of a simple main effects test[15] indicated that the difference between male and female subjects on the moderately difficult task was significant ($F = 9.33$; $df = 1, 66$; $p < 0.05$). On the easy task, there was no significant difference between the two sexes ($F = 2.89$; $df = 1, 66$; $p > 0.05$).

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15 R. E. Kirk, Op. Cit.

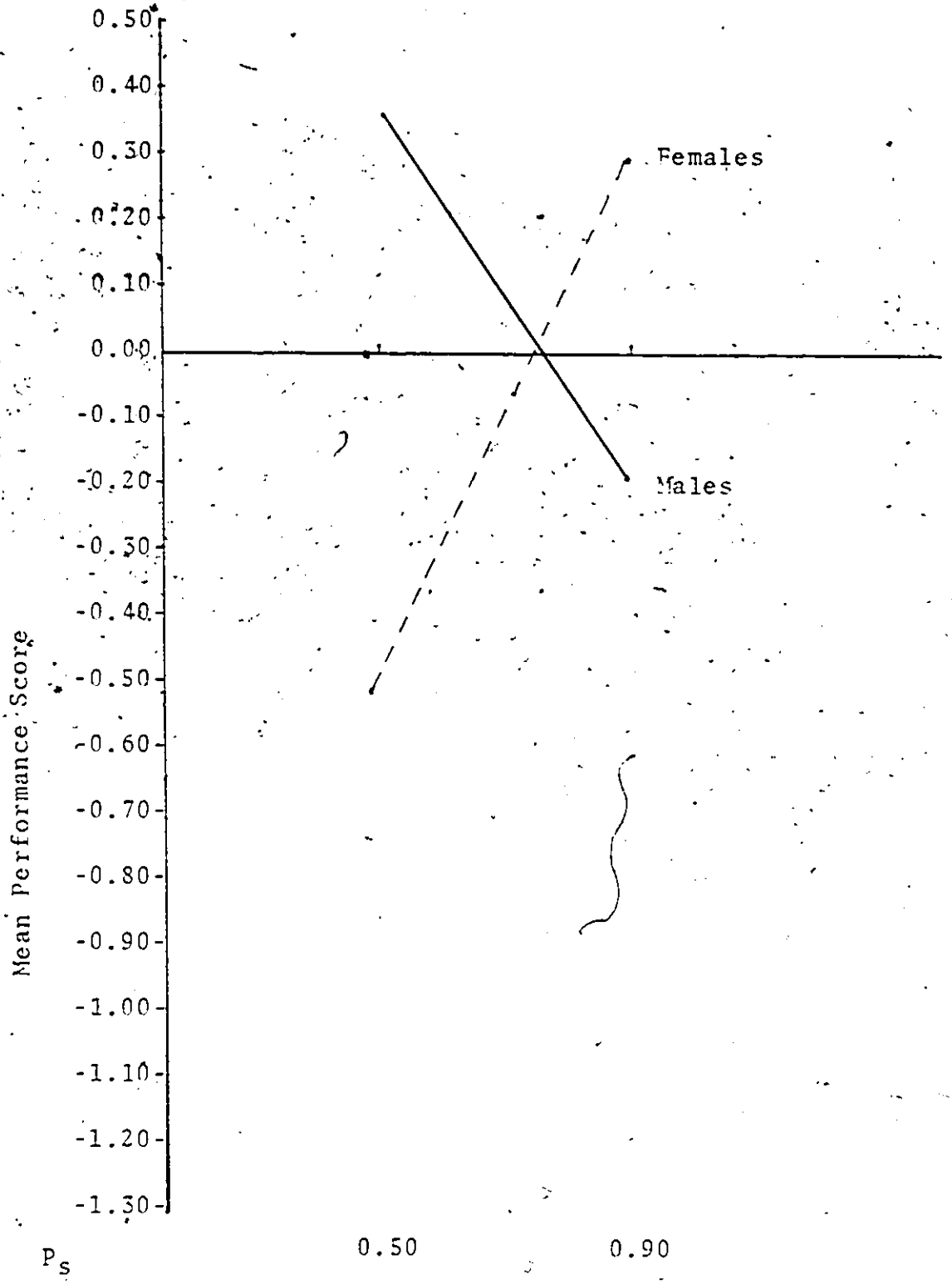

Figure 4.- Mean Performance Scores of Male and Female Subjects on the Moderately Difficult and the Easy Tasks.

Also, as noted in Table XI, there is a significant type of contingent path by sex by P_s interaction (ACD). This interaction is shown in figure 5. It appears that the CD interaction is significant only in the decreasing P_s contingent path group (.9.7.5). A test of simple interaction effects[16] confirmed this ($F = 21.18$; $df = 1, 39$; $p < 0.05$). In the increasing P_s contingent path (.5.7.9), the CD interaction was not significant ($F = 1.42$; $df = 1, 39$; $p > 0.05$). The ACD interaction can be attributed to the very low mean scores obtained by the female subjects on the moderately difficult task in the decreasing P_s contingent path group (.9.7.5) (see Table IX). Had it not been for this group of female subjects (low and high TA), there may not have been a significant CD or ACD interaction.

Finally, it is noted in Table XI that there were no significant differences because of main effects and no other significant interactions.

Preceding the test of the second hypothesis the assumption of homogeneity of variance[17] was tested first with the increasing P_s contingent path group (.5.7.9) and the one-step path group (.5) and second with the decreasing P_s contingent path group (.9.7.5) and the one-step path

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16 Ibid.

17 W. J. Dixon and F. J. Murray, Jr., Op. Cit.

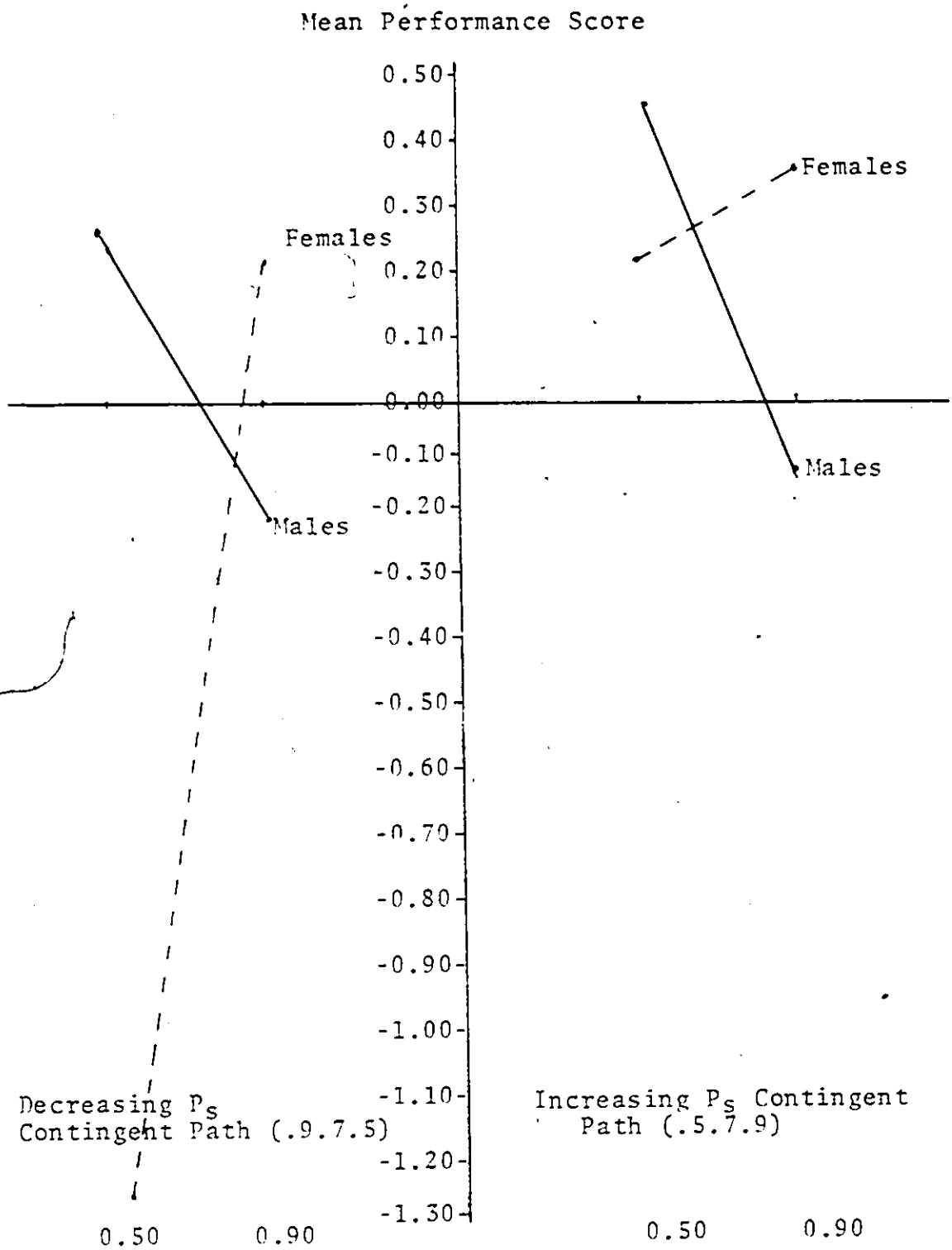

Figure 5.- Interaction Effects of Type of Contingent Path by Sex by Subjective Probability of Success Interaction (ACD) on the Mean Performance Scores.

group (.9). The results of the first test (M = 3.57; Approx. F = 0.47; df = 7, 1358; p = 0.86) and the second test (M = 5.59; Approx. F = 0.86; df = 6, 1050, p = 0.53) indicated that the assumption was not rejected. However, it should be noted that the latter homogeneity of variance test may not be valid since only seven rather than eight groups were used (note df = 6 rather than 7 as in the other tests). The reason is that there is only one female in the low TA, one-step path group (.9) and consequently the variance is zero. Only nonzero variances are used in the homogeneity of variance test.[18]

The results of the second hypothesis test are presented in Tables XII and XIII. The second hypothesis was partially supported. On the moderately difficult task, the increasing P_s contingent path group (.5.7.9) performed better than the one-step path group (.5), as predicted (see Table X). However, on the tapping board, the decreasing P_s contingent path group (.9.7.5) did not perform significantly better than the one-step path group (.9).

Also, for both tests of the second hypothesis, there were no other significant differences resulting from main effects or interaction effects.

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18 Ibid.

Table XII.- Results of the Analysis of Variance Test with Type of Contingent Path, Level of Test Anxiety, and Sex as Independent Variables and Performance on the Moderately Difficult Task as the Dependent Variable.

Source of Variance	Sum of Squares	df	Mean Square	F	
A Type of Contingent Path (.5.7.9 and .5)	88.15	1	88.15	5.94	*
B Level of TAQ	34.79	1	34.79	2.34	n.s.
C Sex	2.27	1	2.27	0.15	n.s.
AB	47.72	1	47.72	3.21	n.s.
AC	3.82	1	3.82	0.26	n.s.
BC	20.22	1	20.22	1.36	n.s.
ABC	14.20	1	14.20	0.96	n.s.
Error	623.64	42	14.85		

$\alpha = 0.05$.

Table XIII.- Results of the Analysis of Variance Test with Type of Contingent Path, Level of Test Anxiety, and Sex as Independent Variables and Performance on the Easy Task as the Dependent Variable.

Source of Variance	Sum of Squares	df	Mean Square	F	
A Type of Contingent Path (.9.7.5 and .9)	16.53	1	16.53	0.23	n.s.
B Level of TAQ	41.06	1	41.06	0.57	n.s.
C Sex	22.82	1	22.82	0.31	n.s.
AB	2.27	1	2.27	0.03	n.s.
AC	26.75	1	26.75	0.37	n.s.
BC	21.25	1	21.25	0.29	n.s.
ABC	54.82	1	54.82	0.76	n.s.
Error	2830.18	39	72.57		

$\alpha = 0.05$.

In this section, the results of the hypothesis tests together with tests of simple main effects and simple interaction effects were presented. In the following section, these results are discussed.

3. Discussion of the Results.

The results of this study did not fully support the hypotheses. Hypothesis one was not supported. The first part of hypothesis two was supported but the second part was not. The results will be examined along with possible design problems. Possible limitations of the theory will also be explored. Since it is possible that the n Ach scores were invalid, the discussion will center on the results of the second analyses (where subjects were classified on the basis of their TAQ scores only).

While the disordinal interaction expected for the first hypothesis was not obtained, there was a significant ordinal interaction. The increasing P_s contingent path group (.5.7.9) performed significantly better on the moderately difficult task than the decreasing P_s contingent path group (.9.7.5), but the latter group did not perform significantly better on the easy task than the former group. Furthermore, this interaction was significant for the low TA group only. For the high TA group, there was no interaction but rather the high TA group in the increasing P_s contingent path (.5.7.9)

tended to perform better on both tasks than the high TA group in the decreasing P_s contingent path (.9.7.5).

It is interesting to note, however, the pattern of results obtained by the low TA subjects in the increasing P_s contingent path (.5.7.9) and by those in the decreasing P_s contingent path (.9.7.5). In both conditions, the low TA subjects performed better in the first step than in the final step. This is consistent with Raynor's theory when he states that the strength of an individual's characteristic resultant achievement motivation is greater at the beginning of a contingent path than at the end.

Also, it is interesting to note that the difference between the first and final steps is greater for the low TA group than for the high TA group. This implies that the low TA group is more likely to be success-oriented than the high TA group. However, it should be noted that the tasks in the first and last steps of each type of contingent path condition (.5.7.9 or .9.7.5) are not the same. Consequently, it is difficult to determine whether the difference in performance between the first and final steps is a result of the subjective probability of success or of the type of task. Therefore, the foregoing pattern of results should be interpreted with caution.

Failure to obtain a disordinal interaction might be attributed to the possibility that the subjects in the increasing P_s contingent path condition (.5.7.9) were more

motivated at the end of the path than would be expected according to theory. Otherwise, their performance on the easy task would have been much lower than the performance of the subjects in the decreasing P_s contingent path (.9.7.5) on the same task. The other possibility is that the subjects in the latter contingent path condition were not sufficiently motivated such that their performance on the easy task was lower than that of the former group on the same task.

If the first possibility is assumed, there may be a number of reasons why the results do not support the theory. First of all, although an attempt was made to control the effects of extrinsic motivation, it is possible that the subjects still may have expected some kind of extrinsic reward upon successful completion of the experiment. The expected reward may have been praise from the investigator, from the teachers or peers. As Raynor[19] noted, while level of resultant achievement motivation in the first step of the contingent path is high, the level of extrinsic motivation is low. But in the final step of the path, this situation is reversed. The effect of this is that total motivation (resultant achievement motivation plus extrinsic motivation) may be the same in the last step as in the first step of a contingent

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19 J. O. Raynor, "Motivation in Career Striving", in J. W. Atkinson and J. O. Raynor (Eds.), Op. Cit., 1974, p. 383.

path. This could account for the lack of support for the first hypothesis.

Another problem may have been the effects of cognitive learning. This means that upon succeeding in the first task, the subjects may have gained more confidence and consequently felt that the stated probabilities of success for the remaining tasks were actually underestimated. While care was taken to employ different motor tasks to minimize the effects of cognitive learning, the fact that the three tasks required some kind of motor skill may have resulted in a cognitive learning effect. Such a possibility would have mitigated the expected results.

There is also the possibility that subjects viewed the three motor tasks as one task because they were required to perform on them in the same testing situation with very little time allowed between each task. If this were the case, then one might not expect support for the interaction hypothesis. Perhaps, the design of the experiment should have permitted a greater time lapse between each of the steps in the contingent path.

Finally, the effectiveness of the experimental manipulation of the subjective probabilities of success might be questioned. While care was taken to make the induced P_s compatible with the subjects' own P_s, there remains the possibility that the procedures used in this study were not

as effective as had been expected.

Some theoretical considerations might also help to explain the lack of support for the first hypothesis. First of all, it was noted in Chapter I that some people might be motivated by the expectation of future success(es) but others might be motivated by the desire to maintain past success(es). If this assumption is true and if some subjects in this study were more motivated to maintain their success(es) in a contingent path, then one could not expect lower performance by subjects who performed on a task at the end of a contingent path as compared to those who performed on the same task at the beginning of a contingent path.

Second, the findings of Gjesme[20] suggest that success-oriented individuals tend to perform better when they are closer to a goal event in time than those who are further from a goal event in time (i.e., one week as opposed to one month). Raynor[21] has noted that these findings contradict his theory, but has suggested that the arousal of the characteristic achievement motivation might be affected separately

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20 T. Gjesme, "Goal Distance in Time and Its Effects on the Relations Between Achievement Motives and Performance", in Journal of Research in Personality, Vol. 8, 1974. p. 161-171.

21 J. O. Raynor, "Future Orientation, Self Evaluation and Motivation for Achievement", Research Proposal Submitted to the National Science Foundation, State University of New York at Buffalo, 1976, p. 18.

by goal distance in terms of time and goal distance in terms of the number of steps remaining in a contingent path. The net effect of the increase in motivation demonstrated by Gjesme and the decrease suggested by Raynor might result in no substantial change in strength of achievement motivation as an individual progresses from the first step in a contingent path to the final step. Possibly, this could explain the lack of support for the first hypothesis. However, this theoretical issue has yet to be resolved.

Finally, Raynor[22] has questioned the multiplicative assumption of the subjective probabilities along a contingent path. He notes that subjects may be averaging the subjective probabilities of success in a contingent path rather than multiplying them as he had originally assumed. If his original assumption is incorrect, then predictions based on the elaborated theory may not be entirely accurate.

If the second possibility is assumed, that is, that the subjects in the decreasing P_s contingent path (.9.7.5) were not sufficiently motivated by the easy task such that their performance was lower than for those who performed on the same task at the end of the path, then the explanation might lie with the type and nature of the easy task. As

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22 J. O. Raynor, "Future Orientation, Self Evaluation and Motivation for Achievement", 1976, p. 19.

noted above in section 2 of this chapter, the easy task may not have been very motivating to the subjects. This possibility will be explored below in relation to the discussion on the results of the test of the second hypothesis.

An unexpected result in the test of the first hypothesis was the sex by subjective probability of success interaction (CD). While this interaction was significant in the decreasing P_s contingent path (.9.7.5), the pattern of results was the same in the increasing P_s contingent path (.5.7.9). Male subjects performed better than the female subjects on the moderately difficult task (pursuit rotor), but the latter tended to perform better than the former on the easy task (tapping board).

An examination of the pursuit rotor scores obtained by the female subjects in the various groups indicated that their performance tended to vary much more than that of the male subjects. In addition, their performance sometimes tended to be better than that of the male subjects and sometimes worse. In the one-step path (.5) female subjects performed equally as well on the pursuit rotor as did the male subjects. In general however, the performance of the male subjects was superior.

The superior performance of male subjects compared to female subjects on the pursuit rotor has been noted by

other investigators. Amons et al.[23] reported that the performance on the pursuit rotor of female subjects in grades nine to twelve was lower than that of the male subjects in the same grades. However, prior to grade nine, there were no sex differences in performance. The investigators were unable to explain this drop in performance for female subjects. They speculated however, that it might be because girls had learned fewer motor skills than boys and had learned them less well. Thus, by the time they reached grade nine, they began to be less proficient in their performance on motor tasks than boys.[24] Buxton and Grant[25] also found higher mean scores on the pursuit rotor among male subjects than female subjects. No ages were reported for the subjects in their study. While not using the pursuit rotor, Nobel et al.[26] found that males and females appeared to be quite similar in level of motor performance up to the age of

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23 R. B. Ammons, S. T. Alpin, and C. H. Ammons, "Pursuit Rotary Performance as Related to Sex of Pre-adult Subjects", in Journal of Experimental Psychology, Vol. 49, 1955, p. 127-133.

24 Ibid., p. 132.

25 C. E. Buxton and D. A. Grant, "Retroaction and Gains in Motor Learning: II. Sex Differences and a Further Analysis of Gains", in Journal of Experimental Psychology, Vol. 25, 1939, p. 198-208.

26 C. E. Noble, B. L. Baker, and T. A. Jones, "Age and Sex Parameters in Psychomotor Learning", in R. N. Singer (Ed.), Readings in Motor Learning, Philadelphia, Lea and Febiger, 1972, p. 202-208.

about sixteen after which female performance declined compared to male performance.

If it is true that girls tend to become less proficient in their performance on motor tasks than boys at the age of sixteen, then perhaps this might explain why some of the girls in this study performed worse on the pursuit rotor than the boys. The average age of the subjects in this study was fifteen. Perhaps some of these girls had already become less proficient in their performance on motor tasks than the boys. However, one might question why the female subjects tended to perform better on the tapping board task than the male subjects. The answer might be that the tapping board task was very easy and required only minimal motor skills. Thus, the girls performed as well and in some cases even better than the boys. For the boys, however, the task may have been too easy resulting in the arousal of less achievement motivation and therefore poorer performance than for the girls.

The first part of the second hypothesis was supported. The subjects (both male and female) in the increasing P_s contingent path performed significantly better on the moderately difficult task than those in the one-step path (.5). Thus,

one might conclude that the subjects in the first step of the contingent path were more motivated by the task than those in the one-step path because of the increased motivation resulting from contingent future orientation. This result is similar to that found by Raynor and Rubin.[27] As noted in Chapter I, however, these investigators compared performance on a moderately difficult task in the first step of a contingent path to that in the first step of a noncontingent path, rather than a one-step path. But a one-step path and each step in a noncontingent path are considered equivalent in terms of the magnitude of achievement motivation aroused.

The second part of hypothesis two was not supported. The subjects in the decreasing P_s contingent path (.9.7.5) did not perform significantly better than those in the one-step path (.9). However, as noted in Table X , the results are in the hypothesized direction. An examination of the task may explain such results.

First of all, the tapping board task is very simple and does not require any motor skills at a higher level than that of gross arm movements. In the case of simple tasks,

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27 J. O. Raynor and T. S. Rubin, "Effects of Achievement Motivation and Future Orientation on Level of Performance", in Motivation and Achievement, 1974, p. 181-187.

Atkinson[28] suggested that maximum efficiency in performance may be reached at a lower level of achievement motivation than at a higher level because of a ceiling effect. That is, the level of performance tends to increase positively with level of motivation up to a certain point after which level of performance does not increase further because a maximum has been reached. If a maximum level of performance on the tapping board can be reached at a lower level of motivation, then that might explain why the decreasing P_s contingent path group (.9.7.5) did not perform better than the one-step path group (.9). Although they were assumed to be more motivated than the latter group because of contingent future orientation, they were not able to perform better because of the ceiling effect. This may also explain why the decreasing P_s contingent path group (.9.7.5) did not perform better on the tapping board than the increasing P_s contingent path group (.5.7.9). The ceiling effect argument was used by Entin and Raynor[29] to explain why there was no significant interaction between motive group (success-oriented and

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28 J. W. Atkinson, "Strength of Motivation and Efficiency of Performance", in Personality, Motivation, and Achievement, J. W. Atkinson and J. O. Raynor, (Eds.), Washington, Hemisphere, 1978, p. 140.

29 E. E. Entin and J. O. Raynor, "Effects of Contingent Future Orientation and Achievement Motivation on Performance in Two Kinds of Tasks", in Journal of Experimental Research in Personality, Vol. 6, 1973, p. 318.

failure-threatened) and type of path (contingent and noncontingent) when a simple task was used.

There may be another reason why the second part of hypothesis two was not supported. Atkinson[30] stated that for some tasks trying very hard to perform may have a detrimental effect on performance. The nature of the tapping board task is such that if the task is approached with any vigor, performance could be worse than if it is approached more cautiously. For instance, from direct observation during the experimental sessions, it was noted that when some individuals tried to tap too quickly or with too much force, the board would shift causing the subject to miss a tap. Simetimes by tapping too quickly, the subject would not quite contact the metal plate on one side or the other resulting in less number of taps being recorded on the counter. Possibly, in this study, the subjects in the first step of the decreasing P_s contingent path tried too hard and as a result, their performance was not as good as had been expected compared to the one-step path group.

Finally, the tapping board task may not have been perceived by the subjects as an assessment of their motor ability or competence. This may have resulted in less

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30 J. W. Atkinson, "Strength of Motivation and Efficiency of Performance", in Personality, Motivation, and Achievement, 1978, p. 122.

achievement motivation for the easy task than would have been expected. Heckhausen[31] states that activities which do not open up any possibilities for the test of one's competence leave highly success-oriented subjects "cold" unless the experimenter presents the task as particularly informative about personal competence. Raynor[32] also notes that it is important that individuals perceive the tasks as valid tests of an ability or competence that they possess.

One of the expectations in this study was that subjects low in TA would perform better than subjects high in TA. Such a difference was not found for either task. McClelland[33] notes that individuals with a high need to achieve do not work hard under all conditions. Only when a task is perceived to require some degree of "mental manipulation" or originality is there a positive relationship between performance and strength of the achievement motive. Perhaps the tasks used in this study did not require enough mental manipulation or were not original enough. While this may be true of the tapping board task, it does not seem to

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31 H. Heckhausen, The Anatomy of Achievement Motivation, New York, Academic Press, 1967, p. 139.

32 J. O. Raynor, "Future Orientation in Achievement Motivation", in Personality, Motivation, and Achievement, 1978, p. 112.

33 D. C. McClelland, The Achieving Society, New York, The Free Press, London, Collier MacMillan, 1968, p. 226.

be true of the pursuit rotor. This more complex task appears to offer a greater challenge than the tapping board.

Atkinson[34] stated that a positive relationship between performance and strength of achievement motivation is found only when the cues of the situation arouse the expectancy that a feeling of personal accomplishment and pride in that accomplishment will follow good performance. If the subjects in this study did not expect to feel a sense of personal accomplishment and pride in that accomplishment, then perhaps that explains why the more highly motivated subjects (low TA) did not perform better than those assumed to be less highly motivated (high TA).

The type of tasks used in this study may have had low incentive value for the subjects. If cultural valuation of success on academic type or intelligence type tasks is more important to grade nine students than success on motor type tasks, then this might be another reason why there were no differences in performance between the more highly motivated subjects and the less highly motivated subjects.

It is also possible that if more extreme groups were used (i.e., success-oriented and failure-threatened) the

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34 J. W. Atkinson, "Performance as a Function of Motive Strength and Expectancy of Goal Attainment", in Motives in Fantasy, Action and Society, A Method of Assessment and Study, J. W. Atkinson (Ed.), Princeton, N.J., Van Nostrand, 1958, p. 278-287.

expected differences in performance between subjects high and low in achievement motivation would have been manifested.

Finally, it should be noted that there may be a problem of confounding in this study. For example, with respect to the second part of hypothesis two, it is difficult to determine whether the hypothesis was not supported because of the fact that the P_s was .9 or because of the nature of the task. The implication in the discussion was that it was the nature of the task. However, it may be that the theory of achievement motivation does not apply in the case of very easy tasks. Also, in the first hypothesis, it is difficult to determine whether the hypothesis was not supported because of the tasks or the P_s. However, it may be very difficult to disentangle P_s and the task. Some of the arguments presented in the discussion indicate that the type and nature of the task is a very important factor in achievement motivation studies and warrants due consideration in future research.

A number of possibilities for future research arise from this study. First, throughout the discussion, it was noted that the type and nature of the tasks may have been the reason why the hypotheses were not fully supported. In future studies of this kind, care should be taken to make sure that achievement type tasks are used. These might be tasks which measure some valued competence such as intelligence

or academic achievement. Subjects should believe that the tasks are valid measures of whatever competence is being measured and that upon successful performance, they would feel a sense of personal accomplishment and pride in that accomplishment. The nature of the tasks should also be considered in future studies so that possible factors such as ceiling effect or trying too hard does not result in obscuring the findings. Such considerations might result in a support of the hypotheses.

Secondly, a study could be designed where the same task is used in the increasing and decreasing P_s contingent path conditions. For example, this study could be replicated using only the pursuit rotor. To induce increasing and decreasing P_s contingent paths, the RPM (revolutions per minute) of the rotating disc in the pursuit rotor could be increased or decreased, respectively. This approach might improve the test of the hypotheses.

The increasing and decreasing contingent paths used in this study are not representative of all such paths. Use of paths with P_s values other than .9, .7, and .5 would result in different predictions according to Raynor's formulations. A study could be designed where the increasing and decreasing P_s contingent paths might be .1.3.5 and .5.3.1, respectively. This could be a further test of the type of hypotheses tested in this study.

Another area for future research might be to investigate the possibility that subjects perceived the contingent path as one step. This could be done by asking subjects in a contingent path how they perceive the steps in the path--as a series of steps or as one step with a number of subparts. Perhaps, in a future study, the steps in a contingent path could be presented allowing for some time (a day or a week) to pass between tasks. This procedure might affect the outcome of the results.

Future research might be conducted to determine whether it is more important for subjects to maintain their past success(es) or to attain future success(es) when in a contingent path situation. One might set up contingent path situations, so that under one condition, contingent path instructions are similar to those employed in this study, while under the other, the importance of maintaining past successes might be emphasized. Then, the performance under the two conditions might be observed to determine if there are any differences.

The multiplicative assumption might be examined in future studies. While it is difficult to suggest methods of how this assumption could be tested, one method might be to ask the subjects directly. Subjects might be presented with a contingent path where they are told how difficult each step in the path is. Then they could be asked to state what they

perceive their chances of success to be in each step, given that they must first succeed in the prior steps. From their responses, one might be able to determine what they do with the subjective probabilities of success in each step (i.e., multiply them or average them) to arrive at their stated probabilities.

Finally, it might be interesting to observe the results if this study were replicated using failure-threatened subjects as well as success-oriented subjects. Perhaps, differences in performance under the different contingent and one-step path conditions would be more apparent if two extreme groups of subjects were used.

In this section, a number of reasons concerning the failure to fully support the two research hypotheses were discussed. Among these were possible design problems such as: type and nature of the tasks; extrinsic motivation; cognitive learning effects; the perception of one rather than three separate tasks; and the experimental manipulation of P_s. Possible limitations of the theory such as desire to maintain past success(es), proximity of a goal event in time, and the multiplicative assumption were also discussed. In addition, suggestions for future research were provided.

SUMMARY AND CONCLUSIONS

The strength of achievement motivation for an immediate activity is basically determined by motives, subjective probability of success, and the incentive value of that success. Contingent future orientation was later introduced as an important determinant of the strength of achievement motivation. It was found that motivation for an immediate activity increased when an individual perceived that the immediate activity was but a step in a path of activities leading to some desired future goal and that success or failure in those future activities was contingent upon success or failure in the immediate activity (contingent path).

To include the concept of contingent future orientation in the theory of achievement motivation, Raynor modified Atkinson's original formulations, thereby making the theory more general. The elaborated theory of achievement motivation, in addition to remaining applicable in a one-step path situation, provides a basis for numerous predictions concerning strength of motivation in various contingent path situations (i.e., long vs. short contingent paths, increasing vs. decreasing contingent paths, etc.). Some of these predictions have been tested and supported while others have not been consistently supported. Still, other predictions have never been tested because the studies reported in the literature have been restricted to a test of the theory in the

first step only of contingent and noncontingent paths.

One of the predictions that has never been tested was that motivation decreases as an individual successfully progresses along a contingent path such that the strength of motivation at the final step is less than that at the beginning of the path. Another prediction that was never tested was that strength of motivation is greater for the first step of a contingent path than it is in a one-step path. Thus, the purpose of this study was to test these predictions.

One of the major concerns in designing the study was to effectively induce the subjective probabilities of success and to maintain these probabilities throughout the contingent paths. For this purpose, three different motor tasks unfamiliar to the subjects were chosen. Motor tasks rather than paper and pencil tasks were chosen because there was a greater chance that subjects would not have had much previous experience with these kinds of tasks and would, therefore, more readily believe the induced P_s. The tasks had to be different because it was important that there was no cognitive learning effect as a function of success along the contingent path.

The results of this study did not support the first hypothesis. However, in both contingent path conditions (the increasing and decreasing P_s contingent paths) there was

a tendency for subjects, especially those low in TA, to perform better in the first step of the path than in the final step. This result, however, should be interpreted with caution because of the possible problem of confounding the P_s with the task. The second hypothesis was supported in part. When the moderately difficult task was used (pursuit rotor), subjects in the first step of the increasing P_s contingent path performed better than those in the one-step path.

Possible problems with the design and possible limitations of the theory were considered. Suggestions for future research were advanced.

In conclusion, given the possible design problems noted in this study, the interpretation and generalization of the results should be viewed with some reservation. However, given these cautions, it appears that there is some support for Raynor's theory. It appears that for subjects who are less motivated to avoid failure, contingent future orientation does result in better performance on a moderately difficult task when it is the first step of an increasing P_s contingent path (.5.7.9) than when it is the only task of a one-step path (.5). However, there appears to be little support for Raynor's contention that achievement motivation is weaker at the end of a decreasing P_s contingent path (.9.7.5) than at the beginning of an increasing P_s contingent path

(.5.7.9) and vice versa. It is suggested, however, that more research is needed in the area of contingent paths in order to both resolve design problems and investigate possible limitations of the theory.

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Atkinson, J. W., Ed., Motives in Fantasy, Action and Society, A Method of Assessment and Study, Princeton, N.J., Van Nostrand, 1958, xv-873 p.

The work reported in this edited book is based on the classic studies in human behaviour conducted by McClelland and Murray. The integrating theme of this book is the search for a method of assessment and study of human motivation which will be valid, flexible, and general.

Atkinson, J. W. and J. O. Raynor, Eds., Motivation and Achievement, Washington, D.C., Winston, 1974, iii-479 p.

In this book, twenty-five years of research in the area of achievement motivation are synthesized. The authors present first their theory of achievement motivation based on the basic determinants of personality and the environment. Added to these are the influence of competence judgements and fear of success together with the effects of future orientation. The relationship between motivation and level of performance is examined. Finally, a new theoretical framework for the study of achievement motivation is presented.

--------, Personality Motivation and Achievement, Washington, D.C., Hemisphere, 1978, ix-272 p.

This book is an abridgement of Motivation and Achievement (1974). The chapters selected from that book present an overview of the main direction of empirical research and theoretical developments of the past decade. Important new ideas concerning traditional mental testing in the context of intellectual performance and cumulative achievement are presented. In addition, ideas about how personality will be expressed in the changing quality of motivation that occurs in various stages of career striving and throughout life are discussed.

Entin, E. E. and J. O. Raynor, "Effects of Contingent Future Orientation and Achievement Motivation on Performance in Two Kinds of Tasks", in Journal of Experimental Research in Personality, Vol. 6, No. 4, 1973, p. 314-320.

In this study, the authors examine the effects of contingent future orientation on performance in a simple and complex task with success oriented and failure threatened individuals in contingent and noncontingent path situations.

Raynor, J. O., "Theoretical Note Future Orientation and Motivation of Immediate Activity: An Elaboration of the Theory of Achievement Motivation", in Psychological Review, Vol. 76, No. 6, 1969, p. 606-610.

In this paper, Raynor presents a summary of his elaboration of the theory of achievement motivation together with some supportive empirical evidence concerning future orientation in achievement related situations. In addition, a number of predictions resulting from his elaborated theory of achievement motivation are presented.

--------, "Effects of Distant Future Goals on Achievement Motivation", Final Report to the National Science Foundation, Unpublished Report, New York State University at Buffalo, 1972.

In this report, a number of studies concerned with how individuals' future plans affect their immediate behaviour when working on tasks requiring effort and skill, are presented and discussed. It is clearly suggested by the data that when immediate success/failure is related to the opportunity to try for future success/failure, individual differences in achievement related motives determine whether future plans significantly affect behaviour.

--------, "Future Orientation, Self Evaluation and Motivation for Achievement", Research Proposal submitted to the National Science Foundation, State University of New York at Buffalo, 1976.

In this research proposal half a decade of research on achievement motivation and future orientation is brought together. The research is extended to include the role of self-evaluation in career striving. This leads to a proposed new theory of competence motivation. In this paper, it is proposed to study both the factors determining motivation for the immediate next step of a contingent path (achievement motivation) and those determining willingness to undertake/resist a test of competence (competence motivation). Most importantly, it is proposed to study the joint influence of achievement motivation and competence motivation in a contingent path situation where the activity is perceived to represent a valid test of a valued competence.

-------- and R. M. Sorrentino, "Effects of Achievement-Related Motives and Task Difficulty on Immediate Performance in Contingent Paths", Unpublished Paper, State University of New York at Buffalo and The University of Western Ontario, 1972.

The authors in this study examine the effects of contingent future orientation on performance of success oriented and failure threatened individuals in difficult, moderately difficult, and easy contingent path situations.

APPENDIX 1

n ACH TEST

NAME _____

CLASS _____

MALE ☐

FEMALE ☐

AGE _____ YEARS _____ MONTHS

SENTENCE INTERPRETATIONS

INSTRUCTIONS

In this booklet, you are going to see four sentences. Your task is to tell a story that is suggested to you by each sentence. Try to imagine what is going on. Then, tell what the situation is, what led up to the situation, what the people are thinking and feeling, and what they will do.

In other words, write as complete a story as you can — a story with a plot and characters.

You will have 20 seconds to look at the sentence and then 6 minutes (1½ minutes per question) to write your story about it. Write your first impressions and work rapidly. I will keep time and tell you when it is time to finish your story and to get ready for the next sentence.

There are no right or wrong stories, so you may feel free to write whatever story is suggested to you when you look at a sentence. Spelling, punctuation, and grammar are not important. What is important is to write out as fully and as quickly as possible the story that comes into your mind, as you imagine what is going on.

Notice that there is one page for writing each story. If you need more space for writing any story, use the reverse side of the paper.

APPENDIX 1

1. Two people in a shop are working at a machine.

SENTENCE NUMBER _____ CODE NUMBER _____

1. What is happening? Who are the persons?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

APPENDIX 1

2. A person is working with a typewriter and books.

SENTENCE NUMBER _____ CODE NUMBER _____

1. What is happening? Who are the persons?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

3. An older person is talking to a younger person.

APPENDIX 1

SENTENCE NUMBER _____ CODE NUMBER _____

1. What is happening? Who are the persons?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

4. A person is looking into a microscope.

APPENDIX 1

SENTENCE NUMBER _____ CODE NUMBER _____

1. What is happening? Who are the persons?

2. What has led up to this situation? That is, what has happened in the past?

3. What is being thought? What is wanted? By whom?

4. What will happen? What will be done?

APPENDIX 2

TEST ANXIETY QUESTIONNAIRE (TAQ)
HIGH SCHOOL FORM
SHORT VERSION

APPENDIX 2

QUESTIONNAIRE ON ATTITUDES TOWARD DIFFERENT TESTING SITUATIONS

(HIGH SCHOOL FORM)

Many people have been interested in how students feel about tests and about taking tests. This questionnaire is designed to let you tell us how you feel about them. We know that different people may have different ideas and attitudes about the same thing. We are particularly interested in how people differ in their feelings about tests.

The value of this questionnaire will in large part depend on how frank you are in stating your opinions, feelings, and attitudes. Needless to say, your answers to the questions will be kept strictly confidential; they will not be made known to any teacher or official in the school system.

For each question there is a line on the ends of which are statements of opposing feelings. The statements refer to the question. In the middle of the line you will find the word Midpoint. This reflects a feeling which is in-between the feelings described above. You are required to put an X on the point on the line which you think best describes the strength of your feelings about that particular question.

The midpoint is only for your guidance. Do not hesitate to put a mark on any point on the line as long as that mark reflects (shows) the strength of your feeling.

By scholastic aptitude test we mean the tests that all of you have probably taken at some time while in High School. These are usually tests for which you cannot prepare and for which you cannot study. By teacher-made test we mean the tests given to you during the term which your teacher announces in advance. These are tests covering material you have had in class; tests for which you can prepare. If we just say 'tests', we mean all kinds of tests.

READ EVERY QUESTION CAREFULLY

ANSWER EVERY QUESTION

PLEASE DO TELL US HOW YOU REALLY FEEL

Answer the questions quickly. Do not spend too much time on any one question. You will have time to complete the questionnaire. Raise your hand if you have any questions and we will try to answer them. ANSWER THE QUESTIONS AS YOU FEEL.

GO AHEAD TO THE FIRST PAGE

1. Before taking a scholastic aptitude test, I feel fairly confident that I will do well.

Feel confident	Midpoint	Do not feel confident

2. Before taking a scholastic aptitude test, I am aware of an uneasy feeling.

Do not feel uneasy	Midpoint	Feel uneasy

3. While taking a scholastic aptitude test, I am aware that my heart is beating faster.

Heart beats faster	Midpoint	Heart does not beat faster

4. I find myself thinking about other things while taking a test.

Do not think about other things	Midpoint	Think about other things

5. Before taking a scholastic aptitude test, I tend to worry.

Tend to worry	Midpoint	Do not tend to worry

6. While taking a scholastic aptitude test, I do not perspire more than I do at other times in school.

Do not perspire	Midpoint	Perspire more than at other times

7. Before taking a teacher-made test, I feel fairly confident that I will do well.

Feel confident	Midpoint	Do not feel confident

8. I usually expect to do poorly on a teacher-made test.

Expect to do poorly	Midpoint	Do not expect to do poorly

GO ON TO THE NEXT PAGE

Put a mark at any point on the line as long as that mark reflects the strength of your feeling.

9. After I have completed a scholastic aptitude test, I worry about how well I have done.

Worry about how well I have done	Midpoint	Do not worry about how well I have done

10. After taking a teacher-made test, I feel fairly confident that I have done well.

Do not feel confident	Midpoint	Feel confident

11. While I am taking a test, I find that I cannot seem to sit still.

Sit still easily	Midpoint	Cannot sit still

12. When the teacher announces that a test is going to be given, I become afraid that I am going to fail - that I will do poorly.

Become afraid that I will fail	Midpoint	Do not become afraid that I will fail

13. While taking a hard test, I find that I tend to forget facts that I thought I knew very well.

Do not forget facts	Midpoint	Forget facts

14. Before taking a test, I worry about the possibility of failing it.

Do not worry about failing it	Midpoint	Worry about failing

15. While taking a scholastic aptitude test, I wonder about how well I am doing.

Do not wonder about how well I am doing	Midpoint	Wonder about how well I am doing

16. Before taking a teacher-made test, I am aware of an uneasy feeling.

Do not feel uneasy	Midpoint	Feel uneasy

GO ON TO THE NEXT PAGE

Remember to put a mark at any point on the line as long as that mark reflects the strength of your feeling.

17. While taking a teacher-made test, I am aware that my heart is beating faster.

Heart beats faster	Midpoint	Heart does not beat faster

18. While taking a scholastic aptitude test, I worry about the possibility of failing it.

Worry about failing	Midpoint	Do not worry about failing

19. Before taking a teacher-made test, I tend to worry.

Tend to worry	Midpoint	Do not tend to worry

20. I expect myself to do better with difficult problems given as homework than with the same problems given on a course test.

Do better with the problems on a test	Midpoint	Do better with the problems given as homework

21. After I have completed a teacher-made test, I worry about how well I have done.

Worry about how well I have done	Midpoint	Do not worry

22. Before I begin to answer the questions on a teacher-made test, I am aware that my heart is beating faster.

Heart does not beat faster	Midpoint	Heart beats faster

23. After taking a teacher-made test, I do not feel very confident that I have done my best.

Do not feel confident	Midpoint	Feel very confident

24. While taking a teacher-made test, I find it difficult to concentrate on the questions because I am concerned with how well I am doing.

Do not find it difficult to concentrate	Midpoint	Find it difficult to concentrate

GO ON TO THE NEXT PAGE

Remember to put a mark at any point on the line as long as that point reflects the strength of your feeling

25. I feel that a course test result (score) shows what I really know in the subject.

Does not show what I know	Midpoint	Shows what I really know

26. While taking a teacher-made test, I find myself thinking about how well I am doing on it.

Do not think about how well I am doing	Midpoint	Think about how well I am doing

27. While taking a teacher-made test, I worry about the possibility of failing it.

Worry about failing	Midpoint	Do not worry about failing

28. Sometimes while taking a test, my mind goes blank.

Mind does not go blank	Midpoint	Mind goes blank

29. Before I begin a scholastic aptitude test, I often feel that I cannot do well.

Feel that I cannot do well	Midpoint	Feel that I can do well

30. Even though I prepare for a course examination, I expect to do poorly on it.

Expect to do poorly	Midpoint	Do not expect to do poorly

31. After I have taken a test, I tend to forget about it and not to be very concerned about the grade I receive.

Not concerned about grade	Midpoint	Very concerned about grade I will receive

32. I usually expect to do poorly on a course test.

Expect to do poorly	Midpoint	Expect to do well

APPENDIX 2

Please answer the questions on this page. We are asking for your name and class only because it may be necessary for research purposes. As mentioned before, all of your answers to the questions will be kept strictly confidential. Neither the questions nor your answers will ever be shown to or discussed with anyone in the school system.

Name: _____

Class: _____

Male ☐

Female ☐

Age _____ Years _____ Months

APPENDIX 3

INTRODUCTION PRECEDING THE ADMINISTRATION OF THE n ACH TEST AND THE TAQ

INTRODUCTION PRECEDING THE ADMINISTRATION OF THE n ACH TEST AND THE TAQ

My name is Alina Kawecki. I am from the University of Ottawa. We are carrying out a study and I am helping to collect the information.

In this study we are interested in two things. First of all, we are trying to find out about the kinds of imaginative or creative stories that students of your age group can write. Secondly, we want to find out how students of your age group feel about tests and various testing situations.

We would very much appreciate your help in obtaining this information.

(For subjects taking both measures in one session, the following instructions were given:)

We will start with the imaginative story writing first. This will take approximately thirty minutes to finish. Following the stories you will be asked to fill our a questionnaire about your feelings on tests and various testing situations. This will take approximately ten to fifteen minutes.

(For subjects taking one measure in one session and one measure in the next session, the following instructions were given:)

Today we will do the imaginative story writing. This will take approximately thirty minutes. In your next English

class, I will return and you will be asked to fill out a questionnaire about your feelings on tests and various testing situations. This will take approximately ten to fifteen minutes.

(In both cases)

I want you to know that these are not tests. You are not being tested. We simply want to gather information on the two things which I mentioned to you at the beginning.

APPENDIX 4

INTRODUCTION TO THE PRETEST

APPENDIX 4

INTRODUCTION TO THE PRETEST

Hello, I'm back collecting information for another part of the study being carried out at the University of Ottawa. For this part, we don't need all the grade nine students, so we selected only some at random. You happen to be one of them. We would appreciate your cooperation in this part of the study, also. What we'd like to find out is how students of your age perform on these tasks. You will be asked to try each task today and next week you will be asked to come back and try them once more.

You probably don't know what these devices are. Let me tell you and then I'll show you what you have to do on each one of them. (Investigator proceeded to identify each device and demonstrate the performance. Each subject was then given the opportunity to try each task.)

APPENDIX 5

INSTRUCTIONS FOR THE PRETEST (TAPED)

INSTRUCTIONS FOR THE PRETEST (TAPED)

In the next five minutes you will be participating in a study which is being carried out at the University of Ottawa. You have already met Alina. She is helping us collect the information.

In front of you there are three devices--the tapping board, the nuts and bolts device, and the pursuit rotor. The tapping board is the easiest of the three. All you have to do on this device is tap back and forth on each side of the board as quickly as you can. The nuts and bolts device is a little more difficult than the tapping board. On this device you must try to put the nuts and bolts together as quickly as possible. The pursuit rotor is more difficult than the other two devices. On this device you must try to stay on the moving light for as long as you can. Since you have already tried each of these devices with Alina, you have an idea of what you are to do on each of them.

In this study, we would like to find out how students of your age group perform on these devices. We will ask you to try each of the three devices again. Alina will keep a record of your performance. We are not particularly interested in how you yourself perform, but rather, in how students of your age group perform.

Are you ready to try the three devices again? Alina will tell you which device to start with. She will also tell you when to start and when to stop.

APPENDIX 6

INSTRUCTIONS FOR THE TREATMENT (TAPED)

APPENDIX 6

INSTRUCTIONS FOR THE TREATMENT (TAPED)

(Instructions for the increasing and decreasing contingent path groups)

You will now be participating in the last part of the study that is being carried out at the University of Ottawa. Last time you worked on these devices, you were not told what they were really for. They are actually devices which are designed to test certain abilities which you have.

When you worked on these devices last time, Alina recorded how you did on each of them. This information was fed into a computer. The computer has assessed how well you can perform on the tapping board, the nuts and bolts device and the pursuit rotor.

On the basis of your performance in the last session, the computer has set a standard for you on each of the three devices. In this session you are expected to meet the standard that has been set for you on the tapping board, the nuts and bolts device and the pursuit rotor.

To be successful in this session you must meet the standard set for you on each of the three devices. If you do not meet the standard that has been set for you on the first device, you will not be allowed to go on to the second device. If you do not meet the standard that has been set for you on the second device, you will not be allowed to go

on to the third device. If you fail to meet the standard set for you on the third device, you will still not be considered successful. The object of this session is to pass on all three of the devices which measure certain abilities that you possess.

The computer has also assessed your chances of meeting the standards that have been set for you on the three devices. Alina will show you what your chances of success are on the tapping board, that is, your chances of meeting the standard set for you on the tapping board (investigator states 9 out of 10 and places card with 9/10 in front of tapping board). Your chances of success on the nuts and bolts device are (investigator states 7 out of 10 and places card with 7/10 in front of nuts and bolts task), and your chances of success on the pursuit rotor are (investigator states 5 out of 10 and places card with 5/10 in front of pursuit rotor). Are you ready to begin this session? Remember, in order to be successful in this session, you must try to succeed on all three tests.

(Instructions for the increasing contingent path group)

You will begin this session with the pursuit rotor which is the most difficult device of the three. If you meet the standard which has been set for you on the pursuit rotor, you will be able to go on to the nuts and bolts device which is easier than the pursuit rotor. If you meet the standard

that has been set for you on the nuts and bolts device, you will be able to go on to the tapping board, which is the easiest of the three devices. If you meet the standard that has been set for you on the tapping board, then you may consider yourself a success in this session.

You will be given two tries at each device. Alina will let you know whether you have met the standard set for you after your second try on each device. She will also tell you when to start and when to stop.

(Instructions for the decreasing contingent path group)

You will begin this session with the tapping board which is the easiest device of the three. If you meet the standard that has been set for you on the tapping board, you will be able to go on to the nuts and bolts device which is more difficult than the tapping board. If you meet the standard that has been set for you on the nuts and bolts device, you will be able to go on to the pursuit rotor which is the most difficult task of the three. If you meet the standard that has been set for you on the pursuit rotor, then you may consider yourself a success in this session.

You will be given two tries at each device. Alina will let you know whether you have met the standard set for you after your second try on each device. She will also tell you when to start and when to stop.

(Instructions for the one-step path groups)

You will now be participating in the last part of the study that is being carried out at the University of Ottawa. Last time you worked on these devices, you were not told what they were really for. They are actually devices which are designed to test certain abilities which you have.

When you worked on these devices last time, Alina recorded how you did on each of them. This information was fed into a computer. The computer has assessed how well you can perform on the tapping board, the nuts and bolts device and the pursuit rotor.

(Instructions for easy one-step path group)

On the basis of your performance on the tapping board in the last session, the computer has set a standard for you to meet. In this session you will be expected to meet the standard that has been set for you on the tapping board which is the easiest of the three devices. If you meet the standard that has been set for you, you may consider yourself a success on that test.

The computer has also assessed your chances of success on the tapping board, that is, your chances of meeting the standard that has been set for you. Alina will tell you what your chances are on the tapping board (investigator states 9 out 10 and places card with 9/10 in front of tapping board).

Are you ready to begin this session? You will be given two tries on the tapping board. Alina will tell you when to stop and when to start. She will also let you know whether or not you have succeeded in this session.

(Instructions for moderate difficulty one-step path group)

On the basis of your performance on the pursuit rotor in the last session, the computer has set a standard for you to meet. In this session you will be expected to meet the standard that has been set for you on the pursuit rotor which is the most difficult of the three devices. If you meet the standard that has been set for you, you may consider yourself a success on that test.

The computer has also assessed your chances of success on the pursuit rotor, that is, your chances of meeting the standard that has been set for you. Alina will tell you what your chances of success are on the pursuit rotor (investigator states 5 out of 10 and places card with 5/10 in front of pursuit rotor).

Are you ready to begin this session? You will be given two tries on the pursuit rotor. Alina will tell you when to start and when to stop. She will also let you know whether or not you have succeeded in this session.

APPENDIX 7

SCORES OBTAINED BY ALL RESEARCH SUBJECTS ON THE n ACH TEST, THE TAQ, THE PURSUIT ROTOR, THE NUTS AND BOLTS TASK, AND ON THE TAPPING BOARD

APPENDIX 7

SCORES OBTAINED BY ALL RESEARCH SUBJECTS ON THE n ACH TEST, THE TAQ, THE PURSUIT ROTOR, THE NUTS AND BOLTS TASK, AND ON THE TAPPING BOARD

Group (.9.7.5)	Subject Code Number	Sex	n Ach Score	TAQ Score	Res. Achiev. Motivat.	Pretest			Pursuit Rotor			POSTTEST Nuts and Bolts			Tapping Board		
						Pursuit Rotor (.5)	Nuts and Bolts (.7)	Tapping Board (.9)	Trial 1	Trial 2	Average	Trial 1	Trial 2	Average	Trial 1	Trial 2	Average
1	160	F	9	84	3.68	9	39.50	70	17.50	19	18.25	45.50	49	47.25	75	71	73
2	149	F	18	185	3.06	11.50	29	75	21	19	20	29	28	28.50	77	70	73.50
3	169	M	4	77	2.79	17	40	87	20	18	19	31.50	37	34.25	86	86	86
4	138	M	6	99	2.66	12	74	60	21	22.50	21.75	71	50	60.50	64	60	62
5	307	M	12	153	2.58	20	32.50	76	22.50	20	21.75	40	30	35	75	78	76.50
6	96	F	2	87	2.11	10.50	30	71	10	12	11	33	45	39	66	70	68
7	255	M	7	132	2.04	16	43	62	22	22	22	34	36.50	35.25	58	68	63
8	269	M	13	186	1.97	13	39.50	70	19	23	21	44	39	41.50	80	72	76
9	97	M	3	113	1.67	16	35	68	17	22	19.50	31.50	28.50	30	64	55	59.50
10	209	M	7	149	1.62	18	32	60	23.50	22.50	23	40	30.50	35.25	62	61	61.50
11	78	M	4	128	1.50	15	46	62	17	23	20	51	34	42.50	62	67	64.50
12	114	M	6	153	1.30	20	41.50	75	20.50	19.50	20	44	32.50	38.25	56	36	46
13	235	M	6	155	1.26	22	42	62	25	25	25	36	36	36	67	58	62.50
14	26	M	7	167	1.16	10	45	52	14.50	15.50	15	44	33.50	38.75	52	54	53
15	232	F	2	127	1.10	15	39.50	63	19.50	16	17.75	25.50	26	25.75	65	67	66
16	268	M	2	131	1.00	21	50.50	61	-	-	-	-	-	-	-	-	66.73*
17	162	M	7	177	.91	23	52	68	27	28	27.50	36	35	35.50	51	55	53
18	193	F	-4	86	.85	8.50	44.50	72	12	10.50	11.25	42	37.50	39.75	57	75	66
19	95	M	4	154	.85	10	49	56	-	-	-	-	-	-	-	-	62.73*
20	91	M	-1	116	.74	14	36	64	20.50	19	19.75	33	28	30.50	63	59	61
21	3	M	0	126	.70	17	53	60	-	-	-	-	-	-	-	-	67.23*
22	102	F	11	221	.67	15	36.50	65	13.50	15	14.25	41	34	37.50	68	64	66
23	276	M	2	147	.60	19.50	37	71	24	24.50	24.25	36	35	35.50	55	73	64
24	189	F	6	182	.58	8.50	37	64	9	10	9.50	35	30	32.50	61	58	59.50
25	116	M	-2	115	.55	11	39.50	76	19	20	19.50	39	37	38	65	61	63

APPENDIX 7 (Cont'd.)

Group (.5.7.9)	Subject Code Number	Sex	n Ach Score	TAQ Score	Res. Achiev. Motivat.	Pretest Pursuit Rotor (.5)	Pretest Nuts and Bolts (.7)	Pretest Tapping Board (.9)	Pursuit Rotor Trial 1	Pursuit Rotor Trial 2	Pursuit Rotor Average	POSTTEST Nuts and Bolts Trial 1	POSTTEST Nuts and Bolts Trial 2	POSTTEST Nuts and Bolts Average	Tapping Board Trial 1	Tapping Board Trial 2	Tapping Board Average
1	171	M	12	122	3.36	16.50	43	59	23	22	22.50	38	36	37	59	60	59.50
2	211	M	11	126	3.05	11	38	67	16.50	21	18.75	33.50	43.50	38.50	72	60	66
3	101	F	10	127	2.81	14.50	59	65	23.50	21	22.25	35.50	35.50	35.50	72	69	70.50
4	220	M	10	131	2.71	13	31.50	64	21	20	20.50	40	32	36	69	62	65.50
5	123	F	11	152	2.40	13.50	50.50	70	24	24	24	33.50	33	33.25	77	79	78
6	183	F	11	158	2.24	14.50	31	73	22.50	22	22.25	32	32.50	32.25	74	76	75
7	290	M	7	132	2.04	14.50	54.50	71	23	23.50	23.25	35.50	36	35.75	51	67	59
8	74	F	6	126	1.98	8	42.50	61	18	20	19	39.50	38.50	39	65	59	62
9	29	M	8	152	1.75	14.50	36.50	59	18	15.50	16.75	33	34	33.50	62	40	51
10	65	F	7	149	1.62	17.50	42	60	9.50	13	11.25	41	35	38	64	59	61.50
11	140	F	10	175	1.61	8.50	31	50	17.50	17	17.25	37.50	31	34.25	55	54	54.50
12	194	F	3	125	1.36	20.50	32	70	26	29.50	27.75	27.50	30	28.75	74	70	72
13	180	F	10	188	1.28	7	41	66	16.50	16	16.25	33.50	28	30.75	66	63	64.50
14	69	F	5	148	1.22	10.50	60.50	36	17.50	15	16.25	40	34	37	72	71	71.50
15	224	M	3	135	1.12	17	55.50	63	27	24	25.50	40	45	42.50	78	61	69.50
16	148	F	3	139	1.01	18	45.50	37	20	17	18.50	45	52	48.50	67	68	67.50
17	155	M	-3	90	.97	16	39	50	19	23.50	21.25	47	44.50	45.75	57	51	54
18	266	M	4	153	.87	18	40	57	20.50	23	21.75	53.50	41	47.25	63	61	62
19	49	M	3	148	.79	16	36	62	19	20.50	19.75	33	38	35.50	62	65	63.50
20	143	F	9	200	.77	10.50	29.50	58	17	15	16	35.50	31	33.25	67	60	63.50
21	89	M	-4	91	.72	23	44.50	70	27.50	26	26.75	36.50	43.50	40	81	75	78
22	242	M	2	144	.67	16	32	69	20.50	25	22.75	32.50	33.50	33	67	72	69.50
23	283	F	1	136	.66	24.50	43.50	68	25	29.50	27.25	31	27.50	29.25	76	73	74.50
24	263	M	2	147	.60	23	35	45	26	25	25.50	30.50	27.50	29	75	74	74.50
25	130	F	9	209	.54	17.50	49	58	20	17.50	18.75	41	36	38.50	66	67	66.50

APPENDIX 7 (Cont'd.)

Group (.5)	Subject Code Number	Sex	n Ach Score	TAQ Score	Res. Achiev. Motivat.	Pretest Pursuit Rotor (.5)	Pretest Nuts and Bolts (.7)	Pretest Tapping Board (.9)	Pursuit Rotor Trial 1	Pursuit Rotor Trial 2	Pursuit Rotor Average	POSTTEST Nuts and Bolts Trial 1	Nuts and Bolts Trial 2	Nuts and Bolts Average	Tapping Board Trial 1	Tapping Board Trial 2	Tapping Board Average
1	170	M	16	89	5.05	13	51	57	7	8	7.50						
2	249	M	10	120	2.99	19.50	38	52	19	20	19.50						
3	161	F	11	133	2.87	13	32	62	16.50	16	16.25						
4	270	F	2	66	2.64	13	40	62	18	19	18.50						
5	229	F	4	93	2.38	11	38.50	47	17	16.50	16.75						
6	310	M	10	155	2.11	14.50	33	60	19	21.50	20.25						
7	134	M	2	89	2.06	17	41	64	21	19.50	20.25						
8	176	M	3	103	1.92	17	34	59	19.50	20	19.75						
9	280	M	4	118	1.75	13	40	57	21	19	20						
10	248	M	6	141	1.61	7	32.50	65	21	19	20						
11	253	F	3	119	1.52	11	36	62	13.50	15	14.25						
12	60	F	2	118	1.33	12	41.50	58	21.50	21	21.25						
13	135	F	-4	70	1.26	17.50	49	61	25.50	25	25.25						
14	56	F	8	174	1.20	11.50	36.50	79	16	17	16.50						
15	275	M	1	118	1.12	17	39	69	23	23.50	23.25						
16	18	F	9	191	.99	13	51	55	10.50	18	14.25						
17	139	M	5	161	.89	11	33	64	18.50	21.50	20						
18	54	M	1	128	.86	19	33.50	70	22.50	24	23.25						
19	200	M	-4	89	.77	16	35	60	19	18	18.50						
20	1	F	7	184	.74	5	31	72	13	20	16.50						
21	64	M	-1	117	.71	10	42	47	12.50	14	13.25						
22	188	M	5	170	.67	8	33.50	62	14.50	16	15.25						
23	46	F	5	171	.64	11	47.50	58	18	22	20						
24	52	F	8	199	.58	13	31	66	23.50	26	24.75						
25	254	F	10	218	.53	14	32	61	24.50	17	20.75						

(NOT APPLICABLE)

APPENDIX 7 (Cont'd.)

Group (.9)	Subject Code Number	Sex	n Ach Score	TAQ Score	Res. Achiev. Motivat.	Pretest			Pursuit Rotor			POSTTEST Nuts and Bolts			Tapping Board		
						Pursuit Rotor (.5)	Nuts and Bolts (.7)	Tapping Board (.9)	Trial 1	Trial 2	Average	Trial 1	Trial 2	Average	Trial 1	Trial 2	Average
1	264	M	19	158	3.95	19.50	41	63							53	63	58
2	144	M	4	56	3.31	15	35.50	67							69	63	66
3	75	F	13	155	2.75	7	30	69							69	64	66.50
4	300	M	9	121	2.75	14.50	37.50	70							70	71	70.50
5	159	M	15	191	2.27	14.50	34.50	59							60	43	51.50
6	43	M	5	113	2.09	14	33	67							52	66	59
7	99	F	16	210	2.01	12	32	63							69	54	61.50
8	227	M	10	163	1.91	18	40	54							60	55	57.50
9	256	M	8	149	1.83	15	48	56							78	74	76
10	250	M	6	140	1.63	18	39	74							79	70	74.50
11	67	M	2	109	1.55	21.50	35	58							56	67	61.50
12	258	F	5	138	1.47	11	51	64							64	62	63
13	294	M	11	197	1.26	12	46	64	(NOT APPLICABLE)						69	74	71.50
14	212	M	3	131	1.22	12.50	34.50	69							68	62	65
15	252	M	3	133	1.16	14	33.50	73							71	71	71
16	25	M	6	163	1.05	21.50	42.50	65							72	50	61
17	260	M	1	124	.97	17.50	39	50							64	61	62.50
18	217	M	3	145	.86	20	34	63							81	64	72.50
19	19	M	-1	115	.77	10	34	58							35	54	44.50
20	221	M	-3	99	.74	22	39.50	75							69	71	70
21	42	F	-1	118	.69	10	47	73							78	56	67
22	152	F	3	153	.67	6	36	63							65	62	63.50
23	184	F	3	154	.64	15	30	62							60	60	60
24	127	F	6	182	.58	1	52.50	24							53	46	49.50
25	262	M	-4	98	.55	11	33.50	57							58	55	56.50

APPENDIX 7 (Cont'd.)

Subject Code Number	Sex	n Ach Score	TAQ Score	Subject Code Number	Sex	n Ach Score	TAQ Score	Subject Code Number	Sex	n Ach Score	TAQ Score	Subject Code Number	Sex	n Ach Score	TAQ Score
2	F	8	204	39	F	-3	144	87	M	-3	182	133	F	-3	186
4	F	3	169	40	F	0	266	88	M	0	185	136	F	2	213
5	F	4	228	41	M	-2	236	90	M	-2	198	137	F	2	248
6	F	1	145	44	M	-4	162	92	M	6	193	141	F	0	245
7	F	1	250	45	F	3	193	93	M	-1	161	142	M	-2	148
8	F	-2	160	47	M	-3	162	94	M	-1	201	145	M	4	217
9	F	4	224	48	M	4	180	98	F	4	253	146	M	-2	202
10	M	-3	158	50	F	5	203	100	F	-4	203	147	F	2	205
11	F	0	149	51	F	2	167	103	F	4	191	150	F	2	192
12	M	-3	147	53	M	1	186	104	F	-2	172	151	F	0	171
13	F	-1	222	55	M	-1	153	105	F	7	194	153	M	-4	130
14	M	-2	206	57	M	-3	171	106	F	-3	195	154	M	-4	105
15	M	-4	186	58	F	3	162	108	M	-2	126	156	F	-3	197
16	F	-4	242	59	F	4	218	109	F	-3	256	157	F	10	228
17	F	-1	247	62	F	-4	186	110	M	0	175	158	F	2	230
20	M	-4	171	63	F	4	206	111	M	-1	161	163	F	1	189
21	M	0	180	66	F	2	196	112	M	-1	181	164	F	-2	162
22	M	-1	152	68	M	-3	132	113	F	-3	140	165	F	0	184
23	M	-2	154	70	F	-2	182	115	M	3	170	166	F	-2	197
24	M	5	230	71	F	2	162	117	F	4	180	167	F	3	196
27	M	2	187	73	F	-2	167	118	M	-2	166	168	F	-2	183
28	M	4	186	76	F	2	188	119	M	1	164	172	F	7	255
30	M	-3	123	77	M	8	232	120	M	1	165	174	F	-2	211
31	M	-2	216	79	F	4	190	121	M	-3	179	175	M	-2	154
32	M	-2	196	80	M	0	179	122	F	-3	147	177	F	5	178
33	M	4	238	81	F	7	239	123	M	-4	164	178	F	1	194
34	M	-3	162	82	M	-3	123	124	F	0	203	179	F	-3	151
35	M	2	164	83	F	6	228	126	M	-2	159	181	F	-3	120
36	M	6	252	84	M	-3	169	128	M	-3	161	182	F	-4	212
37	F	5	194	85	F	2	160	131	F	-3	206	185	M	1	217
38	F	-1	136	86	F	0	171	132	F	-4	225	186	F	0	142

APPENDIX 7 (Cont'd.)

Subject Code Number	Sex	n Ach Score	TAQ Score	Subject Code Number	Sex	n Ach Score	TAQ Score	Subject Code Number	Sex	n Ach Score	TAQ Score
187	F	2	213	246	F	-3	163	301	M	-1	191
195	F	9	215	251	M	2	183	302	F	-3	190
197	M	2	154	257	F	4	168	303	M	0	161
199	M	-2	202	259	F	3	170	306	F	-2	180
202	M	-2	192	261	M	-4	179	308	M	3	169
204	F	-4	187	265	M	1	181				
205	M	-2	177	267	M	-4	205				
207	M	-2	217	271	F	-4	191				
208	F	-2	171	272	F	2	197				
210	M	4	186	273	F	-3	225				
213	F	2	196	274	F	-2	139				
214	F	-1	159	277	F	-2	209				
216	M	-3	146	278	F	3	235				
218	F	-4	129	279	M	-3	211				
219	F	-2	200	281	M	-3	146				
222	M	1	177	282	F	-2	205				
223	M	-4	140	284	F	2	156				
225	F	2	246	285	F	-3	198				
226	F	-1	194	286	F	-2	180				
230	F	1	156	287	F	-2	211				
231	M	2	166	288	M	-2	173				
234	M	4	181	289	M	-3	209				
237	M	-2	168	291	F	-2	177				
238	F	-3	207	292	F	3	269				
239	M	-2	211	293	F	7	228				
240	F	-2	151	295	F	-2	198				
241	F	2	184	296	F	-1	186				
243	M	0	172	297	F	0	160				
244	M	3	172	298	F	4	214				
245	M	5	187	299	F	-4	204				

APPENDIX 8

MEANS AND STANDARD DEVIATIONS OF PERFORMANCE SCORES OBTAINED BY THE TWO CONTINGENT PATH GROUPS ON THE NUTS AND BOLTS TASK

APPENDIX 8

MEANS AND STANDARD DEVIATIONS OF PERFORMANCE SCORES ON THE NUTS AND BOLTS TASK BY TYPE OF CONTINGENT PATH, LEVEL OF RESULTANT ACHIEVEMENT MOTIVE, SEX, AND SUBJECTIVE PROBABILITY OF SUCCESS.

Type of Contingent Path	Level of Resultant Achievement Motive	Sex		Subjective Probability of Success $P_{n}s_{n}$ = .70 Nuts and Bolts (Time in sec.) Raw Scores	Z Scores
Decreasing P_s Contingent Path (.9.7.5)	High	Male (n=9)	M	39.17	0.39
			SD	8.87	1.44
		Female (n=3)	M	38.25	0.24
			SD	9.40	1.53
	Low	Male (n=6)	M	35.71	-0.18
			SD	2.89	0.47
		Female (n=4)	M	38.88	-0.47
			SD	6.21	1.01
Increasing P_s Contingent Path (.5.7.9)	High	Male (n=5)	M	36.15	-0.10
			SD	1.83	0.30
		Female (n=8)	M	33.97	-0.46
			SD	3.49	0.57
	Low	Male (n=7)	M	39.00	0.36
			SD	6.77	1.10
		Female (n=5)	M	37.30	0.08
			SD	7.21	1.17

MEANS AND STANDARD DEVIATIONS OF PERFORMANCE SCORES ON THE NUTS AND BOLTS TASK BY TYPE OF CONTINGENT PATH, LEVEL OF TEST ANXIETY, SEX, AND SUBJECTIVE PROBABILITY OF SUCCESS.

Type of Contingent Path	Level of Test Anxiety	Sex		Subjective Probability of Success P_{nsn} = .70 Nuts and Bolts (Time in sec.) Raw Scores	Z Scores
Decreasing P_s Contingent Path (.9.7.5)	Low	Male (n=7)	M	38.71	0.31
			SD	10.53	1.71
		Female (n=4)	M	37.94	0.19
			SD	8.94	1.45
	High	Male (n=8)	M	36.97	0.03
			SD	2.31	0.38
		Female (n=3)	M	32.83	-0.64
			SD	4.51	0.73
Increasing P_s Contingent Path (.5.7.9)	Low	Male (n=7)	M	39.36	0.42
			SD	3.69	0.60
		Female (n=4)	M	33.13	-0.59
			SD	4.98	0.81
	High	Male (n=5)	M	35.65	-0.19
			SD	6.90	1.12
		Female (n=9)	M	36.19	-0.10
			SD	5.33	0.87

APPENDIX 9

MEANS AND STANDARD DEVIATIONS (TABLE A) AND RESULTS OF ANALYSIS OF VARIANCE TEST (TABLE B) OF HYPOTHESIS TWO

Table A.- Means and Standard Deviations of Standardized Performance Scores on the Motor Tasks by Type of Contingent Path (First Step vs. One-Step) Level of Test Anxiety, Sex, and Subjective Probability of Success.

Type of Contingent Path	Level of Test Anxiety	Sex	Subjective Probability of Success $P_{n}s_{n}$ = .50 Pursuit Rotor (Time in sec.) M	SD	$P_{n}s_{n}$ = .90 Tapping Board (No. of Taps) M	SD
First Step of Increasing P_s Contingent and Decreasing P_s Contingent Path (.5.7.9, .9.7.5)	Low	M	0.70 (n=7)	0.68	0.20 (n=7)	1.12
		F	1.05 (n=4)	1.02	0.54 (n=4)	0.41
	High	M	0.37 (n=5)	0.80	-0.29 (n=8)	1.34
		F	-0.46 (n=9)	0.90	0.30 (n=3)	0.86
One-Step in One-Step Path (.5, .9)	Low	M	-0.34 (n=9)	1.22	-0.15 (n=10)	1.00
		F	-0.25 (n=6)	0.96	0.38 (n=1)	0.00
	High	M	-0.21 (n=4)	0.59	0.17 (n=8)	1.15
		F	-0.23 (n=6)	0.92	-0.40 (n=6)	0.72

Table B.- Results of the Analysis of Variance Test with Type of Contingent Path (First Step vs. One-Step), Level of Test Anxiety, Sex, Subjective Probability of Success as Independent Variables and Performance on the Motor Tasks as the Dependent Variable.

Source of Variance	Sum of Squares	df	Mean Square	F	
A Type of Contingent Path (.5.7.9, 9.7.5, .5 and .9)	3.26	1	3.26	3.33	n.s.
B Level of Test Anxiety	2.27	1	2.27	2.32	n.s.
C Sex	0.06	1	0.06	0.06	n.s.
D Subjective Probability of Success	0.01	1	0.01	0.00	n.s.
AB	1.40	1	1.40	1.43	n.s.
AC	0.04	1	0.04	0.05	n.s.
AD	1.25	1	1.25	1.28	n.s.
BC	1.04	1	1.04	1.06	n.s.
BD	0.07	1	0.07	0.07	n.s.
CD	0.47	1	0.47	0.48	n.s.
ABC	0.02	1	0.02	0.02	n.s.
ABD	0.80	1	0.80	0.82	n.s.
ACD	0.63	1	0.63	0.64	n.s.
BCD	0.05	1	0.05	0.05	n.s.
ABCD	1.64	1	1.64	1.67	n.s.
ERROR	79.28	81	0.98		

$\alpha = 0.05$.

APPENDIX 10

ABSTRACT OF

An Investigation of Performance
Under Contingent and One Step Path Conditions

APPENDIX 10

ABSTRACT OF

An Investigation of Performance Under Contingent and One Step Path Conditions[1]

Studies of contingent future orientation have been restricted to tests of Raynor's theory in the first step of a contingent path. No studies have been reported where the theory was tested in any of the subsequent steps of the contingent path. Furthermore, while researchers have tested the theory by comparing performance in the first step of a contingent path to the first step of a noncontingent path, none have compared performance in the first step of a contingent path to a one-step path. Therefore, the purpose of this study was to compare performance in the first step of a contingent path to that in the last step of a contingent path and also to compare performance in the first step of a contingent path to that in a one-step path.

Using a three-step decreasing P_S contingent (.9.7.5) and a three-step increasing P_S contingent path (.5.7.9),it was predicted that: (a) success-oriented subjects in the first step of a decreasing P_S contingent path (.9.7.5) perform better on the easy task (.9) than the success-oriented subjects in the final step of the increasing P_S contingent path (.5.7.9); and

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1 Alina Kawecki, doctoral thesis presented to the School of Graduate Studies of the University of Ottawa, Ontario, 1980, x-203 p.

(b) the success-oriented subjects in the first step of the increasing P_s contingent path (.5.7.9) perform better on the intermediately difficult task (.5) than the success oriented subjects in the decreasing P_s contingent path (.9.7.5).

Therefore, it was hypothesized that there would be

> a disordinal interaction between type of contingent path and subjective probability of success.

Using also, two one-step paths (.5) and (.9), it was also hypothesized that

> (a) the success-oriented subjects in the first step of the increasing path (.5.7.9) perform better than the success-oriented subjects in the moderately difficult path (.5); and that
>
> (b) the success-oriented subjects in the first step of the decreasing P_s contingent path (.9.7.5) perform better than the success-oriented subjects in the easy one-step path (.9).

The research subjects were 289 grade nine students in the academic stream of a southern Ontario high school. The n Ach Test and the TAQ (high school form) were used to identify the success-oriented subjects. These were 60 male and 40 female subjects who scored in the top one-third of the n Ach-TAQ distribution. Their performance on three motor tasks (pursuit rotor, nuts and bolts, and tapping board) was the dependent variable.

The results of the study did not provide support for either of the two research hypotheses. Examination of the procedures indicated the possibility of invalid n Ach scores resulting from testing conditions which may not have been

neutral. Therefore, subjects were reclassified on the basis of their TAQ score only and the data were reanalyzed. The results supported only the first part of hypothesis two. A number of reasons were advanced for such results and suggestions were made for further research in this area.

Given a number of cautions regarding the results and their interpretation, it was concluded that low test anxiety subjects in the first step of a contingent path are more motivated than those in a one-step path when the task is moderately difficult. However, there appears to be little support for a decrease in achievement motivation at the end of a contingent path compared to that at the beginning of a contingent path.