THE CONSISTENCY OF PERSEVERATION

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THE CONSISTENCY OF PERSEVERATION

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The purpose of this study was to test the existence of perseveration as a personality trait, defined by a consistency of relative persistence on a variety of problems.

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TABLE OF CONTENTS

Chapter		Page
I.	THE PROBLEM	1
	Purpose of the Study	1
	Review of Research	1
	History of the Problem	3
	Correlations Between Indices of Persistence	4
	Factor Analytic Studies	5
	Studies Involving Measures of Personality	10
	Extinction Studies	11
	Over-Achievement and Persistence	11
	Achievement Motivation Studies	12
	Summary	14
II.	METHODOLOGY	16
	Indices of Persistence	16
	Task 1: Scrambled Letter Task	16
	Task 2: Writing K's and F's	17
	Task 3: Hidden Objects Task	17
	Task 4: BB Apparatus Task	18
	Over-Achievement	18
	Description of Tasks	20
	Experimental Design	21
	Subjects	22
	Experimental Setting	22
	Experimenters	23
	Procedure	23
	Task 1	24
	Task 2	25
	Task 3	25
	Task 4	27
III.	RESULTS	29
	Statistics Used	29
	Statistical Significance	31
IV.	DISCUSSION	42
	Conclusions	42
	Persistence as a Situational Variable	43
	The Prediction of Academic Achievement	46

Chapter Page

Methodological Concerns 48
Practical Implications. 50

V. SUMMARY. 51

REFERENCES. 53

APPENDIX A - RAW DATA 56

APPENDIX B - S GROUP ASSIGNMENTS. 62

APPENDIX C - CALCULATION FORMULAS 63

LIST OF TABLES

Table		Page
I.	Some Correlations of the Pi-Score	8
II.	Mean Scores and Standard Deviations for Experimental Groups	34
III.	Mean Scores and Standard Deviations for Experimental Groups (Identical Treatment Groups Combined).	35
IV.	Mean Scores and Standard Deviations for Each Task	36
V.	Task Correlations	37
VI.	Task Correlations (Identical Treatment Groups Combined) . .	39
VII.	Correlations Between Task Scores and Over-Achievement . . .	40
VIII.	Prediction of GPA From Persistence Tasks.	41

CHAPTER I

THE PROBLEM

Purpose of the Study

A person may be assumed to have a given personality variable when he responds in a consistent manner under a variety of conditions. This study is designed to investigate the personality trait of perseveration. A person may be assumed to have perseveration when he persists in one way or another across a variety of problems. Thus, persistence is the operational definition of perseveration in this study.

This inferred perseveration trait will be assumed to exist if the following hypothesis holds true:

HYPOTHESIS: A correlation will exist between persistence scores on different tasks.

Five of the indices of persistence used were devised for the purpose of measuring the correlations between tasks performances. The sixth is over-achievement. Positive correlations between the six indices will be taken as evidence of perseveration.

Review of Research

Personality is widely assumed to be a useful construct in the sense that people believe that indices of personality can be used to predict complexly similar behavior in disparate situations. For instance,

Cattell (1966) writes, "Personality may be defined as that which tells what a man will do when placed in a given situation" (p. 25).

This widespread assumption has recently been questioned. Mischel (1969), writing in the American Psychologist, says:

> Theoretically, in my view, one should not expect social behavior to be consistent unless the relevant social learning and cognitive conditions are arranged to maintain the behavior cross-situationally. On theoretical as well as on empirical grounds, much of the time there is no reason to expect great consistency in the social behaviors comprising most of our personality dimensions (p. 1014).

The inconsistency so regularly found in studies of noncognitive personality dimensions often reflects the state of nature and not merely the noise of measurement, according to Mischel. If one accepts this view, an adequate conceptualization of personality will have to go beyond the conventional definition of stable and enduring differences in behavioral dispositions to include discontinuities as genuine phenomena of personality.

Cattell (1966) attempted to reconcile the inconsistencies found in studies of personality traits by what he called the "integration effect of learning on the personality."

> Through the endless application of rewards and punishments by the family, school, and peer group, certain patterns of personality response---traits---are gradually built up, fitted to the social culture. Some of this learning involves a third principle, different from conditioning and the rewards of behavior on the way to the goal satisfactions of a single drive. This is integration learning, the learning of a hierarchy or combination of responses which will give the greatest satisfaction to the personality as a whole, not just to a single drive. Much of what distinguishes human from animal behavior is this restraint and subordination of one drive to the satisfaction of many drives---the control of impulses in the interests of a greater long-distance satisfaction of the whole person (p. 30).

Of course it is quite possible that personality constructs might be useful in some situations and not useful in others. Perseveration or constructs similar to it have been investigated by correlating indices of persistence with one another, in factor analytic studies, and by correlating indices of personality with persistence. Non-personality variables which have been shown to affect persistence are cognitions contingent on the situation presented (Dietze et al., 1967; James and Rotter, 1958), and the various conditions used in operant conditioning studies (Humphreys, 1939; Jenkins and Stanley, 1950; Lewis and Duncan, 1958; Mischel, 1969). Finally, a small literature exists on over-achievement, a rather aberrant index of persistence.

History of the Problem

Since men have always differed in their willingness to persist on different tasks and in their desire to achieve, psychologists have long recognized some kind of quality similar to perseveration or steadfastness on any given task. Feather (1962) has summarized the historical recognition and use of this idea as follows:

> McDougall (1908) in his discussion of instinct lists persistence as one of the objective features of purposive behavior; Tolman (1932), while rejecting the mentalistic teleology of McDougall's position, considers persistance-until-ends-are-attained as a basic criterion for molar, purposive behavior; Lewin (1935) discussed the persistence of tension within the regions of a person, a conception which has a crucial part in the interpretation of the research concerning rigidity, substitute activity, and interrupted tasks (cited in Lewin, 1947); and both Hull (1943) and Dollard and Miller (1950), within the context of drive theory, are concerned with the problem of continuing action. More recently Peak (1955) and Atkinson (1957) have emphasized that a theory of motivation has as one of its important aims the conceptualization of persistence in behavior; and Bindra (1959), arguing within the general framework of Hebb's concepts (1949),

> considers persistence as one of the defining characteristics of goal directed action (p. 94).

Correlations Between Indices of Persistence

It has been mentioned that personality traits are usually inferred if there is some consistency of response observed in a variety of different situations. One of the early studies hypothesizing persistence as a personality trait in this manner was conducted by Hartshorne, May, and Maller (1929). The form of this study was like that of the other studies of character at this time; i.e., correlations of persistence were drawn between a large number of tasks for each S. The Hartshorne et al. study used eight different persistence tasks consisting of story resistance, puzzle mastery, paper and pencil puzzle solutions, fatigue and boredom in mental work, hunting for hidden objects, continued standing on the right foot, eating crackers and whistling, and solving a toy puzzle.

Validity coefficients obtained by comparing test results with teachers' ratings of persistence were from zero to .33. These correlations are not high; they do not speak in favor of the consistency of persistence across tasks. Also, the correlations between the various tasks themselves were generally low.

Other studies of persistence were also conducted in a manner similar to the Hartshorne et al. (1929) study. An extensive number of persistence tests were investigated, ranging from subjective measures to difficult or insolvable puzzles, as used in the present study, to measures of physical endurance. Most of these studies were poorly designed with other variables such as test context, degree to which the situation was achievement oriented, and whether or not the test was

given individually or as a group test, interacting with persistence. With all these usually uncontrolled factors, it is not surprising that intercorrelations of persistence scores were often low (Feather, 1962).

Factor Analytic Studies

With the increasing use of factor analytic methodology, investigators were better able to isolate some of the factors contributing to the correlations between different tasks of persistence. Crutcher (1934), in an early factorial investigation, tested 83 London school children (age range 7 to 16 years) on persistence tests including manual dexterity, mechanical puzzle solution, addition, artistic ability, and canceling A's (routine activity task). The six tasks were chosen with the intent of minimizing special interests. Persistence was recorded as a function of the time each child persisted on a given task, with a 20-minute limit on each task.

The correlation of scores with intelligence quotients for the group as a whole was +.30. This correlation seemed to indicate that something in addition to intelligence was being measured by the tasks. The results of each task were also correlated with those of every other task in order to find if there was a general factor involved in all tasks. The correlations were all positive, ranging from +.23 to +.71. These correlations suggest that there might be some factor common to all of the tasks. The large range of correlations, however, also suggests that there are other factors not common to but different for each task. Further factor analysis indicated that there were some factors present which were shared by some tasks and not by others. The presence of a group factor could also be working here to have a different influence

on the related specific factors. The author concluded that these results prove neither the presence nor absence of a general factor. However, since the obtained mean and the theoretical probable error are smaller when the correlations which most clearly seem to include group factors are eliminated (e.g., the two mechanical puzzles), the presence of a general factor is indicated. In any case, what is measured is not a simple, unitary quality but a complicated element, or a complication of elements.

An attempt was made to determine what part task interest or preference played in this study. Asking Ss to rate the tasks for preferences revealed some indication that S preferred the task he had worked at the longest. Task preferences, then, as well as other differences in the nature of the tasks, influenced the time spent on the various tasks. These absolute time differences were unaccounted for in the analysis. Performance errors were unaccounted for as well.

One of the more methodologically improved factor analytic studies of persistence was conducted by MacArthur (1955). MacArthur phrased the problem, "To what extent can performance in a battery of persistence measures be explained by common factors independent of abilities; and what is the nature and relative importance of these factors?" (p. 42).

Following preliminary investigation, MacArthur selected a battery of 21 individual and group tests to intercorrelate. The particular tests were chosen because they appeared to measure persistence and because they included the more promising persistence tests reported by other investigators (e.g., Hartshorne et al., 1929). These tests were administered to 120 boys and the influence of ability on persistence was partialled out. The intercorrelations of the 21 tests were factor

analyzed, using Thurstone's complete centroid method, with rotation, and also Burt's group-factor method. This analysis revealed five significant factors, together accounting for 37 per cent of the total variance of the 21-test battery. The factor accounting for the largest portion of both the total and communal variance was interpreted as a general persistence factor.

Eight tests were then selected from this persistence battery on the basis of high communalities, variety, and high loadings on the general persistence factor. These eight tests, called "the pi-battery," were as follows:

P3: Word Building Time No.: an anagrams test

P4: Passalong Test: of practical ability

P6: Japanese Cross: difficult puzzle

P8: Magic Square: numerical puzzle

P14: Maintained Handgrip: physical endurance

P16: Rating, Teacher: on a 5-point scale

P17: Rating, Peers: on a 5-point scale

P20: P-F Study: a picture frustration test

This pi-battery was then factor analyzed. Three significant factors were revealed which accounted for 49 per cent of the total variance of the pi-battery. They were: (1) a general persistence factor accounting for about 58 per cent of the communal variance and about 29 per cent of the total variance of the battery; (2) a bipolar factor contrasting social suggestibility with individuality in situations demanding persistence, accounting for about 22 per cent of the communal and about 11 per cent of the total variance; (3) a bipolar factor contrasting reputation for persistence with objectively measured persistence,

accounting for about 20 per cent of the communal and about 10 per cent of the total variance. The remaining 51 per cent of the total variance was accounted for by specific factors and error.

For each boy, his unweighted T scores for each measure of the test battery were summed. These summed scores, again T-scaled, were called pi-scores, and provided a measure of the general persistence factor for each boy. The results of correlating the general persistence factor loading, as measured by the pi-score for each boy, with other variables, are presented in Table I. All of these correlations, except the correlation with age, are significant at the .05 level. The average correlation between pi-scores and school grades was +.30 with intelligence partialled out. Although the change was not great, the correlation between pi-scores and grades with intelligence partialled out was lower than the correlation with intelligence not partialled out. This would be an expected change, since factors in addition to persistence influence school grades.

TABLE I

SOME CORRELATIONS OF THE PI-SCORE

(r of .180 significant at .05 level)

Age	+.048	Feb. Schl. Mks. with Gen.	
Gen. Intell. Abil.	+.188	Intell. Abil. partialled out	+.273
Feb. Schl. Mks.	+.327	July Schl. Mks, with Gen.	
July Schl. Mks.	+.303	Intell. Abil. partialled out	+.242

The reliability of the pi-score, determined by correlating actual scores on two halves of the pi-battery (of eight tests) and using the Spearman-Brown prophecy formula, was found to be .748; using Spearman's

formula for the correlation of sums and the Spearman-Brown prophecy formula, the coefficient was found to be .795. The reliability coefficient of the pi-battery may therefore be taken as .77 (the average of these two measures), and its index of reliability (the square root of the reliability coefficient) as .88. Having regard for the genesis of the pi-battery, the degree of internal consistency of the battery may be taken as the extent of its validity as a measure of persistence, so the empirical validity may be considered as .77 and its theoretical validity as .88.

These reliability and validity scores are high. They represent a considerable improvement over the early correlational studies as well as the earlier factor analytic studies. Although a split-half reliability coefficient was obtained for the battery as a whole, the reliability of each individual test was not obtained. In fact, MacArthur, like the other authors investigated, failed to mention task reliability at all. Persistence tasks are usually taken from other studies assuming face reliability and face validity. Perhaps because of the nature of the tasks traditionally found to have a loading of a so-called persistence factor, a reliability test is not feasible. At least no investigators have discovered a persistence-task reliability test to date.

The use of teacher and peer ratings as indices of S's persistence may also be questioned in this study. By including these two measures in the pi-battery, MacArthur had included two direct measures of the behavior he was trying to predict from the personality variable; i.e., an observation of the behavior (persistence) is used to predict a function of that behavior (grade point average). In essence a behavior having a given consequence is observed, and a personality trait is

inferred from the correlation between the behavior and consequence. To be a valid index of personality the correlation should be between behavior in different situations. Having two such irregular measures in MacArthur's persistence battery might account for some of his high intercorrelations.

The factor analytic approach is important to the present study in that it is theory oriented; i.e., it makes use of the concept of "trait" with the implication of a stable structure transcending the immediate situation. With the aid of factor analysis, MacArthur discovered several such structures, stable across a number of tests. The most important one was called the general persistence factor. Loading scores of this factor along with those of other factors were used to account for performance differences between individuals in the same situation. These factor-loading scores were also able to account for differences in persistence for the same individual in different situations. Factor analysis, however, is a correlational rather than an experimental technique. It deals more with the analysis of past results than with the prediction of future behavior. Correlations discovered by factor analysis should be validated by experimental techniques.

Studies Involving Measures of Personality

Two types of studies are possible here. One involves the correlation between a measure of personality and one index of persistence. Another involves the personality measure and several indices of persistence (Atkinson and Litwin, 1960; Feather, 1960). Only the latter conforms to the definition of perseveration stated above. Much of the research correlating different persistence measures with an index of

personality have used the personality indices of expectancy of success or reward and the "need for achievement" (McClelland et al., 1953). Reward expectancy and motivation to achieve may also be viewed as situational variables when appropriate. Situational determinants of extinction (Humphreys, 1939; Lewis and Duncan, 1958) are likewise not personality determinants. These variables are of interest here, however, in that a person's past history of expectations about rewards determines the usual degree to which he is willing to persist. Both developed personality and the given situation jointly determine behavior.

Extinction Studies

Extinction phenomena may be used as one index of persistence for purposes of correlation with other indices. One such index used in this study is yielded by one of several situations employed by Gladstone (1966a, 1966b, 1968).

The procedure used in the Gladstone studies employed a Scientific Prototype Rat Pellet Dispenser which dispensed BB's which were turned in for rewards. Using this procedure it was found that the number of extinction responses by college Ss varied considerably. The penalty for responding reduces the number of extinction responses but leaves a significant variance. Gladstone (1968) suggests that the variation might be a function of differences in personality.

Over-Achievement and Persistence

It seems reasonable to suppose that, if intelligence is kept constant, those who persist longer will achieve higher grades. The problem is two-fold. First, can persistence-like personality indices predict

over achievement? Second, is over-achievement as an empirical index of persistence correlated with other empirical indices of persistence?

A look at school achievement demonstrates the variance from expected performance due to factors other than skill. Cattell (1966) reports that the correlation typically found between an intelligence test and achievement is around .5. Or looked at another way, if we could instantly eliminate differences due to intelligence--or take many different people with all about the same intelligence level--the variance in school performance would still be about 75 per cent of what it now is. The presence of unaccounted for variables in predicting the outcome in an academic situation is evident.

It is worth noting that a positive correlation is generally found between the results on persistence tests and intelligence test scores. For example, the Hartshorne et al. (1929) study discussed earlier found a low positive correlation between their obtained persistence scores and intelligence. The Crutcher (1934) study, with an index of reliability of nearly .90, obtained a correlation of .30 between persistence and intelligence. MacArthur (1955) also found a significant correlation between intelligence and persistence (see Table I).

Achievement Motivation Studies

Several studies of persistence have been carried out utilizing the theory of achievement motivation (Atkinson and Litwin, 1960; Feather, 1960). Several more studies of persistence preceded the theory but were still concerned with the development of a valid measure of the achievement motive (French and Thomas, 1958; McClelland, Atkinson, Clark, and Lowell, 1953). The so-called "tendency to achieve" has been

theorized as a function of personal motives, expectations, and incentive values. These variables combine multiplicatively to produce the tendency to persist in that given situation. The strength of this tendency appears to be "jointly determined by the personality disposition (achievement motive) and by immediate environmental influences" (Atkinson, 1964, p. 231). (See Atkinson and Litwin, 1960; Feather, 1960, 1961; Lowell, 1952.)

It has been mentioned that situational determinants of persistence are not personality determinants. However, these two classes of variables are most commonly seen in interaction. In concentrating upon this interaction, McClelland, Atkinson, and other need-achievement theorists are not studying personality in the traditional sense. These researchers are not interested in observing the consistency of performance across a variety of tasks. They are interested in the situational interaction of variables for specified groups of personality types.

Very few studies were found in the achievement motivation literature which measured persistence in more than one situation (Atkinson and Litwin, 1960). A variety of tasks, however, was used in different studies as indices of persistence, i.e., academic performance (as in the time spent taking a final exam), a ring-toss game, puzzles, gambling, and a Decision-Making Test. Persistence behavior on these tasks was always assumed to be the product of personality, as measured by projective techniques, and situational variables. Persistence due to personality alone was not of interest in these studies and its influence would be difficult to determine.

Some of the situational variables considered in the net tendency to achieve are anxiety (Atkinson and Litwin, 1960), fear of failure

(Atkinson, 1964), and risk-taking behavior. These variables have been experimentally controlled, showing various behavioral outcomes depending on the personality type placed in the given situation. In considering persistence as a result of these factors, McClelland and Atkinson have achieved some degree of success in predicting academic achievement but the results are still not clear.

> We have obtained a highly significant correlation between nAch scores and college grades on two occasions and an insignificant correlation on another occasion. The problem obviously needs further exploration (McClelland, 1965, p. 151).

The continued investigation of persistence in an attempt to predict academic success has not yet produced a consistently accurate method.

Summary

Perseveration is being investigated in the present study to determine whether or not it exists as a personality trait. This trait is assumed to exist if Ss persist in one way or another across a variety of problems.

Persistence as a personality trait has been studied for many years. The experimental proof of its existence, however, is not at all clear. Early correlational studies found either low or insignificant correlations among performance scores for their Ss (Hartshorne et al., 1929). Factor analytic studies, although a methodological improvement over earlier studies, were not conclusive in finding a general persistence factor (Crutcher, 1934). MacArthur (1955) was one investigator able to clearly identify a persistence factor, which also correlated significantly with school grades, but his persistence tasks are question-

able as valid indices of persistence.

The evidence supporting persistence as a trait which can be identified under a variety of conditions is not strong. Therefore, the expectation that a given S will persist in a consistent manner across several problems is also not strongly supported.

Several researchers have recently emphasized the importance of situational rather than personality variables in determining behavior (Cattell, 1966; McClelland et al., 1953; Mischel, 1969). Perhaps this approach will prove more useful in predicting behavior than have the traditional investigations of personality factors.

CHAPTER II

METHODOLOGY

Indices of Persistence

Persistence in this study is operationally defined by either (1) the failure to extinguish a given response, or (2) the failure to choose an available alternative response. In this light, responses to four laboratory tasks and academic over-achievement were used as indices of persistence.

Task 1: Scrambled Letter Task

Ss were given 10 minutes to make words out of as many flash cards with a jumble of letters on them as they could. However, after the first three presentations of jumbled words, no more jumble of letters made words. This eliminated the possibility of a correct response after the first three presentations. Ss earned 10¢ for each word they unscrambled but lost 2¢ for each new card they attempted at their own discretion. Ss were given scratch paper and a pencil to do any figuring they desired, but their responses were given orally. Thus after 10 minutes of frustrating failure, Ss were paid for the three words they probably got correct (30¢) minus the number of cards they attempted to solve (at 2¢ each) within the time limit.

The index of persistence was the number of cards used in 10 minutes, a small number indicating more task persistence than a large number

of cards.

Task 2: Writing K's and F's

Ss were given 5 minutes to print on an 8½ X 11 inch piece of notebook paper as many capital K's and capital F's as they could. Specific directions were given concerning the neatness and pattern of printing in columns on the paper, but Ss were told that the order of making the letters was not important. In fact, they could use only one of the letters if they desired, or they could switch off K's and F's as often as they liked. The pay was 5¢ per 100 letters.

Two indices of persistence were taken from this task: (a) the number of letter switches made during the first 200 letters, and (b) the longest run of making one single letter during the first 200 letters. These measures should be inversely related, although not perfectly.

Task 3: Hidden Objects Task

Ss were presented with a series of pictures, one at a time, in the same manner in which they were presented with the flash cards in Task 1. These pictures were taken from Highlights Magazine for children (1965-1970) from a game by John Gee called "Hidden Pictures." The game is geared for children but is also suggested as entertainment for the entire family as an exercise for developing perceptual skills, visual judgment, and imagination. Every picture contains numerous hidden objects such as a spoon or broom. The task here, however, was to locate just the one object labeled at the bottom of each picture. As in Task 1, only the first three presentations were solvable, since the labels after the first three pictures had been changed, i.e., Ss were instructed to

hunt for objects not in the pictures. Ss therefore encountered 10 minutes of frustration with the constant option of being able to switch to a new picture any time they "gave up" on the one they were attempting. However, as in Task 1, each new attempt cost S 2¢ and he received 10¢ for each correct identification. Ss therefore received 30¢ if they were able to locate the first three hidden objects minus 2¢ for every picture they attempted.

The index of persistence was the absolute number of pictures used, a large number within the 10 minutes indicating poor task persistence.

Task 4: BB Apparatus Task

The BB apparatus was the same as that used by Gladstone (1966, 1968). Although the equipment was a complicated wiring of relay circuits, the only parts visible to S were a cardboard front covering the apparatus, a counter which S viewed to keep track of his number of responses made, a light switch with which S made his responses, and a Rat Pellet Dispenser which dispensed the BB's to be traded in for money. As S made his responses, the apparatus made various loud clicking noises, somewhat approximating a game like "pinball" or a slot machine. The Pellet Dispenser was also covered with a cardboard top to prevent S from knowing when all the BB's were gone. Thus, it was a game of risk.

Ten BB's dropped into a dish visible to S on a variable ratio schedule. At the end of these 10 BB's no more would appear, regardless of how many times S flicked the light switch. However, S was instructed that he could play the game or stop whenever he wished, earning 10¢ for each BB he could get out of the machine minus 1¢ for each response made

on the light switch.

The index of persistence was the total number of responses made before S said "I quit," a large number of responses indicating a high degree of persistence.

Due to some idiosyncracy of the equipment, a few times without warning only 6 BB's instead of the 10 were emitted, even though they still came at the correct variable schedule. The data from these Ss were not used.

Over-Achievement

Over-achievement refers to a measured academic performance above the average level expected for S's level of ability. Although the actual measures range from low under-achievement to high over-achievement, only the term "over-achievement" is used to designate the index.

The index of over-achievement was derived by predicting S's grade point average (GPA) as a function of ACT scores alone. Using the GPA and ACT scores of all 180 experimental Ss, a regression equation was generated from the data. GPA was the dependent variable. A predicted GPA was then obtained for each S by using his ACT score to solve the obtained regression equation. This predicted GPA was subtracted from the actual GPA for each S to obtain a deviation score (coded "DEV"). Positive deviation scores designated over-achievement and negative deviations under-achievement.

The assumption behind this index is that persistence will result in a higher grade point average with ability held constant.

The indices of persistence are coded as follows:

WRDS: Task 1 --- the number of cards used in 10 minutes

CHGS: Task 2a--- the number of letter switches made during the first 200 letters

RUNS: Task 2b--- the longest run of a single letter during the first 200 letters

PICS: Task 3 --- the number of pictures used in 10 minutes

BOBS: Task 4 --- the number of total responses made on the switch

DEVS: The index of over-achievement

Description of Tasks

The tasks used are best understood by reading the instructions given to the Ss (see Procedure). They are all performance tasks with some but not great interest value. All tasks also involved the possibility of earning a small amount of money. Hypothesizing that greater control over extinction behavior (lack of perseveration) could be exercised by manipulating motivation in addition to cues (Gladstone, 1966a), money was also taken away from Ss for each response they made. Task 1 and Task 3 were perhaps the most challenging because of their frustrating impossibility after the first three presentations. Task 1 is also assumed to be the most intellectually difficult task, since unscrambling letters involved more thinking, in the usual sense, than, say, writing K's and F's or looking for hidden objects. Motivation for reward was kept at a minimum on all tasks, for although Ss might win money by performing well, the amount was very small.

Since Tasks 1 and 3 are both puzzle-like frustrating tasks, they should yield the most comparable measures of persistence. It is assumed that high perseverators will use fewer cards. Task 2 is more similar to Task 4: both are fairly low in difficulty, perhaps less intriguing

than the games, but both Tasks 2 and 4 still involve the possibility of earning money. Over-achievement appears to be the least similar index of persistence.

Fatigue is assumed to influence the pattern of writing K's and F's for five minutes for a given S. Therefore, only the first 200 letters were used to measure the number of switches made by each S.

While different factors are involved in the tasks, they all have face validity as indices of persistence. If the hypothesis is correct that a personality trait of perseveration consistently influences S's behavior, then S should maintain his rank in the various arrays of persistence scores despite differences in motivation, difficulty, or interest. This is not denying the effect on behavior of such variables as motivation; it is merely saying perseveration as a personality trait will be important enough to have a significant influence on performance.

Experimental Design

In order to keep S from realizing that persistence was of interest rather than task achievement, each S was given only two of the four possible tasks. This realization would have been especially easy in one experimental condition, since on both tasks S was given, he could only reach a maximum of three correct responses, the rest of his trials being unsolvable problems.

The 180 Ss were assigned randomly to one of six different experimental groups devised by taking all possible combinations of four tasks two at a time. For purposes of assigning Ss to groups, these six groups were then also split in half to consider the order variable of administering the tasks. Since each of the six groups had 30 Ss, each

two variable-order combination treatment had 15 Ss. Considering order as a variable, there were actually 12 groups of different experimental conditions (See S Group Assignments: Appendix B).

The hypothesis is that each index of persistence will correlate positively with each other index. These persistence indices have already been operationally defined as the scores received on the tasks described above in addition to the index of over-achievement.

Subjects

One hundred eighty male and female students of Oklahoma State University were taken from the introductory psychology classes and from one of the campus sororities. All Ss volunteered, the majority for extra credit class points. All Ss knew ahead of time that 30 minutes of their time would be required but that they would probably win a small amount of money. All Ss were registered in the college of Arts and Sciences, since this study wished to make the Ss' grade point averages as comparable as possible. Since most Arts and Sciences majors have quite similar courses their first year, their freshman year GPA was used as the achievement measure to compare with their ACT scores. Ss were never aware, however, that this GPA and ACT information was obtained. All Ss were tested in May, 1970.

Experimental Setting

Upon volunteering for the experiment, all Ss were informed that this was a psychological learning experiment which would involve their performance on a couple of "puzzle-like" problems. They were also informed that the problems had no relationship to their intelligence but

it is suspected that they felt that these problems would still reveal their ability somewhat, because they were to work a "puzzle." While S was told his solutions were of interest, persistence was recorded.

All Ss reported to a drab, office-like room in a school building. In this room E sat at a larger desk while S sat in a smaller student desk facing E. Of the four possible tasks to which each S could be assigned, three of them were paper-and-pencil type, timed tasks. The other possible task involved S's sitting in front of the BB apparatus. Task 4 was described to S as working "something like a slot machine" to make it appear more familiar to him. All Ss were timed and were aware of E's stopwatch for all task performances except the "slot-machine task," which had no time limit.

Experimenters

Because each S was tested individually, taking 30 minutes each (n = 180), E found it necessary to use an assistant. Both Es were female, the assistant being an undergraduate senior psychology student.

Procedure

Ss were assigned numbers 1 to 180 in order as they arrived to participate in the experiment. This number for each S was used to determine to which experimental treatment group he would be assigned. Ss were then administered the tests individually, the specific two tasks and order of administration depending upon their grouping. Before being administered the two tasks, Ss completed a personal data sheet with their full name, major, age, and sex. It was from these data sheets that the records were located to learn S's ACT and freshman GPA.

The directions specific to each task best explain the experimental procedure.

Task 1

Ss assigned to Task 1 were instructed as follows:

> This is a puzzle with a 10-minute time limit. You will be given a series of cards. Each card will have a common English word on it. However, the letters of the word will be in a scrambled order. Your task is to make a word out of the scrambled letters. I will give you one card at a time to try to solve. I will give you 10¢ for every card you solve correctly, but I will take away 2¢ for every card you use. So you can make money solving cards (10¢ for each card), but you will lose money by taking each card (2¢). So if you take too many cards you might lose everything you win. But if you lose more than you win we won't make you pay us.
>
> When you solve a card give that one back and I'll give you another. However, if I give you a word you think you cannot solve or that seems too hard, you may trade it in for another one. Here's some paper to figure on.
>
> Do you understand? You have 10 minutes and at the end we'll quit. If you have any questions don't hesitate to ask.
>
> Here's the first one. It's an easy one just to show you how it goes. (Give S card.) You now have 8¢. Here's the next one. It's a little harder. (Give S card.) O.K. Here's the next one. This is harder and from now on they will all be about this same difficulty.

Flash cards were used, each containing one printed jumble of letters. The S was given one card at a time to solve. The first three cards were the only ones forming actual English words, the rest being impossible to solve. As stated in the directions the first three cards (the actual English words) progressed in difficulty. The 10-minute time limit was started with the presentation of the first card, as was scoring. When S indicated he was ready to give up and try the next word, he was given the next card. Ss were not permitted to go back and reconsider any of the cards already attempted. All Ss received the same cards in the following order:

	LETTERS	ANSWER
(1)	ENP	PEN
(2)	TOCA	COAT
(3)	WAWUS	SQUAW
(4)	CRAMPH	impossible
(5)	PRIVE	impossible
(6)	MULTER	impossible
(7)	RUKIAN	impossible
(8)	PORIA	impossible
(9)	KYROP	impossible
(10)	URRYP	impossible
(11)	KOAWO	impossible

Task 2

Ss were instructed as follows:

> I want to see how many total letters you can make in five minutes. Use only the printed capital letters K and F. Make them like this (demonstrate strokes). You must completely finish making one letter before starting the next letter. Hold your paper in this position (show notebook paper in the usual writing position), and make your letters in columns going down the page. Write one letter on each line. You may write the K's and F's in any order you wish. Just write as many K's and F's as you can in the five minutes. I will pay you 5¢ for every 100 letters you make.
>
> Do you have any questions?

Each S was given a piece of 8½ X 11 inch standard notebook paper and a pencil. Each S was given the instructions, questions were answered, and the Ss were timed with a stopwatch for five minutes.

Task 3

Ss assigned to the hidden pictures task were instructed as follows:

> This is a game with a 10-minute time limit. You will be given a series of pictures. Every picture contains many hidden objects. However, your task is to find only the object written across the bottom of each picture. I will give you one picture at a time to try to solve. I will give you 10¢ for every picture problem you solve correctly, but I will take 2¢ away for every picture you use. So you can make money for identifying the correct object (10¢ for each picture), but you will lose money (2¢) by taking each picture. So if you take too many pictures you might lose everything you win. But if you lose more than you win we won't make you pay.
>
> When you find the object asked for in each picture, give that one back and I'll give you another. However, if I give you a picture you think you cannot solve or that seems too hard, you may trade it in for another one.
>
> Do you understand? You have 10 minutes and at the end we'll quit. If you have any questions don't hesitate to ask.
>
> Here's the first one. It's an easy one to show you how it goes. (Give S picture.) You now have 8¢. Here's the next one. It's a little harder. (Give S picture.) O.K. Here's the next one. This is harder and from now on they will all be about this same difficulty.

Each 8½ X 11 inch Xeroxed picture was covered with a hard, transparent plastic folder. The object to be identified was written at the bottom of each picture. However, only the first three pictures actually contained the object listed to the S as hidden in the picture; the remaining pictures were all impossible tasks. The S was given one picture at a time to solve. As stated in the directions, the first three pictures, the solvable problems, progressed in difficulty. If by chance S had a good imagination and thought he found the hidden object in one of the impossible problems, S was told, "No, there's a better one." The 10-minute time limit was started with the presentation of the first picture, as was scoring. When S indicated he was ready to give up and try the next picture, he was given the next problem. All Ss were given the pictures in the same order and were told to find the following objects:

PICTURE	HIDDEN OBJECT
1	MAN (solvable)
2	SPOON (solvable)
3	BOTTLE (solvable)
4	CLOTHESPIN (impossible)
5	BELL (impossible, etc.)
6	SAFETY PIN
7	SHOE
8	HAMMER
9	ENVELOPE
10	HUNTING KNIFE
11	BROOM
12	MAGNET
13	MERMAID
14	COMB
15	DUST PAN
16	BONE
17	BIRD
18	STRAWBERRY
19	CUP
20	TULIP

Task 4

The Ss assigned to the BB apparatus were instructed as follows:

> Your task in this experiment will be to operate this machine. Here is how it works. Flick this switch on and off several times and a BB will drop into this tray, like this (E demonstrates by flicking the switch until the first BB drops). Later you will be given 10¢ for every BB you have but you will lose 1¢ for every time you flick the switch on and off. You may look at this counter to check how many times you have flicked the switch. You now have one BB worth 10¢ and the switch has operated five times so we take 5¢ away and you have a net profit of 5¢. Do you understand? All right, now you can go ahead. Tell me when you are done.
>
> (Answer any questions, like "How long do I have?" by repeating the directions or saying "That is entirely up to you.")

S sat at a desk in front of a cardboard box, leaving the response counter, rat feeder with BB's, and the light switch for responding visible to S.

The following variable ratio reinforcement schedule (number of responses necessary to obtain one BB) was used for all Ss:

5 - 3 - 6 - 3 - 8 - 4 - 3 - 6 - 7 - 3 --- no more

It was possible, then, for each S to obtain 10 BB's; however, some Ss stopped before they had obtained all 10.

After being given their two experimental tasks, Ss were paid according to their earnings and dismissed. The data were then recorded under the appropriate experimental group (see Appendix A for the raw data obtained). Since the majority of Ss were freshmen at the time of the experiment, it was necessary to wait until the freshman year was completed and recorded before analyzing the data.

CHAPTER III

RESULTS

Statistics Used

The index of over-achievement (coded DEV) was derived for each S using a computerized regression equation program. The origin of these scores has already been discussed (see Appendix A for raw scores).

Correlations were found using computerized Pearsonian correlation programs (see Appendix C for equations). These correlations were used to measure the consistency between indices of persistence for each S. Each S had taken two of the tasks, whose scores contributed to the correlation between these particular tasks. Considering all possible task combinations and task administration order, Ss were divided into twelve groups as shown in Appendix B. All possible task scores within each group were correlated. This gave 15 Ss for each correlation (see Table V).

Average correlations were calculated for each two identical treatment groups of Ss (Garrett, 1954, pp. 147-151). The only difference between each pair of groups averaged was the order of task administration. The r between tasks for each group was converted to a Fisher's Z-score; the Z-scores were averaged and converted back into an r. This process enabled finding a correlation for each two-task combination with the effect or order controlled.

Correlations between tasks were computed again, disregarding the

order of task administration (see Table VI), since order had been randomized. This raised the number of Ss in each correlation from 15 to 30. It also lowered the number of experimental treatment groups from 12 to 6, since identical treatment groups had been combined. The purpose of combining these groups was to strengthen the validity of the correlations between tasks by increasing the number of Ss in each correlation.

A nonparametric sign test was conducted to see whether order of task administration significantly affected the correlations between tasks (Conover, 1971, pp. 121-126). A difference score was obtained for each task by subtracting the mean score when administered second from the mean score when administered first. Testing to see whether scores of tasks given second consistently rose or declined, the null hypothesis was that the median difference between the pairs was zero. The symmetrical binomial $(\frac{1}{2} + \frac{1}{2})^N$ was used to obtain the probabilities required for significance. The specific task combination-order interactions were not analyzed.

The Pearsonian correlation program was again used to compute the correlations between each of the five task measures and over-achievement, the sixth index of persistence (see Table VII). All Ss who took each task (not necessarily with the same other task) were used for each correlation. This gave 90 Ss for each correlation between a task measure and over-achievement.

Consideration was given to the possibility of predicting GPA, knowing S's scores on the persistence tasks used in this study. A regression equation was obtained to predict GPA for each S, knowing his task scores. A multiple regression program was used for these calcula-

tions, forming a prediction equation for each two-task combination of Ss, grouped as in Table VI. The task measures appropriate to each group were the independent variables, GPA being the dependent variable. Of interest are the beta coefficients generated from each equation, indicating the weighted contribution of each task variable to the GPA prediction equation (see Table VIII and Appendix C). T values were also obtained to indicate the significance of these contributing task variables. The significance of the T values would also indicate which tasks were the most reliable in predicting GPA. A multiple correlation coefficient was also obtained for each two-task combination, showing the joint correlation between all task measures of a given treatment group and GPA. Higher correlations were interpreted as better task combinations for predicting GPA.

Statistical Significance

The correlations between task measures, with n = 15 for each group, did not yield many significant correlations (see Table V). Ss did not persist consistently on the experimental tasks as expected. The only significant correlation between two different tasks at the .05 level was between Tasks 1 and 3. These tasks were discussed earlier as being the most similar, and it was expected that their correlation would be higher than between other task combinations. As expected, there was also a consistently high significant negative correlation between CHGS and RUNS, the two criteria used for Task 2, but these two criteria are not independent. The correlations between other tasks were not statistically significant. The task yielding the most inconsistent results between groups and also yielding quite low correlations with the other

tasks was Task 4 (BOBS).

Although the significance of task administration order for specific task combinations was not tested, order seemed to influence the scores on Task 4 more than the other three tasks. The test for the general effect of task administration order yielded an insignificant finding.

The two treatment groups given the Task 2 - Task 4 combination showed the greatest differences between groups in means and standard deviations (see Tables II and III). Perhaps this could indicate the involvement of more uncontrolled variables having an effect upon these two performances than on the other two tasks. Tasks 1 and 3, on the other hand, yielded quite consistent means and standard deviations between the two experimental groups given these tasks. Tasks 1 and 3 have been discussed as being the most similar on such dimensions as type of task and incentive value.

An average correlation was computed for each two-task combination (Garrett, 1954, pp. 147-151). Considering both sign and size and using an n of 30, only one r was significant (Table V), again the r between WRDS and PICS discussed above.

When each of the two identical treatment groups were combined, disregarding task order, the general trend was for the correlations to be lowered (see Table VI). Examination of the means and standard deviations of task scores from the combined groups shows that these lowered correlations were not due to an increased variability in scores. With an insignificant order effect, these correlations using 30 Ss might be regarded as a more reliable measure of the correlation between two tasks than using only 15 Ss in each correlation. With this greater number of Ss, the correlations seem to wash out. This could be due to a common

statistical phenomenon: graphically, when two separate correlation clusters without comparable raw scores are combined, the general effect is a gross lowering of the correlation. Perhaps personality in this study has an effect but is masked by changing order and wiped out by switching from one class of tasks to another (e.g., cognitive to non-cognitive); i.e., the effect of persistence is overwhelmed by situational effects using this statistical technique. This influence is supported by the fact that the average yielded by correlations with task order controlled were higher than the combined-group correlations with order uncontrolled (Tables V and VI).

Table VII shows the correlations between each task measure, using all Ss for a given task (n = 90), the the over-achievement index. All five task measures correlated insignificantly with DEV, the over-achievement index. This finding further refutes the hypothesis of this study. A significant correlation does not exist between any two of the six indices of persistence.

The beta coefficients of the task variables contributing to a multiple regression equation for the prediction of GPA are given in Table VIII. T values show that all beta coefficients due to task variables are insignificant. The weighted task measures do not add significantly to the prediction equation of GPA. This conclusion holds for all two-task combinations.

Multiple correlation coefficients between each two-task combination and GPA are generally insignificant. The combination Task 1 - Task 2 was the only one significantly correlating with GPA. The results do not speak in favor of the two persistence task combinations jointly correlating with GPA.

TABLE II

MEAN SCORES AND STANDARD DEVIATIONS
FOR EXPERIMENTAL GROUPS

GROUP NUMBER*	TASK	ADMINISTRATION ORDER	CRITERION CODE	MEAN SCORE	STANDARD DEVIATION
1	1	1st	WRDS	9.2667	2.9633
7	1	2nd	WRDS	8.4000	4.1369
1	2	2nd	CHGS	51.8667	70.9435
7	2	1st	CHGS	27.4000	53.0603
1	2	2nd	RUNS	72.8000	72.5123
7	2	1st	RUNS	74.7333	64.0909
2	1	1st	WRDS	10.1333	4.6884
8	1	2nd	WRDS	7.4000	1.8048
2	3	2nd	PICS	6.5333	1.1255
8	3	1st	PICS	7.6000	1.4541
3	1	1st	WRDS	9.5333	3.9355
9	1	2nd	WRDS	9.6667	3.3726
3	4	2nd	BOBS	87.8667	95.9329
9	4	1st	BOBS	117.8667	85.7029
4	2	1st	CHGS	23.2667	50.1177
10	2	2nd	CHGS	39.4000	61.8544
4	2	1st	RUNS	81.4667	74.2831
10	2	2nd	RUNS	96.5333	76.1463
4	3	2nd	PICS	8.1333	2.5033
10	3	1st	PICS	7.8667	2.1336
5	2	1st	CHGS	42.0667	62.8223
11	2	2nd	CHGS	20.6667	49.9767
5	2	1st	RUNS	66.2000	72.1043
11	2	2nd	RUNS	66.3333	57.4527
5	4	2nd	BOBS	270.7332	343.9985
11	4	1st	BOBS	157.8000	148.5848
6	3	1st	PICS	7.0000	1.3628
12	3	2nd	PICS	7.8000	2.3664
6	4	2nd	BOBS	203.0667	369.7991
12	4	1st	BOBS	181.8667	248.7448

*N = 15 in each group.

TABLE III

MEAN SCORES AND STANDARD DEVIATIONS FOR EXPERIMENTAL GROUPS
(IDENTICAL TREATMENT GROUPS COMBINED)

GROUP NUMBERS*	TASK	CRITERION CODE	MEAN SCORE	STANDARD DEVIATION
1 & 7	1	WRDS	8.833	3.5631
1 & 7	2	CHGS	39.6333	62.7988
1 & 7	2	RUNS	73.7667	67.2482
2 & 8	1	WRDS	8.7667	3.7571
2 & 8	3	PICS	7.0667	1.3880
3 & 9	1	WRDS	9.6000	3.7571
3 & 9	4	BOBS	102.8667	90.6725
4 & 10	2	CHGS	31.3333	55.9188
4 & 10	2	RUNS	89.0000	74.3083
4 & 10	3	PICS	8.0000	2.2894
5 & 11	2	CHGS	31.3667	56.8285
5 & 11	2	RUNS	66.2667	64.0576
5 & 11	4	BOBS	214.2667	266.6152
6 & 12	3	PICS	7.4000	1.9405
6 & 12	4	BOBS	192.4667	309.8457

*N = 30 in each two-group combination.

TABLE IV

MEAN SCORES AND STANDARD DEVIATIONS
FOR EACH TASK

TASK CODE*		MEAN	STANDARD DEVIATION
WRDS:		9.0667	3.6189
	GPA	2.7200	0.6992
	ACT	22.0444	4.3497
	DEV	0.0000	0.5896
CHGS:		34.1111	58.0657
RUNS:		76.3444	68.5587
	GPA	2.7444	0.6965
	ACT	21.7556	4.1982
	DEV	0.0000	0.5923
PICS:		7.4889	1.9270
	GPA	2.7470	0.7027
	ACT	21.6333	4.5874
	DEV	0.0000	0.5204
BOBS:		169.8667	243.8713
	GPA	2.6773	0.7274
	ACT	22.1444	4.0629
	DEV	0.0000	0.6410

*N = 90 for each task.

TABLE V

TASK CORRELATIONS

TASKS CORRELATED IN ORDER GIVEN	GROUP	SIGN OF r EXPECTED	CORRELATION COEFFICIENT (r)	AVERAGE CORRELATION
WRDS : CHGS	1	+	0.30122	
				-.022
CHGS : WRDS	7	+	-0.33985	
WRDS : RUNS	1	-	-0.50668	
				-.273
RUNS : WRDS	7	-	0.01148	
CHGS : RUNS	1	-	-0.65296*	

CHGS : RUNS	7	-	-0.50367	
WRDS : PICS	2	+	0.55411*	
				+.558**
PICS : WRDS	8	+	0.55527*	
WRDS : BOBS	3	-	-0.00226	
				+.050
BOBS : WRDS	9	-	0.90767	
CHGS : RUNS	4	-	-0.42935	

CHGS : RUNS	10	-	-0.61458*	
CHGS : PICS	4	+	-0.23373	
				-.226
PICS : CHGS	10	+	-0.23121	
RUNS : PICS	4	-	0.34688	
				+.076
PICS : RUNS	10	-	-0.21232	
CHGS : RUNS	5	-	-0.52304*	

CHGS : RUNS	11	-	-0.39480	
CHGS : BOBS	5	-	-0.25048	
				-.260
BOBS : CHGS	11	-	-0.26552	
RUNS : BOBS	5	+	0.34928	
				+.197
BOBS : RUNS	11	+	0.04026	

TABLE V (CONTINUED)

TASKS CORRELATED IN ORDER GIVEN	GROUP	SIGN OF r EXPECTED	CORRELATION COEFFICIENT (r)	AVERAGE CORRELATION
PICS : BOBS	6	-	0.30959	+.126
BOBS : PICS	12	-	-0.06715	

*p < .05 (r of .514 significant at .05 level, n = 15).

**p < .05 (r of .361 significant at .05 level, n = 30).

TABLE VI

TASK CORRELATIONS (IDENTICAL TREATMENT GROUPS COMBINED)

TASKS CORRELATED*	GROUPS	SIGN OF r EXPECTED	CORRELATION COEFFICIENT (r)
WRDS : CHGS	1 & 7	+	0.00018
WRDS : RUNS	1 & 7	-	-0.21503
CHGS : RUNS	1 & 7	-	-0.58268**
WRDS : PICS	2 & 8	+	0.26097
WRDS : BOBS	3 & 9	-	0.04371
CHGS : RUNS	4 & 10	-	-0.50688**
CHGS : PICS	4 & 10	+	-0.23434
RUNS : PICS	4 & 10	-	0.07905
CHGS : RUNS	5 & 11	-	-0.46473**
CHGS : BOBS	5 & 11	-	-0.19404
RUNS : BOBS	5 & 11	+	0.25437
PICS : BOBS	6 & 12	-	0.02027

*N = 15.

**$p < .05$ (r of .361 significant at .05 level).

TABLE VII

CORRELATIONS BETWEEN TASK SCORES AND OVER-ACHIEVEMENT*

(r of .207 significant at .05 level)

TASK NUMBER	CRITERION CODE	CORRELATION w/ OVER-ACHIEVEMENT SCORE (DEV)
1	WRDS	0.07727
2	CHGS	-0.10833
2	RUNS	-0.03133
3	PICS	0.03802
4	BOBS	0.08139

*Correlations consider all possible Ss who took each task (n = 90 for each task).

TABLE VIII

PREDICTION OF GPA FROM PERSISTENCE TASKS

TASK GROUPS*	CRITERION CODE	T VALUE	BETA COEFFICIENTS	MULTIPLE CORRELATION**
1 & 7	WRDS	1.04123	0.18758	
	CHGS	-1.11559	-0.24151	0.46391***
	RUNS	1.18486	0.26265	
2 & 8	WRDS	-1.52498	-0.28313	0.36425
	PICS	-0.89888	-0.16689	
3 & 9	WRDS	1.01249	0.19110	0.20001
	BOBS	-0.36015	-0.36015	
4 & 10	CHGS	-0.04524	-0.01051	
	RUNS	0.38153	0.08641	0.10582
	PICS	-0.30913	-0.06208	
5 & 11	CHGS	-1.48674	-0.31373	
	RUNS	-1.11436	-0.23853	0.31532
	BOBS	0.60399	0.11669	
6 & 12	PICS	1.06100	0.19918	0.22103
	BOBS	0.48942	0.09188	

*N = 30 in each two-group combination

**The multiple correlation is between relevant task scores and GPA.

***$p < .05$ (r of .374 significant at .05 level with four variables; r of .367 significant at .05 level with three variables).

CHAPTER IV

DISCUSSION

Conclusions

> It is now generally assumed that it is not possible to 'measure,' in any exact sense, the enduring inclination of a person to engage wholeheartedly in a prospective enterprise, the dependable strength, in other words, of his need for a specific kind of achievement. This variable comprises, in different proportions, such things as the enjoyment of the activity for its own sake, interest in the content or subject matter, desire to perfect the required skills, ambition to complete each undertaking as well as possible, with self-respect dependent on these completions, zest for competition, and the hope for recognition and prestige (Stern, 1956, p. 10).

Stern's comments point out that behavior in a specific situation is the result of a whole host of variables and conditions. The experimental isolation of all these variables would certainly not be possible. This study, however, was designed to measure persistence as one such variable contributing to the prediction of future behavior. A consistency of persistence behavior was not found to hold across experimental tasks. Therefore, evidence of a personality trait of perseveration cannot be inferred. This result was the same on all analyses conducted, whether or not order of task administration was considered and whether the number of Ss for each analysis was 15 or 30.

Several different persistence measures were used in this study for two reasons: First, several different kinds of tasks were needed to measure the consistency of performance for each S across the various tasks. The second reason was an empirical one of attempting to find at

least one good test of perseveration to use in future prediction situations. However, the use of different kinds of tasks apparently brought in situational variables which overshadowed the importance of a perseveration trait.

Persistence as a Situational Variable

The results of this study support the view that persistence varies with the situation. Situational, cognitive variables (e.g., cues as to the availability of rewards, belief about control of the situation, expectancies), have often been studied with more predictable success than have personality dispositions (Mischel, 1969), such as perseveration. Mischel's recent article concerning the important influence of situational variables on behavior, expands upon this view. He states that "noncognitive global personality dispositions are much less global than traditional psychodynamic and trait positions have assumed them to be" (p. 1014).

> The degree and subtlety of discrimination shown in human behavior, however, is at least as impressive as is the variety and extensiveness of stimulus generalization. What people do in any situation may be altered radically even by seemingly minor variations in prior experiences or slight modifications in stimulus attributes or in the specific characteristics of the evoking situation (p. 1016).

The cues given in this experiment to inform Ss about the availability of reward could have been one of the important situational influences. Tasks 1 and 3, for example, yielded a significant consistency for Ss across these two tasks when order of task administration was also controlled. The fact that this effect was washed out when the two groups given these two tasks were combined may point to the importance of the task order in giving Ss clues concerning the learning situation.

Since Ss could not possible succeed after the first three trials of both Tasks 1 and 3, it is suspected that performance may have been affected by S's perceiving that this was the situation. In this case various idiosyncratic patterns may have developed such as not perseverating, since the Ss were aware that no more rewards would be coming. This may have been especially true with brighter Ss who may be perseverators in an academic situation, but who caught on more rapidly to the nature of this task. These brighter Ss who may or may not have caught on, may also not have perseverated as they would have in an academic situation, since they did not enjoy failing. Self-expectancy of success on such an apparently easy task may have made Ss anxious to hurry on to the next trial, where they felt surely they would succeed.

The inconsistency between task performances for each S in general could also be explained by the differences in cues available during extinction for the different tasks. Gladstone (1966a) showed support for the influence of one such cue variable; i.e., that the perception by the S that no more rewards are coming will cause S to stop responding. This would be especially relevant to Task 4, using the same BB apparatus upon which Gladstone based his conclusion. Task 4 was the task in this experiment most obviously dealing with reinforcement, where Ss could more easily have perceived that no more rewards were coming. If given Task 4 first, Ss could have been more aware of a possible extinction situation on the next task. It is also interesting to recall that Task 4 did in fact seem to be more affected by order of task administration than did the other tasks. This fact would seem especially pertinent when followed by Task 1 or Task 3, where extinction played a part after S's first three responses. The recognition during Task 4

that no more rewards were coming may have also affected behavior, both on Task 4 and on S's following task, because of the cognition of "chance versus skill." James and Rotter (1958) pointed out that a S will not extinguish as rapidly, i.e., he will persist longer, if he sees the situation as due to his own skill. On the BB task, however, it is very likely that some Ss saw the situation as out of their control, which may have caused more rapid extinction.

The fact that Task 4 results were the most inconsistent across Ss may also point to the compounding of the above variables with intelligence, or some differences in S's ability to perceive the situation as one of extinction. Also, as Gladstone (1968) pointed out, Ss often don't respond to an extinction situation when it is obviously rational to do so. Personality definitely plays a part in each S's responses, but perhaps a combination of variables is more important than perseveration alone. Some Ss on the BB task commented, "Well, I was only winning about 50¢ so I figured I might as well see what happens." Other Ss in this unusual gambling situation appeared by other measures to be high perseverators, but when it came to playing a "slot machine," they were unduly careful, even though it wasn't their money.

Persistence, then, seems best viewed as a task-specific variable. Factors compounding with persistence such as frustration tolerance, degree of task difficulty, decision-making behavior, and motivation may deserve a second look. Cattell's notion of "integration learning" for the best outcome to the individual's personality, viewing variables as combination influences, is perhaps a better approach than putting the emphasis on personality dispositions for the prediction of future behavior.

The Prediction of Academic Achievement

Since evidence of a perseveration trait was not found in this study, it cannot be stated how this notion might be helpful in the prediction of academic achievement. Persistence task scores did not correlate significantly with actual over-achievement scores of the experimental Ss. Therefore, perseveration did not prove to be a useful concept, at least in so far as it was used in this study.

As pointed out in the McClelland and Atkinson literature, academic achievement is not an easy behavior to predict. Research has been very inconclusive about which factors seem to be most important. Even intelligence usually correlates with achievement only about .5 (Cattell, 1966), as mentioned earlier. Morgan (1952) also points to the inconsistency in correlating nonintellectual personality factors with achievement by emphasizing the variety of measuring instruments used in these studies, the different populations which have been tested, and the varying definitions used in establishing achiever and nonachiever groups. More recently, the concepts of over- and under-achievement have even been questioned as too complex to be useful. From Morgan's conclusions, it again appears evident that the personality variables affecting achievement may perhaps be best used as combinations of factors. For example, Morgan's (1952) study pointed out that the nonintellectual factors or personality variables which appear positively related to the academic achievement of, in this case, high-ability college students were: (1) maturity and seriousness of interests, (2) awareness of and concern for other persons, (3) a sense of responsibility, (4) dominance, persuasiveness, and self-confidence, and (5) motivation to achieve, or the need for achievement.

Atkinson and Litwin (1960) conducted a study which endorses this discussion of the complexity of the achievement situation. In relating persistence, efficiency, and accomplishment of college men to the S's combinations of the motivation to achieve success as compared with the strength of the S's motivation to avoid failure, they could not even conclude that the test they were using was measuring the motive to achieve success. The study went on to conclude, however, that achievement motive was positively related to persistence, as measured by the time spent working on a final exam.

French and Thomas (1958), in a motivation study in which intelligence was controlled, showed a clearcut positive relationship between nAchievement and persistence (time spent) in the solution of a very complicated problem. This study also clearly showed, however, that the relation between motivation and success was not the result of the relation of motivation and time spent working, since the actual solution time for those who solved was not different for the two motivation groups. As hypothesized, it seemed that motivation was related to problem-solving effectiveness as well as persistence.

The McClelland and Atkinson theory of achievement motivation generally conflicts with the results of this study. They consider persistence, along with performance level, as two almost self-evident manifestations of the motivation to achieve (Atkinson, 1960). The tendency to achieve is in turn taken as the theoretical function of "motive X expectancy X incentive" (Atkinson, 1964, p. 258). "Motive," or nAch, is considered the personality variable, which would include perseveration, and "expectancy X incentive" the situational variables. Considering these factors together, McClelland and Atkinson have achieved

some success in predicting academic achievement, often using the same scrambled words task as used in the present study to infer nAch (Atkinson and Feather, 1966).

McClelland and Atkinson have usually found that "those individuals with high academic grades obtain reliably higher nAch scores than those with low academic grades" (McClelland, 1953, p. 241). It would be expected, then, that persistence as measured in this study would also correlate with academic achievement. This was not the case, however. Apparently, McClelland's projective measures of nAch are sensitive to factors which are not measured by objective tests of persistence. Perhaps the variables not evaluated in this study were the situationally-relevant ones stressed in McClelland's model. Although still largely theoretical, concentration upon such variables as fear of failure, perception of task difficulty and incentive have on occasion yielded successful prediction of academic achievement.

Methodological Concerns

The present study did not yield more conclusive results than has past persistence research. The complexity of situational factors, as discussed above, may account for the insignificance of a single trait of perseveration. It might be helpful to again review Cattell's (1966) explanation of integration learning: "the learning of a hierarchy or combination of responses which will give the greatest satisfaction to the personality as a whole" (p. 30). Not only may this explanation account for the lack of clear evidence of perseveration as a personality trait, but it may also account for the unpredictability in the area of academic achievement. Both Marks (1967) and Stern (1956) support the

importance of combining factors, even though no one has developed a good way of measuring them to date. Perhaps Cattell's factor analytic approach holds promise for developing a prediction equation for such events as academic achievement.

Singer and Roby (1967) used this factor analytic approach, for example, to pinpoint the variables relevant to unguided decision-making behavior. Two of the six meaningful factors found in this study are especially pertinent to the problem of persistence and academic achievement. These factors are defined as:

> Factor 3: Likes to be bold and explore new approaches but also worries over details, likes to do precise work and to be persistent are characteristic. There is a tendency to deal with information rather than be overwhelmed. S is against both over-cautiousness and impulsiveness.
> Factor 4: A wish to be successful above other considerations, strong pessimism and choice of repetitive, rigid behavior rather than other solutions to problems suggest behavior does not appear to be either activistic or optimal (p. 573).

Perhaps, then, the notion of perseveration, or persistence, would be more useful when used in conjunction with other accompanying factors. Perhaps Singer and Roby's (1967) research, although general, could be a starting point for isolating personality variables involved in prediction of academic achievement. Further investigation may show such combinations of factors more useful in early judgment of a likely over- or under-achiever; i.e., perhaps a Factor 3-type personality would be more likely to over-achieve, whereas a Factor 4-type person would more likely be an under-achiever. If such correlations could be found, analysis from this point of the individual factors could again be considered--factors emphasizing perseveration or persistence, for example, specific to the academic setting.

Practical Implications

The emphasis in this study was upon methodological considerations in hopes of discovering a valid and reliable test of perseveration. So far no test has been developed that will consistently predict a person's academic achievement well, and it was hoped that an index of perseveration would contribute to the prediction equation.

The need for further investigation in the area of the personality factors involved in academic achievement appears clear. As discussed earlier, situationally-relevant factors must also be considered. As evidenced in this study, consideration of merely one aspect of performance, such as personality, does not yield results which will predict future behavior accurately. In sympathy with many researchers who have been left with inconclusive and inconsistent results of the same phenomenon when measured more than once, it is concluded that "we may have to tolerate more dissonance than we like in our personality theory" (Mischel, 1969, p. 1017).

CHAPTER V

SUMMARY

The purpose of this study was to test the existence of perseveration as a personality trait, defined by a relative persistence on a variety of problems. It was hypothesized that each index of persistence would correlate positively with each other index. Five of the persistence indices used were obtained from experimental tasks. The sixth index was over-achievement. One hundred eighty male and female college Ss were administered two of the four experimental tasks. Each S's freshman year GPA and ACT test score were also obtained to compute the over-achievement indices. The four experimental tasks were as follows: Scrambled Letter Task, Writing K's and F's (using two indices), Hidden Objects Tasks, and extinction in an operant conditioning situation (BB Apparatus Task). Pearsonian correlations were computed to measure the consistency between indices of persistence for each group of Ss. These correlations were computed both with administration order considered and not considered. Correlations between each of the task measures and over-achievement were also computed, using all Ss ($n = 90$) who took each task. A multiple regression equation was obtained to predict GPA for each S, knowing his task scores. These equations were formed for each two-task combination of Ss. The beta coefficients generated from each equation indicated the weighted contribution of each task variable to the GPA prediction equation.

The correlations between task measures did not yield many significant correlations. When identical treatment groups of Ss were combined, disregarding order of task administration, the general trend was for the correlations to be lowered. Ss did not perform consistently on the experimental tasks as expected. All five task measures also correlated insignificantly with the index of over-achievement. The weighted contributions of each task variable to a GPA prediction equation were all insignificant.

The conclusion is that perseveration as a personality trait cannot be inferred from performance on these tasks. The use of different kinds of persistence tasks apparently brought in situational variables which wiped out any effect of a perseveration trait.

The results of this study support the view that persistence varies with the situation. Factors compounding with persistence such as frustration tolerance, degree of task difficulty, decision-making behavior, and situational motivation deserve consideration. For practical uses such as prediction of academic achievement, it is recommended that any use of perseveration should be in conjunction with other variables.

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APPENDIX A

RAW DATA

GROUP NUMBER	WRDS	CHGS	RUNS	ACT	GPA	DEV
1	12	9	38	21	2.500	-0.1575
1	8	199	1	21	1.758	-0.8995
1	7	4	192	27	2.933	-0.3872
1	8	0	200	28	3.090	-0.3407
1	7	8	96	16	2.967	0.8619
1	7	104	10	19	3.322	0.8855
1	11	99	2	18	2.600	0.2739
1	8	23	23	26	3.166	-0.0438
1	8	12	74	27	4.000	0.6798
1	6	5	109	19	1.212	-1.2245
1	10	100	32	17	1.843	-0.3726
1	15	199	1	18	2.700	0.3726
1	15	6	51	20	1.964	0.3739
1	11	10	63	22	3.133	-0.5830
1	6	0	200	28	4.000	0.3651
7	6	40	16	19	2.625	0.5693
7	6	0	200	23	2.612	0.1086
7	6	5	73	19	2.333	-0.3157
7	11	14	29	18	2.607	-0.1834
7	19	6	32	19	2.967	0.4506
7	6	97	7	20	1.750	-0.8692
7	8	0	200	24	3.724	0.6935
7	5	10	32	15	2.807	0.7018
7	6	2	126	22	1.900	-0.9249
7	9	9	64	27	3.758	0.4191
7	7	6	32	18	2.566	0.1524
7	14	4	100	27	3.677	0.3381
7	4	197	2	17	1.814	-0.4968
7	6	2	96	26	3.264	0.1279
7	13	19	112	28	3.147	-0.2947

RAW DATA

GROUP NUMBER	WRDS	PICS	ACT	GPA	DEV
2	13	7	16	2.000	-0.1111
2	7	6	23	3.343	0.3958
2	7	7	18	2.928	0.5780
2	12	6	21	2.709	0.0007
2	8	5	24	3.531	0.4643
2	11	8	19	2.724	0.2546
2	8	6	17	2.612	0.3815
2	6	4	26	3.068	-0.2376
2	13	8	17	1.483	-0.7475
2	8	7	27	3.606	0.1810
2	8	6	27	2.281	-1.1440
2	25	8	16	1.750	-0.3611
2	9	7	29	3.764	0.1001
2	10	6	24	3.645	0.5783
2	7	7	19	2.137	-0.3324
8	9	8	21	2.242	-0.3700
8	6	6	23	3.580	0.8275
8	8	8	13	2.615	0.5654
8	9	8	27	3.062	0.0283
8	10	11	15	2.433	0.2428
8	5	7	23	2.965	0.2125
8	9	9	17	1.548	-0.7828
8	6	7	23	2.903	0.1505
8	7	7	28	2.838	-0.2660
8	6	6	24	2.000	-0.8228
8	6	5	19	1.806	-0.6654
8	5	8	27	2.866	-0.1677
8	10	8	25	3.812	0.9189
8	9	7	10	1.740	-0.0988
8	6	9	19	2.700	0.2286

RAW DATA

GROUP NUMBER	WRDS	BOBS	ACT	GPA	DEV
3	10	38	23	1.656	-0.9762
3	7	36	23	3.533	0.0998
3	6	64	25	1.935	-0.7067
3	9	86	19	2.750	0.1368
3	7	65	23	1.593	-1.0392
3	22	67	26	2.500	-0.1464
3	12	41	25	3.966	1.3243
3	10	400	26	2.400	-0.2464
3	7	200	20	2.791	0.1731
3	9	50	19	2.640	0.0268
3	12	49	26	2.033	-0.6134
3	7	32	25	3.593	0.9513
3	7	40	17	3.200	0.5963
3	8	50	25	3.032	0.3903
3	10	100	18	1.838	-0.7704
9	5	50	16	1.666	-0.7971
9	11	40	23	2.800	0.0423
9	15	68	26	3.757	0.8730
9	13	90	30	3.382	0.3296
9	5	68	22	2.566	-0.1496
9	11	305	18	2.714	0.1667
9	7	211	22	2.848	0.1324
9	6	110	28	3.100	0.1318
9	10	71	16	2.928	0.4649
9	16	73	22	3.406	0.6904
9	9	140	28	3.123	0.1548
9	12	300	28	2.821	-0.1472
9	9	100	26	1.107	-0.7770
9	8	77	27	2.161	-0.7651
9	8	65	26	3.533	0.6490

RAW DATA

GROUP NUMBER	CHGS	RUNS	PICS	ACT	GPA	DEV
4	19	30	6	19	3.066	0.5647
4	21	60	7	22	3.758	1.0765
4	12	46	8	20	1.031	-1.5304
4	1	192	9	23	2.700	-0.0416
4	46	28	6	28	3.258	0.2159
4	199	1	7	9	2.366	0.4656
4	6	32	13	13	2.166	0.0253
4	7	53	12	28	3.366	0.3239
4	6	32	7	20	2.600	0.0386
4	21	19	6	16	1.733	-0.5880
4	0	200	12	27	2.363	-0.6190
4	3	72	7	30	3.133	-0.0293
4	0	200	10	23	2.000	-0.7416
4	1	196	7	21	2.666	0.0446
4	7	61	5	25	3.655	0.7932
10	0	200	5	24	3.032	-0.1680
10	4	118	8	22	3.212	0.2170
10	4	164	7	20	2.766	-0.0240
10	0	200	9	28	4.000	0.3901
10	13	48	7	23	2.718	-0.3795
10	30	19	8	26	2.677	-0.7279
10	199	1	6	16	2.300	-0.0801
10	147	52	8	25	3.353	0.0506
10	9	64	13	24	3.645	0.4451
10	44	64	7	23	3.470	0.3725
10	29	25	8	20	2.206	-0.5840
10	0	200	7	19	2.793	0.1055
10	0	200	6	18	3.031	0.4459
10	4	75	12	24	2.935	-0.2650
10	108	18	7	26	3.606	0.2011

RAW DATA

GROUP NUMBER	CHGS	RUNS	BOBS	ACT	GPA	DEV
5	199	1	217	21	1.700	-0.8986
5	20	21	241	22	2.107	-0.5386
5	6	32	75	21	2.517	-0.0816
5	41	16	85	20	1.766	-0.7856
5	73	26	100	27	3.137	0.2562
5	1	196	14	13	2.866	0.6436
5	0	200	150	24	2.451	-0.2887
5	17	20	46	17	2.156	-0.2550
5	5	64	25	23	3.645	0.9523
5	165	2	100	25	2.833	0.0463
5	9	32	200	26	3.147	0.3132
5	0	200	1059	16	3.066	0.7025
5	3	72	1000	21	2.300	-0.2986
5	84	35	100	15	1.433	-0.8834
5	8	76	649	19	3.620	1.1155
11	2	130	260	20	1.250	-1.2872
11	6	32	100	20	3.612	1.0748
11	13	32	95	25	2.966	0.1783
11	6	32	200	24	3.322	0.5844
11	34	23	90	19	1.607	-0.8801
11	2	151	135	22	3.033	0.3956
11	0	200	130	29	1.500	-1.4882
11	199	1	17	19	2.566	0.0789
11	8	72	253	24	3.133	0.3954
11	6	32	110	27	3.741	0.8531
11	6	32	32	20	2.285	-0.2522
11	10	32	635	18	3.000	0.5630
11	8	41	100	28	3.285	0.3469
11	8	62	100	20	2.290	-0.2472
11	2	123	110	22	2.320	-0.3174

RAW DATA

GROUP NUMBER	PICS	BOBS	ACT	GPA	DEV
6	7	81	21	2.968	0.4579
6	6	61	14	1.285	-0.3014
6	9	100	29	3.500	-0.0659
6	8	96	27	3.718	0.4160
6	7	150	24	2.906	-0.0001
6	10	83	21	2.666	0.1559
6	5	200	26	2.827	-0.3430
6	6	50	21	2.120	-0.3902
6	8	1500	26	3.100	-0.0700
6	6	65	28	3.096	-0.3379
6	6	400	18	1.518	-0.5962
6	7	55	17	1.937	-0.0453
6	8	85	18	2.000	-0.1142
6	6	60	16	2.483	0.6327
6	6	60	23	3.375	0.6009
12	7	1046	17	2.750	0.4887
12	7	25	13	2.533	0.7415
12	9	100	26	3.466	0.1479
12	10	90	27	4.000	0.5644
12	6	200	21	2.774	0.0430
12	8	240	24	4.000	0.9167
12	8	100	23	3.096	0.1302
12	13	90	15	1.535	-0.4914
12	4	68	20	1.483	-1.1306
12	6	250	23	2.761	-0.2049
12	7	110	24	3.787	0.7037
12	12	200	17	2.600	0.3387
12	6	67	22	1.428	-1.4204
12	7	67	23	2.741	-0.2249
12	7	75	24	2.482	-0.6013

APPENDIX B

S GROUP ASSIGNMENTS

GROUP	TASKS (IN ORDER)	CRITERION CODES
1	1 - 2	WRDS - CHGS & RUNS
2	1 - 3	WRDS - PICS
3	1 - 4	WRDS - BOBS
4	2 - 3	CHGS & RUNS - PICS
5	2 - 4	CHGS & RUNS - BOBS
6	3 - 4	PICS - BOBS
7	2 - 1	CHGS & RUNS - WRDS
8	3 - 1	PICS - WRDS
9	4 - 1	BOBS - WRDS
10	3 - 2	PICS - CHGS & RUNS
11	4 - 2	BOBS - CHGS & RUNS
12	4 - 3	BOBS - PICS

APPENDIX C

CALCULATION FORMULAS

PEARSON PRODUCT-MOMENT CORRELATION FORMULA*:

$$r_{jk} = \frac{\frac{1}{N_{jk}} \sum_{i=1}^{n} I_{ijk} \, (X_{ij} - X_{.j}) \, (X_{jk} - X_{.k})}{\left[\frac{1}{N_{jk}} \sum_{i=1}^{n} I_{ijk} \, (X_{ij} - X_{.j})^2 \left(\frac{1}{N_{jk}} \sum_{i=1}^{n} I_{ijk} \, (X_{jk} - X_{.k})^2 \right) \right]^{\frac{1}{2}}}$$

where X_{ij} denotes the i^{th} observation of the j^{th} variable.

PEARSONIAN MULTIPLE CORRELATION COEFFICIENT:

BETA WEIGHTS: $\beta_j = \sum_{i=1}^{k} r_{iy} \cdot r_{ij}^{-1}$

where r_{iy} = intercorrelation of the i^{th} independent variable

r_{ij}^{-1} = the inverse of the intercorrelation r_{ij}

$i, j = 1, 2, \ldots K$ (independent variables)

r_{iy} and r_{ij}^{-1} are input to the subroutine to obtain Beta weights.

REGRESSION COEFFICIENTS: $b_j = \beta_j \cdot \frac{S_y}{S_j}$

where S_y and S_j are standard deviations.

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*See Snedecor & Cochran, 1967, p. 172.

VITA

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