

1954

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PERSEVERATIVE PHENOMENA AND SHIFT ABILITY

BY

EDWARD E. WARE

A THESIS
SUBMITTED TO THE GRADUATE FACULTY
OF THE UNIVERSITY OF RICHMOND
IN CANDIDACY
FOR THE DEGREE OF
MASTER OF ARTS IN PSYCHOLOGY

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AUGUST, 1954

Preface

This thesis had its inception in the combination of concepts taught in experimental psychology by Dr. Stanley C. Skiff and in social psychology by Dr. Merton E. Carver. It has been carried out under the supervision of Dr. Carver. A great debt is owed to these professors and to Mr. Austin E. Grigg and Dr. Robert J. Filer for their encouragement and the interest they have shown.

I would like to thank Dr. Carver, Dr. Filer, and Mr. Grigg for their helpful suggestions, as well as for their class time and the use of their students as subjects. I am quite grateful to those students who have taken part in this research and to those fellow students who took an interest in the project and offered their aid and suggestions.

I wish to acknowledge the help of Dr. John C. Strickland, Jr., and Dr. Nolan E. Rice in supplying a room for the necessary testing.

An inestimable debt is owed my mother, Mrs. R. E. Ware, whose typing skill seems to be exceeded only by her patience.

Edward E. Ware

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Vita

CHAPTER I

Perseveration, The Concept And Its Correlates

A. History and Meaning of Perseveration

"A common phenomena of everyday life is the stubborn continuance or recurrence of certain bodily sensations, images, ideas or purposive tendencies in spite of conscious efforts to banish them. We have all experienced the tune that "runs in the head", the sensations of movement after a sea voyage, the intrusion of a gnawing idea into the stream of thought. We are also familiar with the difficulty in "getting started" and, conversely, after having started, with the effort that is sometimes required to shift from one activity to another. Such and related phenomena have been subsumed under the concept of perseveration or perseverative tendency." (34, p. 223)

An indication of the importance of this phenomena is given by the following conclusion of Spearman.

"Only second in importance to the establishment of g has been that of another factor as also possessing functional unity or acting as a behavior unit. This consists in the first kind of retentivity, and may be called general mental inertia or lag; another convenient name for it, especially when present to excess, is perseveration. Comparative freedom from it, which with Garnet we may call c, has proved to be the main ground on which persons become reputed for "quickness" or for "originality"." (60, p. 412)

The term perseveration dates back to 1894 when it was first used

by Neisser, a psychiatrist, in discussing abnormally persistent repetition of some behavior (31, p. 23, 22, p. 394). Comments on the general concept may be traced back to Aristotle (31). Muller and Pilzecker, in 1900, brought the term perseveration into psychology (22, p. 395), and the earliest important research was carried out by Wiersma in 1906. He developed three tests for measuring the factor; (1) color fusion, (2) light adaptation; (3) adaptation to electrical stimulation (60, p. 293). Results of this research will be discussed later. Since this beginning perseveration has accumulated a variety of meanings.

"If one analyzes the works on perseveration, it becomes evident that considerable confusion exists as to the meaning of the term. It has been used to describe several psychological phenomena. Sometimes it is employed to denote the occurrence of spontaneous "ideas"; at other times, it is used to explain the persistence of after-effects or any kind of neuromuscular activity beyond the duration of the appropriate stimuli. At still other times, the term perseveration is used to explain the inhibitive effects of an activity upon a subsequent activity. It must also be pointed out that the concept has been made an entity, and used as if it were a name of a something which makes people work better alternately or continuously, depending upon the amount of that something present. Different writers have used the concept in so many different ways that it is frequently very difficult to decide what a given author means when he talks about perseveration." (10, p. 127)

Some of the definitions of these different authors will be considered. The first operational definition of perseveration was given by Spearman (13, p. 230). He referred to the concept as mental inertia and his law of mental inertia states that "cognitive processes always both begin and cease more gradually than their (apparent) causes" (60, p. 291). Spearman's concept of perseveration was formed from a

combination of the concept introduced by Muller and the "secondary function" of Gross. Spearman feels that these two concepts "exactly supplement each other. For whereas the perseveration indicates that percepts and ideas once vividly aroused have a marked tendency to persist or revive in subsequent consciousness the secondary function implies that the percepts and ideas remain markedly influential even when they have become unconscious. Joining these two concepts together, we get simply that, with some persons, there is a tendency for mental processes to persist in activity long after the cessation of the conditions to which they were originally due" (60, p. 51-52). Quite similar to this is Jasper's definition of perseveration. He defines perseveration as "the tendency of a set of nervous, once excited, to persist in the state of excitation autonomously showing resistance to any change in this state." (31, p. 28)

Cattell defines perseveration, or rigidity, as "simply a relative inability to mold old habits ... to new ones". (14, p. 256). Rigidity and perseveration are not distinguished in the literature on the concept and will be used interchangeably in this paper. Cattell is able to distinguish two types of perseveration. The first of these he calls "inertia of mental processes" or "process-momentum rigidity". It is "the tendency of a percept or an emotion or a motor activity to persist, when once activated, totally or partially, despite substitution of new stimuli for the original one that produced the process" (15, p. 322). It is measured by the "alternation tests" in which activities are quick-

ly alternated, one activity, consequently, interfering with another (13). The other type is known as "disposition rigidity" or "structural rigidity", and is "the resistance of a habit or personality trait to forces which might be expected to change it" (15, p. 322). This type is generally measured by "creative effort" tests which require doing a thing in an old habitual manner, and in a new way. The resistance to the new way is measured as the "disposition rigidity" (13). This distinction by Cattell was necessitated by research concerned with the generality of the perseveration factor. This will be discussed further in a section dealing with this problem.

In Stagner's book, Psychology of Personality, we find "Perseveration is operationally defined as the inability to shift rapidly from one act to another - the first act persisting to interfere with the second". (61, p. 199). The definitions of Rokeach (53), Cowen and Thompson (17), and Luchins (47) closely approximate Stagner's concept. Since all three use the same type of test to measure rigidity, their concepts of the term are practically identical. Rokeach defines rigidity as the "inability to change one's set when the objective conditions demand it, as the inability to restructure a field in which there are alternative solutions to a problem in order to solve that problem more efficiently". (53, p. 260). The definition offered by Cowen and Thompson is no more than a slightly different wording. Luchins offers the term "Einstellung" in place of rigidity. According to Luchins

"Einstellung refers to the tendency to continue using an oft-repeated mode of solution in subsequent problems which are capable of solution by other, generally more simple methods" (47, p. 303).

A quite different interpretation of rigidity is offered by researchers working with Lewin's field and topological theories. According to Kounin rigidity "refers to that property of the functional boundary between the cells of the person which represents the relative independence of different regions of a person .. Rigidity is that property of a functional boundary which prevents communication between neighboring regions" (35, p. 251-252). A good deal of discussion has been carried on in the literature as to whether this constitutes a functional or structural definition of the concept. Werner sees Kounin's concept as implying some physical meaning with "rigidity as a quasi-material property of mental organization" (68). Kounin, replying to Werner's criticism, asserts that the Lewinian concept of rigidity is functional, not structural, and furthermore, states that his concept is genotypical, referring to a functional property underlying behavior, and is not a phenotypical or purely descriptive concept (37). Goldstein divides this rigidity into primary and secondary rigidity. His primary rigidity is simply the inability to shift voluntarily to unrelated tasks. This type does not involve the higher mental processes. Secondary rigidity occurs when the tasks are too difficult for the individual. It is caused by some defect of the higher mental processes, and functions as an escape or defense mechanism (24).

A distinction is also made between subnormal and abnormal rigidity. Research has shown quantitative and qualitative differences in the rigidity for familial and for brain-injured feeble minded groups. After a number of experiments Werner concluded that rigidity in the former was due to a lack of differentiation and in the latter to a lack of integration (69).

No real attempt to bring all of these definitions of perseveration or rigidity under one inclusive concept has been attempted. Perhaps one of the better tries at summing up some of these concepts was made by Burri. After having discussed a number of the meanings of perseveration, he makes the following statement:

"If, however, we attempt to sum it up, as far as possible, what is meant by perseveration in connection with studies of alternation, the idea is something like this: Every organism manifests a tendency to have its activities persist, and the degree of this persistence or perseverative tendency varies from person to person, thus producing differences in the ease with which these persons can break up a given "set" and change to new activities. Whatever activity a person engages in will hinder subsequent activities to greater or less degree, and the degree of this hindrance will depend upon the degree of perseverative activity." (10, p. 127)

It would perhaps be better not to attempt this summing up or to try to derive any one definition from this myriad of concepts, for in reviewing the research we will find it necessary to keep each individual's concept in mind while considering his results.

In the above definition by Burri, we find the term persistence mentioned in defining perseveration. This use of the term is unfortunate. There has been a good deal of confusion concerning perseveration and

persistence with the two terms often used interchangeably. It may be profitable to attempt here to distinguish between the two. Persistence is defined as "the tendency to continue certain definite activities in the face of difficulties" (18, p. 409) by Crutcher. Kendig and Shevach distinguish this from perseveration by persistence referring to the conscious or volitional (34, p. 225). Factor analysis of a large number of tests has shown perseveration and persistence to be separate factors (51). Other research using a large number of subjects found no evidence to indicate that persistence is actually a generalized trait (50).

Numerous methods of measuring perseveration have been used with each person devising tests to suit his own purpose. These tests are probably best classified as sensory, motor, and ideational. Examples of the sensory tests are flicker fusion speed and light adaptation. Some of the motor tests are mirror drawing, the inverted "S" test in which S's are first written the usual way and next are written reversed, and the triangles test in which triangles are first drawn with the apex up and then with the apex down. Ideational tests of perseveration are recall tests in which errors are often due to perseveration and tests in which towns, animals, or nouns are named as quickly as possible. An excellent list of many other tests of rigidity is given by Jasper (31). Other lists are given by Luchins (44), Cattell (11), Spearman (60), Shevach (58) and Burri (10). The enormous number of tests used to measure perseveration are another indication of the number and variety of meanings given to the concept.

B. Perseveration As a General Trait

In the first section we attempted to give some meaning to the concept perseveration. Once we have defined the concept, our next problem is to discover just how general a factor it is. Does it pervade all of our activities or only certain specific behavior? Can one be said to persevere in all behavior or does one persevere only in certain activities? Are there certain individuals who are general perseverators and others in whom the trait is specific? These are the problems which faced the investigators whose research will be discussed in this section.

Heymans and Brugmans in 1913 carried out the first research on the generality of perseveration. Using fifteen subjects and six tests of perseveration, mostly sensory, they arrived at an average intercorrelation of .28 (60, p. 294-295). Notcutt in 1943 gave numerous tests of sensory, motor and associative perseveration to fifty adults. He found no general tendency to persevere, but there was some slight evidence of a general factor in the alternating motor tasks (65). Burri, using fifty-one subjects, administered a number of alternating activities tests. He "found that people differ greatly in their ability to alternate activities, and they show little consistency from task to task" (10, p. 138). Hargreaves with one hundred thirty nine subjects is reported by Jasper as finding no evidence of a general factor. Jasper in his own research with seventy-eight subjects found an

average intercorrelation of $-.021$ (31). The research of Hamilton and that of Walker, Staines, and Kenna are reported as giving reason to doubt the existence of a general trait of perseveration (67, p. 34). These are some of the less favorable studies for the generality of the perseveration factor.

Using eight tests of perseveration and a questionnaire on the trait, Lankes, in 1914, found most of the intercorrelations were quite small. He studied forty-seven students. A few of the correlations were fair and none of them were significantly negative (60, pp. 298-301). Bernstein administered ten tests of perseveration to one hundred and thirty children. Some of the tests were the natural rate of tapping, mirror-drawing, reversed letters, and the triangles test. He found intercorrelations which were quite low, but the greater majority of them were positive (60, pp. 302-304). Using seventeen tests Cattell, also, found low positive intercorrelations (15). These researches still leave doubt as to any general trait.

The most favorable research was published in 1929 by Jones. Regarding this study, Spearman states "The definite evidence so far lacking, however, that perseveration normally constitutes any functional unit or group factor was eventually supplied by Wynn Jones" (60, p. 295). Jones used the reversed S's test, reversed digits, mirror-drawing and the "i t" test. In the latter test prose is written first in the usual way and then written again without dotting the "i"s or crossing the

"T"s. These were given to seventy-seven children twelve years of age. The intercorrelations ranged from .34 to .56 with an average of .49 (60, pp. 295 - 297). Pinard, using four tests of perseveration and one hundred and ninety four children as subjects, found an average intercorrelation of .34 (10, p. 130). Rokeach, in order to support his own discussion of rigidity as a generalized trait, reports a study by Schrier and Boyd. They found a significant multiple correlation of .556 between rigidity measures from an arithmetic problem test of rigidity and from an analysis of the Bender-Gestalt test (54).

After another study on the problem Cattell writes "we shall conclude that there is a general factor proved only for motor "creative effort" tests; and ... that it is best called disposition rigidity" (13). In giving a number of tests of perseveration to different groups, Shevach found that, "the same tests of perseveration might intercorrelate positively when applied to one group of subjects, and might yield an insignificant or even a negative intercorrelation when applied to another group of subjects" (59, p. 425). After reviewing the research, we must agree with Shevach, who states "At best, then, perseveration is but a very weak general factor. A close scrutiny of the data, however, barely justifies the recognition of a narrow group factor of motor perseveration, and even the latter point remains doubtful" (58, p. 384).

C. Personality Correlates of Perseveration

Despite the fact that doubt still exists as to the existence of a true trait of perseveration, much research has been carried out in an attempt to find those personality variables which may in some way be related to perseveration. Numerous relationships have been discovered and many of these contradicted by other researches. This lack of consistency in research on this problem is caused more often than not by the variety of definitions and measurements subsumed beneath the concept perseveration. Rigidity has been found to be related to everything from age to popularity and some of these studies will be reviewed in this section.

Rogers gave a number of group tests of intelligence and perseveration to two hundred and twenty public school pupils. There was no relationship discovered between perseveration and chronological age, mental age, or intelligence. A relationship was indicated, however, between perseveration scores and the disparity between intelligence and school achievement. Both high and low perseverators showed this disparity to a greater degree than did the medium perseverators (52). Other studies of rigidity and I. Q. have found correlations of $-.19$ with eighty nine subjects, using the Stanford-Binet test, and $-.13$ with eighty four subjects, using the Wechsler-Bellevue test (53). From these studies there seems to be no indication of a relationship between perseveration and intelligence.

Brozek and Keys found a small but consistent decrease in flicker-fusion frequency with age (7). This test is often used as a measure of rigidity, but a question may be raised as to whether another factor other than rigidity may be operative in this test. This problem may be raised with most of the tests of perseveration, since a pure measure of perseveration is not given by the tests so far devised. From the results of four tests of perseveration given to a large number of children and adults, Pinard concluded that there was a steady increase in perseveration with age (63). From his studies Cattell states that "p" scores decline with age to adolescence, level off during the adult period, and then increase in old age. He finds no sex difference for adults, but finds an increase in rigidity with increases in fatigue (16). Kendig found perseveration increased as the result of failures in assigned tasks (33). Lazarus, Deese, and Osler in a review of numerous studies conclude that an increase in perseveration may be created by stress. Failure was often used to induce the stress (38). These findings may add weight to the concept of secondary rigidity introduced by Goldstein and discussed in the first section.

Eisenson administered a battery of tests of perseveration to a group of stutterers and a group of non-stutterers. The results indicated a greater tendency to perseverate in the group of stutterers. Eisenson proposed the hypothesis that stuttering is a manifestation of the phenomena of perseveration (26).

Using the Rorschach test as a measurement of rigidity, Reichard

found that persons with strong opinion prejudices tended to more rigid personalities (21). Rokeach used the arithmetic problems test, in which a complex method of solving problems must be used in the earlier problems, and if this method is used by the subject on later problems, which are solvable by a much simpler method, then rigidity has been manifested. He compared the scores on this test with those on the California Scale of Ethnocentrism for seventy college sophomores. Dividing the subjects into two groups by degree of ethnocentrism, he found that the difference between the means of these groups on the rigidity test was significant at the five per cent level of confidence, with the ethnocentric group being more rigid. He, also, found, with use of scratch paper and amount of verbalization in responses to the arithmetic test as criteria for concreteness of thought, that the difference between the two groups for this factor was significant at the one per cent level of confidence. In this case the ethnocentric group was more concrete, as opposed to abstract, in their mode of thought (53). Rokeach in a later study found that by increasing the time allowed for perception of the problems, a decrease would be created in the number of rigid solutions and in the concreteness of thinking. Luchins confirms the decrease in rigid solutions due to an increase in time (55), but he was unable to confirm Rokeach's findings regarding rigidity and concreteness of thinking. Luchins disagrees with the choice of use of scratch paper and verbalizations as criteria for concrete thinking and chooses to use

the Wechsler - Bellevue similarities test. He used Rokeach's method of scoring the arithmetic problems test, but found no consistent relationship between the arithmetic problem scores and concreteness of thinking on the similarities test (47).

Cattell compared scores on disposition rigidity tests with ratings of associates for one hundred college women. A correlation of $-.44$ was indicated between rigidity and dominance. This was later confirmed by a study with two hundred men (14). With seventy-eight subjects studied, Jasper could find no relationship between perseveration and depression or introversion (31). Shvach, regarding the work done by himself and by other researchers concludes that "The correlation of varying degrees of perseveration with various character types and with introversion ... seems to rest on doubtful grounds" (53).

In a study of sixty-two college students Cattell found the more popular persons tend to low perseveration and the more unpopular tend to very high perseveration (12). In his study of college women, he found disposition rigidity and character integration to have a correlation of $-.34$ (14). In a qualitative study by Cattell of ten high and ten low perseverators from a group of fifty subjects, character integration was discovered to be poorer for both extreme groups (20). In a chapter on character, Stagner concluded that the extreme lack or presence of the perseverative tendency is quite important in character and personality problems (61).

Binard administered four tests of perseveration to one hundred and

ninety four children from undesirable homes and one hundred and sixteen adults from mental hospitals. Seventy-five per cent of the most difficult cases were either high or low perseverators (63). In a study comparing a normal group with a group of soldier patients in a mental hospital, Luchins found that the abnormal group tended to greater rigidity (44, p. 245). Extreme perseveration scores, both high and low, are reported by Cattell in children who were referred for delinquency or nervous difficulties (29). Cowen and Thompson studied the responses of ninety three eighth grade students on the arithmetic problem test of rigidity and on three personality tests, the Bell Adjustment Inventory, the California Test of Personality, and the Rorschach test. No significant differences between the rigid and non-rigid groups on the two paper and pencil tests were indicated, but statistically significant differences are found in the Rorschach responses. Judges' ratings on the Rorschach show the rigid group to be more poorly adjusted. The specific Rorschach signs which showed a significant difference between the rigids and non-rigids were response total, organization, number of color responses, movement plus color responses and content range on which the rigid group are lower, and average time of response and average time of first response on which the rigid group are higher (17).

Angyal developed a new method for measuring rigidity. The types of errors and method of approach in reproducing a group of letters

exposed tachistoscopically were measured as indicators of rigidity. In administering this test to patients, Angyal found that obsessive compulsive neurotics and those with psychosomatic conditions tended to fall into the rigid group. The anxiety neurotics and those suffering from tension states and hysteria were generally non-rigid or "loosely organized" (4). In contrast to this study Kendig is able to find no relationship between perseveration and neurotic tendency (32). This discrepancy is due to the fact that Kendig's study was not made on abnormal cases as well as to the difference in the tests used for perseveration.

There have also been a number of studies relating perseveration with psychotic states. Wiersma found in his research that the degree of perseveration increased for manics, normals and melancholics, respectively (60, p. 293). Pinard's study of mental patients confirms the association between high perseveration and melancholia, and low perseveration and mania (64). A series of sensory, motor, and ideational tests of perseveration were given by Jones to manics, melancholics and normals. The sensory and motor tests showed no distinction between manics and melancholics, but the ideational tests were fairly successful in separating them (62). Angyal used the tachistoscopically exposed letters test with forty-nine schizophrenics and thirty-one normals. The paranoid group tended to greater rigidity, while the hebephrenics tended to the loosely organized group (3). Stephenson

finds a relationship between perseveration and the inaccessibility of praecox patients. He concludes that a high score on perseveration makes prognosis quite unfavorable in schizophrenia (25).

After discovering these relationships between abnormal behavior of various types and perseveration, we are still faced with the problem of just what is causing what. Is abnormality a manifestation of perseveration or is perseveration a manifestation of the abnormality? Logically, either solution may be backed. We may reasonably assume that an overly rigid or too flexible approach to life might create difficulties that lead to abnormality. There is evidence, also, that perseveration may be a defense mechanism arising when problems become too difficult (24). If this is true, then the perseveration could be a reaction to the abnormal condition. Whether either or both of these processes is active in creating the discovered relationships will perhaps be answered by future research.

There have also been a number of researches on personality variables and the Lewinian concept of rigidity. McAndrew, using tests of satiation, level of aspiration and the Rorschach, concluded from a study of the deaf and the blind that "rigidity is a positive function of the degree of isolation" (49, p. 494). Kounin finds rigidity to be related to age and to the degree of feeble-mindedness (35). The Lewinian concept of rigidity is believed to play a large part in explaining behavior in feeble-minded individuals (36). Lewin in A Dynamic Theory of Personality states "I am constrained to believe that a much

more fundamental property of the feeble-minded is here operative; namely, a functional rigidity, an immobility of the psychic material, which itself constitutes the true cause of the intellectual difficulties" (42, p. 202).

In concluding the discussion of personality correlates, we may find the following list of characteristics of low and high perseverators taken from rating studies by Cattell and Pinard interesting:

Characteristics of

Low Perseverators:

Prone to action in dissatisfaction
Assertive, active.

Insistently assertive. High tension
Hence nagging, restless, fussy.
Enterprising, self-reliant
Openly individualistic
Tend to be natural leaders.
Not affected by emotional scenes.
Inconsiderate, tough.
Irritable, selfish, silent, anxious
tense.

Tends to be interested in mechanical,
scientific, and mathematical matters.
Decisive and impetuous. Ability to
grasp situations whole. Good
taste and definite style in dress,
voice, music, etc.

Dreams very little.

Liable to short periods of acute rest-
lessness and crises of intense emo-
tional dissatisfaction.

More interested in scientific, busi-
ness, and practical matters.

High Perseverators:

Resigned, but often seeking expres-
sion in tortuous ways - hence
sometimes deceitful, cruel, spite-
ful, unpredictable.

Quiet, slow more emotional and
"deep" in general.

More skeptical and pessimistic
Conservative in habits.

Sensitive emotionally.

Rebellious in theoretical outlook,
serious, shy, and solitary.

Tends to be interested in history,
languages, and humanities.

Absent-minded. Impressed by one
thing at a time. Drifting to deci-
sions. Dreamy. Sentimental.

Careless of detail. Slovenly in
dress.

Greater tendency to dreaming (in
sleep).

Liable to long periods of depression
or gentle melancholy.

More interested in religious, his-
torical and language subjects.

Neurotic symptoms of a general
nature more prevalent.

Low Perseverators: (continued)

Makes good use of relatively low I Q (In social status, responsibility of occupation, etc.)
 Systematic, precise, planful.
 In general character is defective because of "immaturity", naivete superficiality of emotions, and self-will.

High Perseverators: (continued)

Fails to make best use of intelligence in any ordinary sense.
 Negligent of external demands.

In general, character is defective because of excessive deep inhibitions, emotionality with general discouragement and lack of integrated driving power.

(11, p. 441).

In considering many of these personality correlates of perseveration, we must keep in mind that many of them "do not at the moment satisfy rigid statistical criteria" (11, p. 442), and so, consequently, they await confirmation by future research.

D. Dynamics of Perseveration

After reviewing the meaning of perseveration and some of the research dealing with its manifestation, and its related phenomena, there still remains the question of why. What is the basis for perseveration? In our search for the dynamics, we shall find that they are as elusive as any of our previously discussed phenomena. It would seem that the return has not been proportional to the amount of research carried out on perseveration.

In Jasper's definition of perseveration, it is seen as simply a characteristic of neurons to persist in their state of excitation (31, p. 28). This appears to be an application of Newton's first

law of motion (30, p. 18) to the functioning of neurons. Another conception implying this same phenomenon is Spearman's law of inertia (60, p. 291). He discusses the gradual beginning and ceasing of cognitive processes. Rather than have this law apply to the neurons, as does Jasper, Spearman assumes a "mental energy". He sees intelligence and perseveration as separate aspects of this energy, with intelligence referring to the amount of energy and perseveration to its degree of inertia (60, p. 306). Cattell's disposition rigidity is seen in this same light when he discusses it as the "resistance to change of neural discharge paths" (15, p. 325). The usual laws of individual differences are assumed to hold for this characteristic of neurons, mental energy, or neural discharge paths, and consequently tests generally find perseveration to be normally distributed.

Cattell is of the opinion that the major source of individual differences in perseveration is hereditary. He gives two racial studies in support of this contention. He has found a higher disposition rigidity among Mediterranean than among Nordic groups. Cattell also comments on a study by Rangazhar in which Jewish students are found to score higher on the trait than English students. Wynn Jones is reported as finding a correlation of perseveration scores of siblings which, when corrected for attenuation, are approximately the same as those generally found for intelligence (14). Yule gave a battery of perseveration tests to one hundred and fifteen pairs of twins and a control group of sixty unrelated children. He discovered that the monozygotic twins were more

alike in perseveration than the dizygotic twins and in the dizygotic group those of like sex showed more resemblance in perseveration than those of unlike sex (27). The dynamics and hereditary basis discussed above are of most use in explaining the phenomenon of motor perseveration or what Cattell refers to as disposition rigidity for it is here that we possibly find a true general trait and one that is influenced only slightly by environmental influences.

Research relating perseveration to failure (35) and fatigue (16) point out another basis for the phenomenon. Here we are faced with Goldstein's secondary rigidity (24, p. 225) which occurs when tasks are too difficult. This type of perseveration has been observed in innumerable experiments with animals in which the animal responds by fixations and perseverative behavior to a frustrating or insoluble problem. Perseverative behavior of this sort is used as a defense mechanism. The individual, unable to give the correct response in order to adapt, clings to the previous response and perseverates it despite its inappropriateness. From this discussion, the conclusion may be reached that perseveration is not a single, separate phenomenon, but that it may be the resultant of either or a combination of forces.

CHAPTER II

An Investigation Of "Shift Ability" In Simple Mental Sets And Generalized Conservatism

A. Presentation of the Problem

In Cattell's discussion of the characteristics of perseverators (11, p. 441), they are seen as being more conservative than non-perseverators. Their rigid approach makes a change of ideas difficult for them. According to Lentz, "the essential principle in the conservatism - radicalism difference among persons is the difference in degree of opposition or favor towards change" (39). This investigation has attempted to ascertain the relationship between the ability to handle simple mental sets and the degree of conservatism or radicalism. It has been implied that inability to shift readily from a previous set to a more appropriate one is a phenomenon operating from the level of simple mental sets to the level of complex attitudes. The major problem of this research was to discover if there is a positive relationship between the inability to shift readily from a pre-

viously correct mental set to the set which is necessary to solve the problem at present and a generalized conservative attitude. Also conversely, is there a relationship between this shift ability and radicalism? This shift ability implies not only changing from the original set, but also discovering and using the appropriate new set. This distinguishes shift ability from perseveration as strictly defined.

In White's The Abnormal Personality there is a discussion of the relationship between rigidity or flexibility and good adjustment. He concludes that reality allows neither extreme for healthy adjustment (70, p. 105). Numerous studies relating adjustment to perseveration are given in the first chapter. The present study investigated this relationship in order to ascertain whether those high in shift ability will make better social than emotional adjustments and those low in shift ability will be better adjusted emotionally than socially. The logic for the above hypothesis has been that the ability to change, flexibility, is helpful in dealing with people and social situations, but may create an instability within the individual. Also investigated in this research were the relationships between intelligence, and shift ability, conservatism and adjustment, and also the relationship between conservatism and adjustment.

B. Choice of Tests

In finding a test of conservatism, it was necessary to avoid

those which investigated the specific attitudes, particularly political conservatism, for this was not the measurement desired. In an attempt to measure the trait of generalized conservatism, rather than a specific attitude, Lentz's C-R Opinionaire was chosen. Research has shown conservatism to be a general trait and Allport reports the C-R scale to be "one of the most satisfactory" tests for measuring conservatism-radicalism (1, quoting Allport, Personality, a Psychological Interpretation, p. 431). Alpert and Sargent in an experiment with ninety-three subjects found conservative and radical attitudes to be general rather than specific (1). Lentz studied the scores of five hundred and seventy-nine subjects on six different phases of conservatism. The median corrected intercorrelation was .73 (41). This finding strongly supports the validity of the concept generalized conservatism.

The C-R Opinionaire is a self-administered, non-timed test. The reliability of form J of the test, the form used in the present research, was reported by Lentz as .91. According to Lentz, "The case for validity can be summarized as follows. Experienced judges agree with regard to the key. People who call themselves conservative or middle-of-the-road and who have not changed their church or who did or would vote for Hoover or Smith or Roosevelt, or who are enrolled in the small denominational colleges, make respectively higher conservatism scores on the test than those who

rate themselves as radical or who have changed their church or who would or did vote for Norman Thomas or who are enrolled in large universities" (39). Studies by Moore (20) and Lents (40) find no relationship between conservatism-radicalism and intelligence. Dexter was unable to find any statistically significant relationships in her study of personality traits related to conservatism and radicalism (20).

In further support of the use of Lents' s C-R Opinionnaire to measure the variable desired in this research, we may quote from Hartmann' s comments in The Fourth Mental Measurements Yearbook on this test.

".. for a comprehensive estimate of an individual' s disposition to welcome or resist rationally-grounded proposals for change in such diverse areas as science technology, religious beliefs and practices, education, sex and family life, national and international organization, etc., this well seasoned Washington University product probably supplies as convenient and useful a composite score as any existing alternative" (9, p. 83).

In order to control for any effect that it might have upon the scores on other tests as well as to investigate its relationship to shift ability, conservatism, and adjustment, a test of intelligence was sought. Since scores on the American Council of Education Psychological Test were already available for the subjects used, the total A. C. E. score was used as a measure of intelligence. This is not an I Q test, but is devised for use with college freshmen to measure ability to do college work. The A C E total score has been

found to correlate with the Wechsler - Bellevue Intelligence Scale .55 (2) and .69 (57), with the Stanford Binet .62 (2) and .69 (57), with the Otis Test .65 (57) and .74 (66), and with the Alpha test .79 (57). These relationships indicate that although this test is not a pure measure of intelligence, it is extremely highly loaded with this factor.

The Bell Adjustment Inventory, Student Form, was used as the measure of adjustment. This inventory gives four separate measures in addition to the total adjustment score. These are home, health, social, and emotional adjustment. The reliabilities of these measures are reported as .89 for home, .80 for health, .89 for social, .85 for emotional, and .93 for total adjustment (5). "A number of studies have checked the reliability coefficients of the Student Form and have found them satisfactory" (9, p. 70). Also in The Fourth Mental Measurements Yearbook, Hanawalt states "In conclusion it appears that there is no doubt concerning the correlations published in the manual of the Adjustment Inventory. The validity apparently is as good as any of the paper and pencil adjustment inventories and better established than most of them. The subtests furnish valuable data concerning adjustment in four areas. It has proved to be a valuable instrument in research, in schools, and in clinical work. Apparently its popularity over the years is well justified" (9, p. 72).

The search for a test of shift ability was more difficult than

the choice of the tests described above. The Einstellung test using arithmetic problems in which water containers are manipulated to obtain a specified amount of water was first investigated. This test has been used in a number of studies (17, 47, 48, 53, and 55). The method is discussed in these, but is more thoroughly covered in an article by Luchins (43). He gives a list of problems and the directions for administering the test. The directions and problems used in the present investigation are found in the appendix. A practice problem, a control problem, four set problems, and five crucial problems were given to fifty-three students in advanced psychology courses. The control problem as well as the crucial problems could be solved by the set method or a simple method. The set problems could be solved only by the one complex method. The ability to shift was to be measured by the number of crucial problems solved by the simple method. The inability to shift would be shown by a perseveration of the set method of solution in solving the crucial problem.

Of the fifty-three subjects tested, thirty-five were eliminated due to incorrect solutions of the problems or to complex solutions to the control problem. If the control problem was not solved by the simple method, but by the complex set method, then set solutions to the crucial problems could not be assumed to be caused by perseveration from the set problems. An attempt to control this loss of

subjects was made by slightly varying the directions and using time limits ranging from one minute to two and one-half minutes on the problems. These changes had no significant effect. There seemed to be some degree of self-instruction in addition to the given directions. Mental sets, such as the set to use all the containers in each problem, were assumed by some subjects despite the experimenter's attempts to avoid them. Luchins reports similar difficulty with this test (45, 46, and 56). He concludes that the rigid responses are due not to a general, fundamental trait in the individual, but to situational or field forces influencing the assumptions of the subjects. It was decided not to use this test in the final experiment due to its susceptibility to these forces.

An anagram test devised on a similar principle to that of the arithmetic test was tried. (See appendix for the list of anagrams and their solutions.) The first four anagrams were capable of being solved by the same rearrangement of letters, the next five by a different rearrangement, the following four by a third method of rearrangement, and the final two by a fourth method. The inability to shift mental sets was to be measured by the greater length of time spent in solving the first anagram in each of the above sets of anagrams. It was assumed that a mental set would be learned in solving one series which would interfere with the solution of the earlier anagrams of the following series. After admin-

istering this test to only a very few subjects, it became obvious that anagrams were not solved by simple rearrangements of letters, but were seen as wholes with the solution coming as a seemingly sudden insight. A series could be solved without perception of the fact that each had been solved by the same arrangement of letters. For this reason, the anagram test was useless and had to be discarded.

The test finally selected to measure shift ability was a modification of Berg's test of flexibility in thinking. This test is described thoroughly in an article by Berg (6). She used sixty-four cards, four stimulus cards and sixty to be sorted. The cards were to be sorted by the subjects. As they sorted, the sorting categories were changed without their knowledge. There were three categories for sorting: (1) color; red, yellow, blue or green; (2) design; star, cross, triangle or circle; (3) number of designs; one, two, three or four. The number of errors made in changing from one category to another indicated the flexibility in thinking. Berg with fifty-one subjects divided them into three groups by the test; (1) those discovering that the sorting criteria was being shifted; (2) those having only vague notions concerning the shifts; (3) those unable to solve the problem (8, p. 262). Significant differences were found in the number of errors made by each group. Berg concluded "The results so far obtained demonstrate reliable, objective measures of consistent ability to shift" (6).

The modification of this test which was used in the present research contained only twenty-seven cards, three stimulus and twenty-four cards to be sorted. The colors were red, blue, and green; the designs were circles, squares, and crosses, and there were either one, two, or three designs on each card. The stimulus cards, which were attached to a white section of cardboard beneath the words "Sort the cards into three groups below the key cards", were red with one circle, blue with two squares, and green with three crosses. The number of errors made, excepting those on the first sorting category, was used as the measure of shift ability. The sorting category was changed without any knowledge of this by the subject after five correct responses in the category. The subject was notified whether each response was right or wrong as it was made. No changes were allowed. A card remained where it was first placed. The sequence of categories was; (1) design; (2) color; (3) number; (4) color; (5) design; and (6) number. This same sequence was followed for all individuals tested.

C. Procedure

The subjects used in the experiment were Richmond College students who volunteered for the research. They were all general psychology students. Their age ranged from eighteen to twenty-eight with

a mean age of twenty-one years. Volunteers who were thirty years of age or more were not used to prevent the relationship between age and perseveration discussed in the first chapter from influencing the results. The test of shift ability was administered to seventy-one students, four of whom were over thirty years of age, leaving sixty-seven subjects. The subjects were at first requested to take the test on their own time, but when it was discovered that too few volunteered under these circumstances, it was decided that the testing had best be done during the general psychology class period.

The shift ability test was given individually with only the experimenter and the subject in the room. The subject was given no information concerning the purpose of the research or just what was measured by the test. The subject was seated across the table from the experimenter and the board containing the three stimulus cards was placed before him. The cards were shuffled and handed to him as he was being directed to sort the cards one by one into three groups beneath the key cards. He was told that as each card was placed, he would be told whether it was placed right or wrong, but that no other questions could be answered. As the twenty-four cards were used, they were simply reshuffled and the test continued.

On completing the shift ability test, the subject was given a copy of the Bell Adjustment Inventory, Student Form, and was told what the test attempted to measure. He was requested to complete

the inventory, as honestly as he could, and to return it within the following few days. After all of the individual testing had been completed, the Lentz C-R Opinionnaire was administered to the three groups during their general psychology class period. The subjects were not informed as to what was being measured by this test, but they were briefed later on the purpose and procedure of the research. Each of these tests was scored and correlations were determined through the use of the C - D Hand Correlation Chart (19).

D. Results and Discussion

The correlation between shift ability and conservatism was $-.15$ with a standard deviation of $.12$. The mean score on the shift ability test was 29.2 , $\sigma = 10.7$, and on the Lentz C-R Opinionnaire $M = 31.4$, $\sigma = 6.8$. The higher the score on shift ability, the less able the individual was to shift, and the higher scores on the C-R scale represent more conservative scores. Therefore the expected relationship here had been a positive one. The discovered correlation was negative, but it is not statistically significant. The correlations between conservatism and the number of errors made for each sorting category, except the first, and for the category in which the highest number of errors was made were computed (See appendix, Table 2). None of these relationships were significant. From

these correlations no relationship was evidenced between shift ability as measured by the modification of Berg's test and conservatism as measured by the C-R Opinionnaire.

In order to test the hypothesis concerning shift ability and adjustment, a correlation was determined for the relationship between shift ability and the difference between the emotional and social adjustment for each subject (See Table 3). The higher scores on the Adjustment Inventory indicate poorer adjustment. This correlation of $-.16$ was in the expected direction, but was not significant. This negative relationship between the poorer emotional than social adjustment and the inability to shift mental sets had been predicted, but it was not strong enough to be held as supporting the hypothesis. This difference in emotional and social adjustment was not related to conservatism (Table 3).

The relationships between home, health, social, emotional, and total adjustments and shift ability (Table 5), as well as between total adjustment and the deviations from the mean shift ability score (Table 4), were investigated with no significant results. No evidence was found to support the findings of Pinard (63), Cattell (29), and Cowen and Thompson (17) on perseveration and adjustment.

In discussing the lack of significant relationships between shift ability and these other factors, it might be well to re-appraise the measurement of shift ability. In discussing the test with groups of the subjects after completion of the experiment,

it was obvious that a large number of them had never realized that the shifting was occurring. They had spent the entire testing time seeking one specific criterion which would hold for all responses. They were quite flexible and tried numerous complex solutions, but they were unable to find the correct categories. From this discussion, it was obvious that flexibility itself was not being measured by the test, but that the measure was of appropriate shifting. This information indicated that either extreme, rigidity or flexibility, could lead to a high score, meaning low shift ability. This flexibility coupled with inability to make appropriate responses may be in some cases due to the intelligence factor, since the correlation of $-.21$ between the A.C.E. scores and shift ability test scores indicates the possibility of a relationship although it is not significant. It was more likely, however, that this was due to a process of self-instruction whereby the subjects assumed that there must be a complex (far be it from college students to seek a simple explanation) solution to fit the entire problem. From this point then the test was perhaps "too simple" for the subjects used. Despite the faults of the test, there still remained the conclusion that no relationship was illustrated between the ability to handle these simple mental sets appropriately and conservatism or adjustment.

There was no indication of a relationship between adjustment and conservatism (Table 5), or intelligence (Table 5). Those college

students scoring poorly on a test of ability to do college work are apparently as well adjusted as those receiving high scores on the A.C.E. test. Of course, the Bell Adjustment Inventory does not give a measure of their school adjustment, but if it were poor, one would expect this to influence the other measures of adjustment. The findings of Moore (20) and Lentz (40) on conservatism and intelligence are supported as no evidence of a relationship was found (Table 6). The distributions of shift ability (Figure 1) and conservatism (Figure 2) and the means and standard deviations of the various measures (Table 1) are found in the appendix.

E. Conclusions

1. There was no evidence to indicate a relationship between the inability to shift readily from a previous simple mental set to a more appropriate set and generalized conservatism.

2. There was also no relationship indicated between the ability to shift mental sets and better social than emotional adjustment in this research.

3. No evidence was found to support a relationship between home, health, social, emotional, or total adjustment and shift ability, conservatism, or intelligence.

4. Intelligence was not related to conservatism, but may be related to shift ability with the evidence here being inconclusive.

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A P P E N D I X

ARITHMETIC PROBLEMS TEST

Problems	Size of Containers			Amount to Be Obtained	Solution
	A	B	C		
Practice 1.	39	4	--	51	$A - 2(B)$
Control 2.	13	29	3	10	$A - C$ or $B - A - 2(C)$
Set 3.	30	40	3	4	$B - A - 2(C)$
" 4.	7	16	4	1	"
" 5.	31	61	4	22	"
" 6.	8	18	3	4	"
Crucial 7.	23	49	3	20	$A - C$ or $B - A - 2(C)$
" 8.	11	25	3	8	" "
" 9.	17	40	6	11	" "
" 10.	10	23	3	7	" "
" 11.	11	27	5	6	" "

Directions (These were read to the groups)

Fill in the information on the front of your booklet.

You are to be given a test which is to be used for further research in other classes on campus. Consequently I would greatly appreciate your not discussing this test in any way with other students. Questions concerning the test can not be answered at present, but a report of the results will be given to you when the research

is completed.

The test will consist of several simple arithmetic problems. The problem will be to obtain a certain amount of water by the manipulation of containers of specified capacities. You will have an unlimited supply of water, but no measuring device except the containers which are not marked. In other words, each container holds only a certain number of gallons. By pouring the water back and forth among the containers, the desired number of gallons can be obtained.

As an example, if I gave you two containers, one holding exactly sixteen gallons and the other holding exactly three gallons, how would you get seven gallons? The solution would be to fill the sixteen gallon container and then fill the three gallon container three times from it. You might write the solution like that, or just write $16 - 3 - 3 - 3 = 7$, or $16 - 3(3) = 7$. Give your answer in any way which will clearly illustrate how the containers are used to obtain the required amount.

Please do not talk or ask any questions during the test. Do your own work. Each problem will be timed, so work quickly. Put only one problem on a page, turn the page over after the problem is solved, and do not go back to any of the problems.

The amount each container will hold and the amount to be obtained will be put on the board. Number each problem in your book. The capacities will be written here and the amount to be obtained here. (Positions on the blackboard were designated.) The containers may be used in any way you please to obtain the answer.

Begin and stop on my signal.

Anagram Test¹

Anagram	Solution	Rearrangement of letters
1. elcum	uncle	54312
2. klach	chalk	"
3. enesc	scene	"
4. tsogh	ghost	"
5. emcal	camel	43125
6. enhoy	honey	"
7. lichd	child	"
8. eequn	queen	"
9. rasof	scarf	"
10. peshe	sheep	54123
11. nitra	train	"
12. macre	cream	"
13. elwha	whale	"
14. patry	party	12435
15. motuh	mouth	"

¹ These anagrams are taken from a list in 70, pp. 406 - 407.

Figure 1. Distribution of shift ability scores.

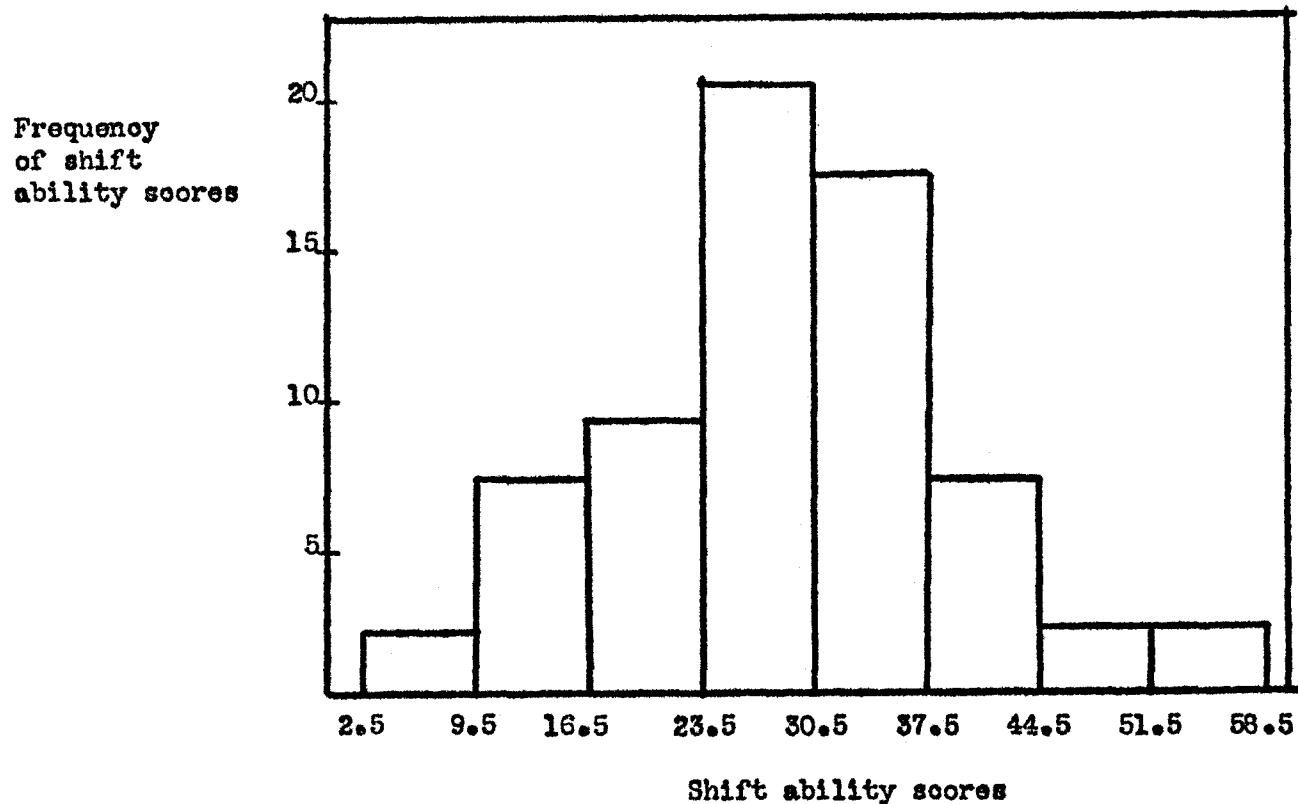


Figure 2. Distribution of conservatism scores.

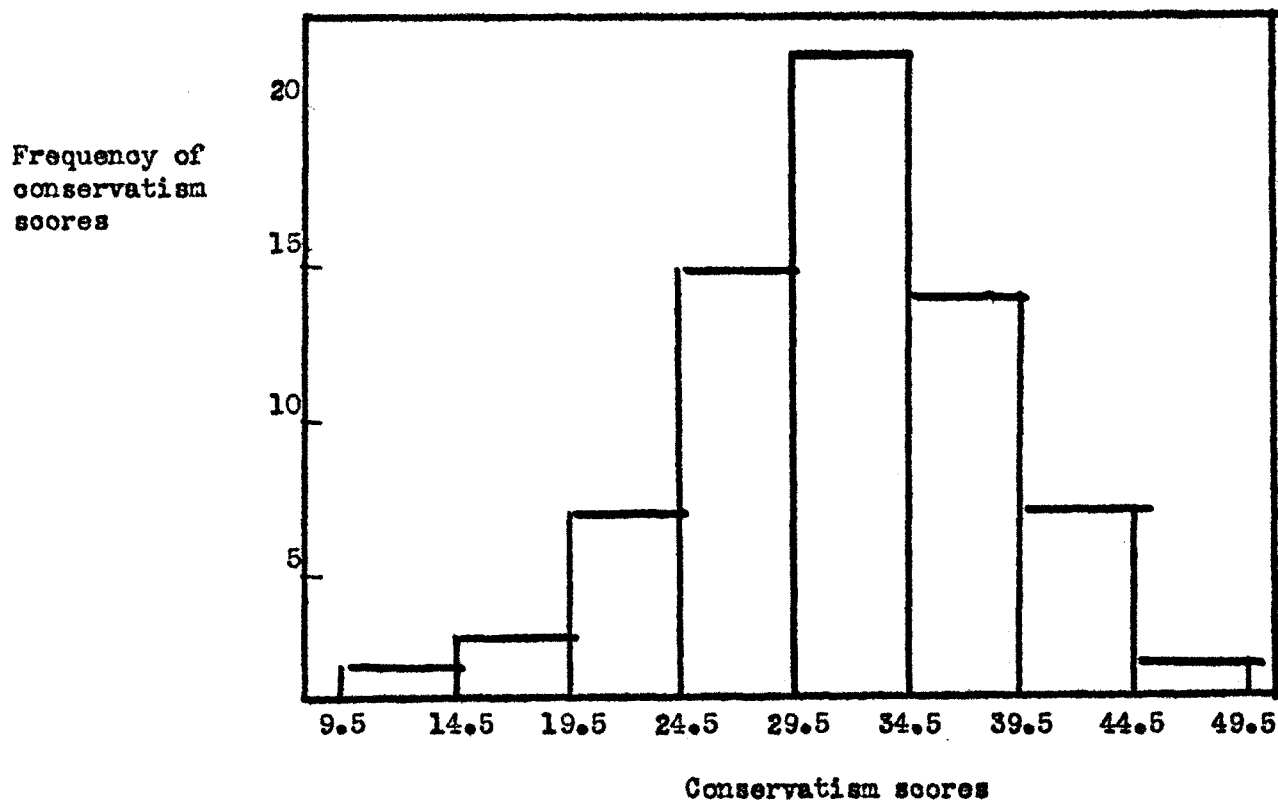


Table 1. Means and standard deviations of the measures used in the research.

	M	σ
Shift Ability	29.2	10.7
Conservatism	31.4	6.8
A.C.E. Psychological Exam.	114.2	18.1
Bell Adjustment Inventory		
Health	5.2	4.8
Home	7.3	3.6
Social	6.8	4.8
Emotional	6.7	5.0
Total	25.9	13.0

Table 2. Correlations between shift ability and conservatism, N = 64.

		T ¹	2 ²	3	4	5	6	H ³
Conservatism	γ	-.15	.13	-.04	-.11	-.06	-.15	-.10
	σ	.12	.12	.12	.12	.12	.12	.12

1. T refers to the total number of errors
2. Numbers refer to number of errors on each consecutive change of shifting criterion
3. H is the highest number of errors on any one shifting criterion

Table 3. Correlations between social and emotional difference and shift ability and conservatism.

	Shift ability	Conservatism
Social and Emotional Difference	$r = .16$	$r = .052$
	σ .13	σ .13
	N 60	N 57

Table 4. Correlation between deviations from mean shift ability score and total adjustment.

r	σ	N
.12	.13	60

Table 5. Correlations between shift ability and adjustment, conservatism and adjustment, and A. C. E. scores and adjustment.

	Bell adjustment				
	Home	Health	Social	Emotional	Total
Shift ability, N = 60	r .06	-.13	.06	.03	.01
	σ .13	.13	.13	.13	.13
Conservatism, N = 57	r -.08	.01	-.05	-.14	-.11
	σ .13	.13	.13	.13	.13
A. C. E. scores, N = 56	r .20	.05	.01	.08	.13
	σ .13	.13	.13	.13	.13

Table 6. Correlations between A. C. E. scores and shift ability, and A. C. E. scores and conservatism.

	Shift ability	Conservatism
A. C. E. scores	$r = .21$	$r = .02$
	σ .12	σ .13
	N 63	N 60

VITA

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