Development of a Measure of Locus of Control Using Early Recollections

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INTRODUCTION

The degree to which an individual believes that reinforcements are contingent on his own behavior has been conceptualized by Rotter (1966) as internal-external locus of control. Internal control refers to individuals who believe that reinforcements are contingent upon their own behavior, capacities, or attributes. External control refers to individuals who believe that reinforcements are not under their personal control but rather are under the control of powerful others, luck, chance, fate, etc. Depending on past experiences, a person develops a consistent attitude or set of beliefs tending toward either an internal or external locus as a source of reinforcement.

An inventory measure for locus of control devised by Rotter (1966) has been extensively used to establish both its own reliability and validity and to relate this dimension of personality to other variables. Joe (1971) wrote a review of the internal-external control construct as a personality variable and Throop and MacDonald (1971) have presented an extensive bibliography of over 330 references to published and unpublished works relating to the construct.

In addition to Rotter's inventory, Dies (1968) provided a
measure of locus of control based on a projective measure instead of a scale. His scoring of TAT stories is an alternate method of measuring locus of control.

Adlerians have used early recollections as a projective technique (Mosak, 1958) to get information about a person's cognitive goals, beliefs, and expectations. Beliefs about how a person sees the contingency of events in his life might be expressed in his early recollections.

The present study sought to devise a method for measuring locus of control based on early recollections. After establishing reliability in scoring early recollections, the concurrent validity of the measure was determined by comparison with two other measures of locus of control, the inventory I-E scale of Rotter and the TAT measure of Dies. The Marlowe-Crowne Social Desirability Scale was used to determine discriminant validity.
Early Recollections and Stories as Constructions

Both the stories a person tells and his recollections of early experiences may be regarded as personal constructions. As creative products of the individual's memory and imagination, they may be expected to reflect how he uniquely sees the world and the people in it, how he expects to react to events, what difficulties he sees in the pursuit of his goals, and how he might respond to these difficulties. Stories seem to express primarily an imaginative process whereas recollections depend on memory. Yet a story is not exclusively the product of imagination, nor is a recollection merely the replication of past happenings. For in telling a story, we draw upon memory by recalling situations we are familiar with, experiences we have had, and what we have heard, read, or seen. Less obvious is the role of creative imagination in memory, but in our reconstruction of past experiences, there is not only a selection of the incidents that we spontaneously recall, but the further selectivity in the way we recall them, the point of view expressed. The way we recall an incident depends on how we perceived it in the first place and this perception is further retained or altered as it fits into our current view of life.
Since the stories a person tells and the recollections he gives show how he perceives situations and the effectiveness of his action in them, they can be expected to indicate whether a person believed or expected to attain a goal (success) or merit punishment (failure) on the basis of his own action or independent of it. Stories and recollections should both reflect a person's beliefs about internal or external locus of control.

**Differences between Recollections and Stories**

Although storytelling and personal recollection are both active constructions based on selective perception, some differences between them need consideration.

The first difference is the apparent tie to historical events. A story is not autobiographical as such and need not relate to actual happenings in time and place of the person's life, but a recollection purports to do so. This apparent difference is not so sharp on closer look. For, whereas workers such as Dudycha and Dudycha (1933, 1941) tried to locate early memories historically, the use of early recollections as a projective technique is relatively unconcerned about their historical accuracy. It is more important to consider the selectivity of the experience recalled and how it is reported to have been experienced. From an Adlerian viewpoint, it is the "message" (Gushurst, 1971; Mosak, 1958) that is important, not its historical accuracy. Likewise, from an analytic orientation, it is the function of the early memory as screening
trauma or its clue to ego defenses that is noteworthy. As a screen, the early memory is assumed to conceal unacceptable impulses or trauma that are to be uncovered by analysis. Both stories and early memories from a strictly psychoanalytic orientation serve to conceal important material; from an Adlerian viewpoint, they serve to express the style of life. Psychoanalytic theory leads one to look into stories to discover the drives and needs that unconsciously motivate the person, and these are woven in associatively through the themes of the stories. Stories, however, may be regarded more directly as the product of imagination deliberately used, so that a problem situation is set up and the storyteller resolves it in the outcome. The differences between stories and other fantasy material were elaborated by Holt (1961) and further by Arnold (1962) for the interpretation of TAT stories.

For Adlerians, early recollections "merely reflected the person's perceptual framework within which he interpreted life's experiences" (Mosak, 1958, p. 302). Adler wrote: "Thus his memories represent his 'Story of My Life'; a story he repeats to himself to warn him or comfort him, to keep him concentrated on his goal, to prepare him, by means of past experiences, to meet the future with an already tested style of action" (Adler, 1931, p. 73). Although at first glance early recollections appear to be primarily historical recall and stories seem unrelated directly to personal experiences, both do lend themselves to an interpretation of a person's construction of life as he sees it, i.e., his phenomenal viewpoint.
A recollection and a story differ also in the amount of elaboration in them. The recollection is limited to the world of the child as the adult recalls it, because it is based on personal recall of childhood. Elaboration is limited to the child's frame of reference. In a story, a person may draw upon all the resources of his adult world, and even enter fantasies that extend beyond real possibilities. Although the more generalized goals and expectations of the child as the adult recollects it have their analogues in his current world, these must be interpreted from the more simplified goals and expectations presented in the childhood recollections. The repertoire of means selected to deal with the goal or expectation is likewise simplified. In contrast, a story's problem may be quite complex and the means to resolve it quite involved. If the recollection were strictly an historical report, one might expect a more external locus of control expressed in early recollections than in the stories of adults, because a child presumably in fact has less control over external events than an adult has. But since what is recalled and how it is recalled fit in with a person's current goals and expectations, both will likely express a unified belief. They may differ in the type of action taken in response to the belief or expectation. The story may more accurately reflect current behavior in response to the expectation.

A third difference relates to content. Whereas the story is a problem-solution setting with a plot and an outcome, the early recollection may be primarily an affective incident, an
incident where the person felt a certain way. A story calls upon intellectual and cognitive capacities of the storyteller as well as his habitual attitudes and expectations. The early recollection is more often simply a narrative about an affective incident showing how this person felt in a given situation and why, what he expected to happen and how he felt about it. Early emotions of like, dislike, fear, joy, anger, sadness, disappointment, and embarrassment are related to the situations that gave rise to them and how persons responded. These feelings and the reasons for them, however, will reflect what the person believes about his control of the happenings around him. According to Adlerians (Gushurst, 1971), we can expect the person to react emotionally to current similar situations as he did to the recollected situation, but he may act differently in response to it. The recollections express current attitudes, but not necessarily current behavior. Since locus of control is a belief or expectancy about life and events, it too does not directly predict behavior. Since the story draws also upon habitual cognitive solutions, behavior patterns, and habits, it more accurately predicts current behavior. For example, the message or belief of a recollection may be that "life is dangerous." This belief may produce a variety of stories: the way to deal with danger is to withdraw from life; since there is danger, one must proceed cautiously but go forward; because life is dangerous, I need someone to protect me; danger, nonsense, a daredevil can laugh danger in the face. While the story may recount any of these solutions, both story
and recollection tell us that the person anticipates danger in life. While we might expect a preoccupation with themes of danger in both stories and recollections of a person with this belief, the solutions to meeting danger might well differ, even contrast, between recollection and story. Both story and recollection, it is hypothesized, will indicate whether a person sees his actions effecting any change in the events around him.

A fourth difference between recollection and story is the point of view of the narrator. We assume that the early recollection is a self-report, but we do not assume that the hero of the story is necessarily the storyteller. However, according to Arnold (1962), we can still determine from the story and outcome how the storyteller expects such situations to turn out, even when he is not identified with the story's protagonist. Hence, the point of the story, its import, is not vitiated by the difficulty in identifying the hero as the storyteller.

The differences between early recollections and stories suggest that they are quite different methods for determining a person's cognitive beliefs about the contingency of events upon personal action. Both may express the belief, but whereas the recollection holds the belief in focus, the story action may reflect the change in behavior since the recalled incident.

**Similarity of Approach to Recollections and Stories**

The use of TAT pictures and early recollections has been influenced by four questionable assumptions related to their
interpretation from a psychoanalytic orientation. The first is the analytic or atomistic approach. The story or recollection is broken down into themes or isolated components which are then used for interpretation rather than taking the recollection or story as a whole as the unit of interpretation. The second assumption is that the recollection or story conceals traumatic material that is repressed from consciousness. The theory of infantile amnesia holds that material that is recalled represents content less threatening to the ego. Stories are similarly treated as concealing the needs and drives, particularly those of a sexual or aggressive nature, which unconsciously motivate the person. As a consequence of these first two assumptions, the content or themes of recollections and stories are treated as clues or symbols to reach the latent material that has been associatively transferred to manifestly safer images through the defensive operations of displacement and symbolization. Fourthly, in order to integrate this process of interpretation, the hypothetical material is organized according to the Freudian structure of personality, the id, ego, and superego, with the particular dynamics related to this structure in terms of id impulses of sex and aggression, the defense operations of the ego, and prohibitions from the superego. By the time this analysis has taken place, the interpretation has moved away from the manifest content of the story or recollection by conjecture based on isolated segments of the story or recollection and the intrinsic logic of the psychoanalytic model of man.
The Adlerian approach to early recollections and the interpretation of TAT stories according to Arnold (1962) avoid the psychoanalytic pitfalls by working on the following assumptions. First, the recollection or story is to be taken as a whole. For Arnold, this consists in taking the import, the kernel or "moral" of the story, which abstracts from the concrete details of the story to discern what the storyteller is trying to say about life. A single import from each story is the unit of interpretation. Although Dies's (1968) scoring of the TAT for locus of control does not employ an intermediate step of taking an import, each story is treated as a unit and assigned a single score. In an Adlerian tradition, Mosak (1958) and Gushurst (1971) look for the "message" of the recollection, setting it to a "headline" that captures its point, or in a particular formulation to preserve it. Second, the recollection or story is considered as revealing rather than as concealing. The manifest content is taken as such. Adler sees the early recollection as revealing or expressing the life style, not as concealing conflict. Arnold stresses using the person's own words where possible to formulate the story import. As a result, thirdly, the content is taken to mean what it says, rather than as a symbolization or displacement of something that is not said. The particular situations or persons in the story or recollection may be generalized to similar current situations of the person's life, but they are not taken to mean something completely different according to a predetermined meaning for the symbols. If certain objects have a symbolic meaning or are
prototype, these meanings are found out by asking the person what
he means by them. They are taken in the context of the person experi-
eniting them or telling about them. Finally, the interpretation is
made according to the subject's account rather than by fitting it into
a structure of personality or dynamics employing jargon remote from
the reported story or recollection. It is the lack of this super-
imposed structure and adherence to the report of the person that gives
to an Adlerian interpretation of early recollections and to Arnold's
interpretation of the TAT a "common sense" flavor and allows it to be
used by any person "with sufficient education, intelligence, and
general familiarity with the language of the subject's culture"
(Gushurst, 1971, p. 31). Or as Arnold writes: "We are psychologists,
not seers, and need not pretend to an insight into the innermost core
of personality, when all we have to go on is what a man says and
does. We should let him speak for himself and do our level best to
help him speak clearly" (1962, p. 46).

What is common to both Adler's approach to early recollections
and Arnold's approach to TAT stories is that for both of them the
interpretation is an attempt to let a person speak for himself and an
earnest effort to help him speak clearly by listening closely to what
he is saying about himself and reflecting it back to him. While Dies
does not explicitly follow Arnold's method of interpreting TAT records
to score for locus of control, his approach is consonant with her
theory.
Early Recollections

Three currents interflowing in early recollection literature have been pointed out by Mosak (1958) and Gushurst (1971): (a) taxonomic and statistical studies which classify the age of recollections, their affective character, and other aspects of memory content; (b) those following the Freudian tradition which are largely concerned with the screening function of early recollections and more recently as revealing personality structure and defense operations (Eisenstein & Ryerson, 1951; Langs, 1965; Mayman, 1968); (c) those following the Adlerian tradition which consider the early recollection as a reflection of life style or an individual's perception of his world. An excellent review of this literature is found in Gushurst (1971). Our concern is with the Adlerian use of early recollections as a projective instrument. Mosak (1958) presents a review of the literature and the theory for the use of early recollections projectively. Gushurst (1971) has developed a methodology for systematic interpretation of early recollections which is in the Adlerian tradition and which he found reliable.

Several specific assumptions concerning the use of early recollections need to be pointed out. Dreikurs (1952), Mosak (1958), and Gushurst (1971) differentiate between a recollection and a report. The early recollection is a single, unique occasion, where a person is able to give details. It stands out as a single incident and fits into the formulation: "I recall one day when..." The report, in contrast, is general and recurrent, "a collection of incidents
whose individuality has been lost" (Mosak, 1958, p. 304), and fits into the formulation: "I remember how (we) used to..." The early recollection possesses uniqueness whereas the report is a generalized experience. The recollection possesses greater clarity and distinctness, whereas the report is vague and fragmentary. Early recollections are sparse whereas reports are abundant. Since the recollection is highly selective, we must ask why it stands out (Gushurst, 1971). Mosak says of the recollection: "A recollection pertains to a single incident which can be reduced to a 'one time' format while the report cannot. The recollection, therefore, generally contains more specific detail than is possible in the report and is similar to a TAT story" (1958, p. 304). This distinction between a recollection and a report is important because the recollection is more valuable, according to Dreikurs, Mosak, and Gushurst, in reflecting the central strivings and basic attitudes.

The assumptions about early recollections made by Adlerians include the following (Gushurst, 1971): (a) the early recollection contains contemporary generalized attitudes about self, people, and life; (b) the early recollection does not provide information about contemporary behavior, but only about attitudes; (c) a generalized attitude can be extracted accurately and reliably by different interpreters; (d) the early recollection can be taken to represent the individual's "real life" exactly as it is represented in the recollection, i.e. the person refers to himself, "others" in the early recollection can be generalized to persons for which it serves
as a prototype (Mosak, 1958), and "life" can be generalized to the non-human aspects of his experience; (e) the individual's emotional response in the early recollection can be expected to recur if the person meets its contemporary equivalent, although the behavior may be different. This last assumption is based on a cognitive theory of emotions, such as Arnold's, that holds that emotions result from the subjective appraisal of a situation. This appraisal, intuitively made, is recalled subsequently in a similar situation. The person's intuitive appraisal of a current situation, and consequently his emotion, will be roughly equivalent to that reported in his early recollection although his reflective appraisal or deliberation leading to action may be different (Arnold, 1960).

The foregoing assumptions may be considered the core for a projective theory of early recollections. There are other hypotheses regarding early recollections that are more problematic. One is that of "dramatic recollections." These are recollections that are particularly vivid--death, an accident, a disaster, a uniquely happy occasion--which most people would recall if it occurred to them. Although according to Mosak (1958) the more "dramatic" an incident the less significant will it be and the more "innocuous" the incident the more likely will its recall be due to an individual's particular style, still the way a dramatic incident is recalled reflects the person's attitudes.

The particular importance of the earliest recollection was emphasized by Adler (1931), but subsequent research has not supported
its importance (Purcell, 1952). It seems that all early recollections are significant with little special significance to be placed on the earliest one. Early recollections in general--arbitrarily set at age eight or earlier--do seem to reflect basic attitudes while recent recollections change with the present mood (Mosak, 1958).

Research on Early Recollections

The largest amount of research on early recollections has been devoted to their utility for differential diagnosis and to correlating them with personality variables.

Plottke (1949) found that the first memory of 50 delinquent girls had more active and more pessimistic content and less emotional content than those of 50 normal girls. The memories of delinquent girls involved more punishment, less harmonious social relations, and more often a sense of being abused.

Eisenstein and Ryerson (1951) identified certain types of recollection themes with various diagnostic categories. Psychosomatic patients gave evidence of the organ of choice for their ailments, anxiety hysterics showed fear, obsessive-compulsive patients revealed strong prohibitions, depressed patients had themes of being abandoned, and schizoid patients showed severely traumatic themes, involving solitary situations, autoerotic activity, helpless rage, and rejection.

Jackson and Sechrest (1962) used the indications reported by
Eisenstein and Ryerson (1951) to differentiate four diagnostic groups: anxiety reaction, depressed, obsessive-compulsive, and patients with gastrointestinal distress. They used three recollections of the clinical patients, comparing them with the recollections of college and seminary students. They found that the neurotic groups yielded different types of recollections. When specific items from recollections were used to differentiate groups, the overall incidence rate of these items was low. This problem arises in studies where specific items are focused on.

Friedman (1950) compared the early memories of 100 patients diagnosed as psychotic and neurotic. The psychotic group showed memories with depersonalized themes, despair, and loneliness; the neurotic groups had themes of dependency, over-protection, and sorrow over loss of love.

Langs, Rothenberg, Fishman, and Reiser (1960) compared memories of 10 hysterics and 10 paranoids and found that the hysterical group had memories of grossly traumatic themes, themes of punishment and illness, action orientation, and concern for body parts. The paranoid group showed memories lacking interaction of persons, ideational rather than practical themes, and themes centered on happy occasions. Mosak (1969) criticized this study because the sample was so small and he raised the objection that idiographic material is lost in satisfying the requirements of objectivity. Langs (1965) later compared the early memories of four diagnostic categories: obsessive-compulsive, inhibited obsessive-compulsive, hysterical, and
narcissistic, locating characteristics related to each category.

Friedman and Schiffman (1962) were able to distinguish 20 psychotically depressed patients from 10 paranoid schizophrenics with early recollections. They used nine characteristics hypothesized to differentiate between the groups. Ferguson (1964) was less successful in differentiating among 10 psychotics, 10 neurotics, and 10 normals on the basis of early recollections. Five clinicians, including three Adlerians and two eclectics, diagnosed pathology on the basis of the early recollections, but none were able to attain accuracy above chance. The Adlerians wrote life style summaries from the early recollections. These summaries could be matched with their early recollection protocols.

Heuvig (1965) used early recollections to differentiate between children diagnosed as either psychoneurotic or adjustment reaction. Judges were advised to make the differentiation on the basis of whether the protocols showed active as opposed to passive rebellious tendencies. Two of three judges made the differentiation at a significant level; and with all three judges combined, the results were also significant.

Early recollections have also been related to other personality variables not directly related to pathology. Ansbacher (1947) used the earliest recollection of 271 male college students and compared them to responses on the first 25 items of the Maslow Security-Insecurity Test. He found certain themes associated with high and low scorers on this scale. Purcell (1952), however, objected that
Ansbacher had not backed up his impressions with adequate statistics. Using 126 college students, he found that secure students as measured by the Maslow Security-Insecurity Test reported significantly more pleasant memories, whereas insecure students reported more unpleasant memories. He also found that for secure students, the ratio of joy to fear reported in the early memories was greater than it was in insecure students.

Kadis, Greene, and Freedman (1952) used both early recollections and 10 TAT stories to match descriptions written by two teachers independently of 20 high school girls regarding their ability to (a) pursue tasks and (b) to relate to teachers. Three judges matched the TAT protocols from each girl with the descriptions of the two characteristics for each girl. When the early recollections were added to the TAT protocols, correct matching for both characteristics increased.

Using other tests as a criterion for matching was done by Lieberman (1957). An evaluation was written by two psychologists for each of 25 female patients, one using a test battery including the Wechsler-Bellvue, the Rorschach, the Bender-Gestalt, and the House-Tree-Person, the other using early recollections alone. These two reports were compared, using a checklist of traits. There was more agreement than disagreement on the traits checked. Although the test battery provided more information from which to check traits, the items that were checked on the basis of information derived from early recollections correlated positively with items
derived from the test battery.

McCarter, Tomkins, and Schiffman (1961) compared early recollections written by 75 college students with their performance on the Tomkins-Horn Picture Arrangement Test. The PAT is a test that combines features of the TAT and the Picture Arrangement subtest of the Wechsler. Twenty-five plates of three simple cartoon-like drawings are to be arranged in an order "which makes the best sense." Scoring is based on those responses that are out of the ordinary, i.e. given by less than 5% of persons at a similar age, IQ, and educational level. McCarter studied the early recollections and made predictions from these about the performance of each subject on the PAT keys. Seven of 19 predictions were significant, eight of the remaining twelve were in the expected directions, and the other four did not disagree beyond chance. The correct predictions had two factors in common: (a) the degree of activity, and (b) the amount of social interest. Work orientation was predicted with the greatest certainty.

Gushurst (1971) compared the positive early recollections of researchers, performers, and security guards. Positive early recollections are those that have pleasant themes. He found that researchers had twice as many "discovery" recollections as performers and four times as many as security guards. Performers had twice as many recollections containing themes of obtaining applause or using performance to win favors as either security guards or researchers. His hypothesis that security guards would have fewer recollections with themes of mastery or achievement was not supported, since all three
groups produced approximately the same number of mastery or achievement recollections. He also compared early recollections with scales on the Edwards Personal Preference Schedule, but the results showed only slight correspondence between the two. His study is noteworthy in that it relates early recollections to vocational groups of healthy individuals rather than with some type of pathology. An unfortunate aspect was that the security guards differed from the other two groups in a number of dimensions other than occupation as well, viz., age, education, race, time spent collecting the recollections, and the number of recollections obtained from each person.

Although these studies have shown moderate success in differentiating among diagnostic and occupational groups and have correlated with personality variables, some limitations attend the process. In selecting items or content from the early recollections, rather than its "message", the idiographic character of the recollection is lost. Furthermore, the incidence rate of such themes may be too low in a particular group to warrant reliable generalization. Gushurst (1971) has critically pointed out that much of early recollection research has been muddled by the failure to distinguish between a recollection and a report.

Two studies are known using the TAT together with early recollections. The study of Kadis, Greene, and Freedman (1952) mentioned above matched TAT stories first alone and then together with early recollections to descriptions about girls with respect to their ability to pursue tasks and relate to teachers. The additional information supplied by early recollections along with the
TAT made the matching more accurate. There was no attempt, however, to correlate the two tests, nor is their mention of specifically how the TAT protocols were interpreted for use in the matching.

Hedvig (1960) compared the stability of TAT stories and early recollections after experimental conditions of success and failure and under conditions of friendly and hostile experimenters. She used six TAT cards and early recollections written after each experimental condition. The TAT stories and early recollections were compared by rating their pleasantness or unpleasantness, by content analysis for themes of achievement and hostility, by a count of emotional words, and by the amount of total productivity. When counting the number of achievement and hostility themes, Hedvig found that the TAT showed more themes of achievement and hostility following the failure and hostile experimental conditions respectively. Early recollection theme content did not change under the changed conditions. While this study seems to show that early recollections are more stable in content than TAT stories, it is somewhat irrelevant to the present study because change was determined by counting themes.

**TAT Measure of Perceived Locus of Control**

Dies (1968) developed a projective measure for evaluating internal-external control from TAT stories. Each story is rated for internal-external control along a five-point continuum. A rating of 0 is given when a story does not provide clues for internality, 1 for considerable degree of internal control, 2 for moderate internal
control, 3 for a neutral story giving aspects of both internal and external control, 4 for moderate external control, and 5 for considerable degree of external control. In addition to the rating given to each story, the total record is given a score by averaging the scores of the individual stories. Validation was done on a group of forty female nurses, 19-22 years old. A median split on the basis of the Rotter I-E scale constituted the two groups. Stories were written to seven TAT cards (1, 2, 4, 6GF, 9GF, 12F, and a card portraying a psychotherapeutic relationship), allowing five minutes for each story. Reliability was determined by random selection of 10 protocols, 70 stories. An interjudge reliability of .53 ($p < .01$) was obtained for the 70 stories taken individually, a correlation of .82 for the ten protocols for the average score between two judges. The method correctly classified 80% of the students according to their scores on the I-E scale. An overall correlation of .44 was obtained between the questionnaire and the TAT method. An analysis of variance showed no overall effect due to different TAT cards. There was an approximately equal number of ratings internal and external on each of the seven TAT cards. Two cards showed greater efficiency in differentiating students in the two groups. These were cards 9GF and 6GF.

**Locus of Control and Social Desirability**

Rotter (1966) reported discriminant validity correlations between the I-E scale and the Marlowe-Crowne Social Desirability
Scale (MC-SDS) among various groups of elementary psychology students ranging from -.12 to -.35. Since a high score on the I-E scale indicates externality and a high score on the MC-SDS indicates social desirability response set, a negative correlation between the two measures indicates that the socially desirable response is toward internal locus of control. The reported correlations have been consistently negative but low in Rotter (1966). A negative correlation of -.41 was reported (Ladwig, 1963) for a group of prisoners. A correlation of -.22 represented the median for the different samples of college students where males and females were combined.

According to Joe (1971), recent findings relating internal-external control and social desirability have been inconsistent. Strickland (1965), Tolov (1967), and Tolov and Jalowiec (1968) found nonsignificant correlations between the I-E scale and the MC-SDS; while Feather (1967) and Altrocchi, Palmer, Hellmann, and Davis (1968) reported a significant relationship between I-E scores and MC-SDS scores (r = -.42, p < .01, N = 53 and r = -.34, p < .05, N = 96 respectively). Similarly, Berzins, Ross, and Cohen (1970) reported a significant correlation of -.23 between the I-E scale and the Edwards Social Desirability Scale (N = 97, p < .05). These findings suggest that the I-E scale is not totally free of the social desirability set.

The Multitrait-multimethod Matrix

Campbell and Fiske (1959) present a method for determining the convergent and discriminant validity of construct measurement.
At least two traits are measured, each by at least two methods. By obtaining correlations among each of the measures, a matrix is obtained. Different measures of the same trait by the same method, different forms of the same test or alternate items of the measure, establish reliability. Different measures using different methods to measure the same trait establish convergent validity (monotrait heteromethod). Different methods measuring different traits establish discriminant validity (heterotrait heteromethod).

The design of the present study was a modification of this multitrait-multimethod matrix, since discriminant validity was determined with only one method. Two traits, locus of control and social desirability, were measured. Locus of control was measured by three methods and social desirability was measured by one method. Correlations among the three methods for measuring locus of control determined convergent validity; correlations between locus of control and social desirability determined discriminant validity. For adequate validity, higher correlations among the measures of locus of control should be obtained than between a measure of locus of control and social desirability.
METHOD

There were two parts to the study: (a) an initial study to develop a reliable scoring system for locus of control using early recollections; and (b) a concurrent validity study using a modification of the multitrait-multimethod matrix for convergent and discriminant validity based on three measures of locus of control and one measure of social desirability.

Subjects

Subjects were 84 male senior high school students of an all boys Catholic high school centrally located in a metropolitan area. The students were of mixed ethnic and racial background, primarily Caucasian but about one-fourth Negro, and from middle to low middle socioeconomic status. Research measures were given to members of three senior classes. Students were asked to cooperate with the research, but were told they could decline. A few students did decline, and a few incomplete protocols could not be included in the data. The 84 subjects were those who cooperated and whose data were complete.
Materials

Each student was given four measures: the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960), the Rotter Internal-External Locus of Control Scale (Rotter, 1966), the TAT, and Early Recollections. The Marlowe-Crowne Scale measures social desirability response bias. The Internal-External Locus of Control Scale consists of 29 forced choice items, including 6 filler items to make the purpose of the test more ambiguous, devised to detect individual differences in a generalized belief in internal or external control. This scale was further broken down into two factors (Mirels, 1970): Factor I is concerned with the amount of control one believes he personally possesses and Factor II is concerned with the extent one believes a citizen can control political and world affairs. The TAT stories were scored for locus of control according to Dies' (1968) method. The early recollections were scored by the manual devised in the first part of this study.

Procedure

The Marlowe-Crowne Social Desirability Scale and the Rotter Internal-External Locus of Control Scale were completed in writing and scored according to their respective keys. The Rotter I-E scale was likewise scored for Mirels' Factors I and II and their sum score.

For the TAT, eight stories were written to slides of cards 1, 2, 3BM, 4, 6BM, 7BM, 13MF, and 8BM in that order. This is the Basic TAT set given by Hartman (1970). Before the first slide, these
instructions were given (Arnold, 1962, p. 49):

You will be shown eight pictures, one after another. As you look at each picture, write as dramatic a story as you can about it. Tell what has led up to the scene shown in the picture and what is happening now. What are the thoughts and feelings of the people in the picture? What will be the outcome?

Be sure to tell a story with a plot and an outcome. Do not just describe the picture. Try to write a story and not just a piece of conversation. You will have five minutes to write each story.

The instructions were repeated after the first slide was shown, again stressing that a story was desired, rather than a description or a conversation. After four minutes on each slide, the subjects were asked to bring the story to a close. Another minute was allowed for them to complete the story before the next slide was shown.

Eight early recollections were collected from each subject in a personal interview. The interview was used to insure that recollections rather than reports were given and to allow opportunity to inquire adequately for details, for the emotions related to the recollection, why the person felt as he did, and to determine what stood out most in the recollection. The procedure for getting a recollection is made explicit by Gushurst (1971): (a) to specify an incident which happened only once and can be clearly defined; (b) to ask explicitly for details; (c) to limit the early recollection to an age prior to nine; and (d) to question the subject as to what part of the recollection stands out most clearly, how he felt in the situation, and why he felt that way.

The specific instructions given by Gushurst (1971, p. 59)
were followed:

Please try to remember some incidents from your early childhood, before the time when you were nine or ten years old. Try to remember things that happened only once, which you can remember rather clearly. Also, please try to remember as many specific details as you can—about both the incidents themselves and how you felt at the time.

The TAT stories were scored by the author according to Dies' (1968) system for locus of control. In addition to the 1968 article, an unpublished paper, "Criteria for scoring beliefs in external control of reinforcement", was available from Robert Dies.

Reliability

The 84 sets of eight early recollections obtained through personal interview were typed on separate sheets of paper. The subjects were arranged in alphabetical order and assigned numbers. The first twenty sets of early recollections as drawn from a table of random numbers were used in the reliability study.

A preliminary scoring manual was devised (Appendix A), based on four components on which early recollections could be rated positively or negatively. These four components were: (a) whether the person is active (+) or passive (-); (b) the extent that what happens is seen by the person as a result of personal action (+) as opposed to externally determined or caused (-); (c) whether the action is rational or planned (+) as opposed to impulsive (-); and (d) whether what happens is intrinsically related causally or intentionally to the person's action (+) as opposed to being indirectly or only accidentally related to the action (-). Two of these components,
activity-passivity and internal-external causation were scorable by two degrees in either the positive (internal) or negative (external) direction (i.e. +2, +1, -1, or -2). The last two components, rational-impulsive and direct-indirect causation, were considered as additional scores to be added when clearly present in the recollection. The component ratings were summed for the total score for locus of control on each recollection. These scores for each recollection were in turn summed over the eight recollections of a record for a total locus of control score for the subject.

Two judges, as well as the author, independently scored the twenty records of eight early recollections each using this preliminary manual in order to determine inter-rater reliability.

Concurrent Validity

The validity study is a modification of the multitrait-multimethod matrix of Campbell and Fiske (1959) discussed above. Pearson product-moment correlations were obtained among the various measures of locus of control (Rotter's I-E, Mirels' Factors I and II, and Dies' scoring of the TAT) and the measure of social desirability (Marlowe-Crowne Social Desirability Scale).

To establish convergent validity, the correlations between the Early Recollection I-E and other measures of locus of control should be high. To establish discriminant validity, the various measures of locus of control should have a low correlation with social desirability. The measures of locus of control using different methods should correlate more highly with each other than does
each with the measure of social desirability.
RESULTS

Reliability

Two judges were given the twenty randomly assigned protocols of eight early recollections each to be scored according to the criteria of the preliminary manual in Appendix A. Each judge was trained in the use of the manual both through the examples given in the manual and through scoring other early recollections among the data collected excluding those subjects designated for the reliability sample. The author likewise scored the early recollections of this reliability sample.

When the scoring was completed independently by the three judges, it could be seen by inspection that the components Rational-Impulsive (RI) and Direct-Indirect (DI) were used so sparingly and inconsistently among the judges that it was decided to eliminate these two components from the scoring procedure. Pearson product-moment correlation coefficients were obtained between each pair of judges including the author for the Active-Passive (AP) and Internal-External (IE) components. These reliability coefficients for the two main dimensions, Activity-Passivity (AP) and Internal-External (IE), are given in Table 1.
Table 1
Reliability between Judges on the Preliminary Scoring System

<table>
<thead>
<tr>
<th></th>
<th>Active-Passive</th>
<th>Internal-External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Judges A &amp; C</td>
<td>0.564</td>
<td>0.736</td>
</tr>
<tr>
<td>Judges B &amp; C</td>
<td>0.549</td>
<td>0.655</td>
</tr>
<tr>
<td>Judges A &amp; B</td>
<td>0.448</td>
<td>0.626</td>
</tr>
</tbody>
</table>

Note: Pearson product-moment correlation coefficients; N = 160
On both components, it can be seen that each independent judge (Judge A and Judge B) correlated higher with the author (Judge C) than with each other. On the Active-Passive (AP) dimension, Judge A and Judge B reached an approximately equal reliability with Judge C (0.564 and 0.549 respectively). On the Internal-External (IE) dimension, however, Judge A achieved a slightly higher reliability (0.736) with the author (Judge C) than did Judge B (0.655). Taking the correlations among all three judges, the reliability for scoring the Internal-External dimension is somewhat higher than for the Active-Passive dimension.

Since the reliability attained by using this preliminary scoring manual was lower than desired, the scoring categories were revised to make the scoring more consistent and simple. Appendix B gives the revised scoring system. In this revised system, the two components of Rational-Impulsive (RI) and Direct-Indirect (DI) were omitted, leaving two components: Active (Competent)-Passive (Incompetent) and Internal-External Control. Ambiguities in scoring that had appeared in using the preliminary manual were clarified. Each of these components was rated on a 5-point scale, with score 1 indicating the most internally oriented direction and score 5 indicating the most externally oriented. The judges were instructed in the use of these criteria and were asked to re-score the early recollections using the revised scoring system. Table 2 gives the reliability coefficients between each pair of judges after using the revised scoring system. The author (Judge C) likewise re-scored these
Table 2
Reliability between Judges
on the Revised Scoring System

<table>
<thead>
<tr>
<th></th>
<th>Active-Passive</th>
<th>Internal-External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Judges A &amp; C</td>
<td>0.572</td>
<td>0.823</td>
</tr>
<tr>
<td>Judges B &amp; C</td>
<td>0.683</td>
<td>0.826</td>
</tr>
<tr>
<td>Judges A &amp; B</td>
<td>0.791</td>
<td>0.769</td>
</tr>
</tbody>
</table>

Note: Pearson product-moment correlation coefficients; N = 160
On the Internal-External dimension, each independent judge
(Judge A and Judge B) correlate with the author (Judge C) higher
than they do with each other, 0.823 and 0.826 respectively with
Judge C, but 0.769 with each other. On the Active-Passive dimension,
however, they correlate with each other higher (0.791) than either
does with the author (Judge C), 0.572 and 0.683 respectively.

By comparing the results given in Table 1 with those in
Table 2, it can be seen that the revised scoring manual resulted in
improved reliability in scoring for both dimensions. In no case was
there a decrease in reliability between first and second scoring.
The improvement in scoring the Internal-External dimension is some-
what greater than in scoring the Active-Passive dimension.

On the basis of these results, it was decided to use the
revised scoring system on the dimension of Internal-External as the
scoring system for locus of control for early recollections. This
dimension most closely matches the concept of locus of control and
can be scored reliably. The reliability obtained on the Active-
Passive dimension was considered unsatisfactory for this dimension
for use in the validity study.

Concurrent Validity

The validity study includes six measures of locus of control
and one measure of social desirability. Four of these measures
derive from the same instrument, Rotter's Internal-External Locus
of Control Scale; that is, this inventory was scored for the sub-
scales for Factor I (personal control) and Factor II (political
control) as determined by Mirels (1970), for the combined score of these two factors, and for the total score of the full scale. These subscales of the Rotter I-E would be expected to correlate highly with the full scale Rotter I-E score. The items scored for Mirels' Factors I and II are given in Appendix C.

The means and standard deviations obtained for these measures for the sample of 84 subjects are given in Table 3.

Table 4 gives the matrix of correlations obtained by the various measures of locus of control and social desirability. It can be seen that the highest correlations obtained are among the measures derived from the Rotter I-E scale. Mirels Factor I correlates with the full scale Rotter I-E, $r = 0.747$; Mirels Factor II with the full scale I-E, $r = 0.537$; and the combined score of the two factors with the full scale I-E, $r = 0.761$. These correlations are all three significant ($p < .01$). Each of the Factors I and II correlates positively and significantly ($p < .01$) with the sum of their combined scores, $r = 0.853$ and $r = 0.640$ respectively. Mirels Factors I and II show a low correlation of 0.127 with each other, suggesting that they may measure different concepts. Among measures of locus of control based on different methods, the Dies TAT has a significant ($p < .05$) positive correlation with the full scale Rotter I-E ($r = 0.239$), and with each of the subscales for Factor I ($r = 0.191$) and Factor II ($r = 0.222$). The correlation between the Dies TAT and the combined Factors I and II is significant at the .01 level, $r = 0.267$. 
Table 3
Means and Standard Deviations of Measures

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Recollection I-E</td>
<td>26.143</td>
<td>5.004</td>
</tr>
<tr>
<td>Rotter's I-E</td>
<td>11.381</td>
<td>3.512</td>
</tr>
<tr>
<td>Mirels Factor I</td>
<td>4.155</td>
<td>1.997</td>
</tr>
<tr>
<td>Mirels Factor II</td>
<td>3.000</td>
<td>1.335</td>
</tr>
<tr>
<td>Mirels I + II</td>
<td>7.155</td>
<td>2.539</td>
</tr>
<tr>
<td>Dies TAT I-E</td>
<td>25.607</td>
<td>5.335</td>
</tr>
<tr>
<td>MC-SDS</td>
<td>15.381</td>
<td>5.079</td>
</tr>
</tbody>
</table>

N = 84
Table 4
Correlations among measures of Locus of Control
and Social Desirability

<table>
<thead>
<tr>
<th></th>
<th>Rotter's I-E</th>
<th>Mirels Factor I</th>
<th>Mirels Factor II</th>
<th>Mirels I + II</th>
<th>Dies TAT I-E</th>
<th>MC-SDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Recollection I-E</td>
<td>-0.114</td>
<td>-0.061</td>
<td>+0.052</td>
<td>+0.230*</td>
<td>-0.064</td>
<td>-0.126</td>
</tr>
<tr>
<td>Rotter's I-E</td>
<td>+0.747**</td>
<td>+0.537**</td>
<td>+0.761**</td>
<td>+0.239*</td>
<td>-0.182</td>
<td></td>
</tr>
<tr>
<td>Mirels Factor I</td>
<td></td>
<td>+0.127</td>
<td>+0.853**</td>
<td>+0.191*</td>
<td>-0.241*</td>
<td></td>
</tr>
<tr>
<td>Mirels Factor II</td>
<td></td>
<td></td>
<td>+0.640**</td>
<td>+0.222*</td>
<td>+0.028</td>
<td></td>
</tr>
<tr>
<td>Factors I + II</td>
<td></td>
<td></td>
<td></td>
<td>+0.267**</td>
<td>-0.175</td>
<td></td>
</tr>
<tr>
<td>Dies TAT I-E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.068</td>
<td></td>
</tr>
</tbody>
</table>

Note: Pearson product-moment correlation coefficients; N = 84

* $p < .05$, $r = .183$
** $p < .01$, $r = .256$
The measure for locus of control developed for early recollections yielded very low correlations with other locus of control measures. With the Rotter I-E it correlated \(-0.114\) and with the Dies TAT \(-0.064\). The only correlation that reached a level of significance \((p < .05)\) for the Early Recollection I-E was with the combined score of Mirels Factors I and II, \(r = +0.230\). It correlated \(-0.061\) with Factor I and \(+0.052\) with Factor II.

The Marlowe-Crowne Social Desirability Scale (MC-SDS) provided a measure of discriminant validity. The correlations between social desirability and the measures of locus of control were characteristically low and in a negative direction. A significant \((p < .05)\) negative correlation was obtained between social desirability and Mirels Factor I of personal control \((r = -0.241)\). In contrast, the correlation between social desirability and Mirels Factor II is quite low \((r = 0.028)\) although in a positive direction, suggesting again that the two Factors may differ in the type of traits they measure. The Early Recollection I-E showed a non-significant but negative correlation with the MC-SDS \((r = -0.126)\).
DISCUSSION

Reliability

In developing a measure for locus of control using early recollections, the procedure for establishing reliable scoring criteria must surmount two difficulties.

First, the construct of locus of control as theorized by Rotter (1966) is an abstract concept whereas early recollections are concrete incidents of memory. To apply the concept to the data of early recollections calls for a practical judgment about the relevance of the abstract concept to the varied content of early recollections as people report them. Just as Rotter did not have early recollections in mind when he conceptualized locus of control, neither do people reporting early recollections have specifically in mind to tell us about their beliefs and expectations about the control or causality of events in their lives. The two elements, early recollections and the concept of locus of control, were not a priori designed for each other.

Secondly, because locus of control is a specific concept, much of the projective data included in the early recollections are bypassed, dismissed as irrelevant to the trait being measured.
Adlerians have stressed the idiographic quality of these recollections (Gushurst, 1971), but this is lost in tapping only one aspect of the material. The main point of a recollection may be lost when it is scored for a single trait perhaps expressed in the recollection but not stressed. For example, the following two recollections taken from Mosak (1968) are those of a person who needs to be right, where he is either in the right or someone else is in the wrong.

ER 1 One day I was on my way to Sunday School, and I told my friends I would no longer steal candy from the store (which all the kids did) because we were learning the Ten Commandments and one shouldn't steal. They laughed. I said if they did, I'd tell. They went into the store. Someone was watching to see which kids stole, so they didn't take anything.

ER 2 My mother was feeding my brother pablum. He spit it up, and she refed it to him. I was horrified by it.

From the point of view of scoring for locus of control, both of these recollections seem to indicate an external locus of control. In the second, the person sees a horrifying thing which he passively does nothing about. And although in the first recollection, the person seems to take a personal stance in controlling his own behavior, he is seen as ineffective in having any control over the behavior of his friends. Their behavior appears controlled rather by the fortuitous event that someone is watching, so they could not follow through on their intentions. But in both cases, the main point of the recollections is that the person sees himself on the side of right, although he does not see himself as having much control over making right prevail. He may be righteously indignant, but he does little to make right win out in the situations.
Although the main point of both recollections is concerned with the need to be in the right, they also give information that may be scored for locus of control. This presents a problem primarily for the validity of the scoring method by giving weight to data that are more incidental than central to the main point of the recollection. However, when data incidental to the main point of the recollection must be used to score locus of control, reliability is also affected. When the issue of control is clearly present in a recollection, a score can more easily be assigned; but when the message of the recollection is something else, assigning a score for the locus of control trait is more ambiguous. In the first recollection, not only is it doubtful that control of right behavior is at stake, but one would want to differentiate between the person's control of his own behavior in refusing to steal and his control over what the other kids intended to do.

The first scoring manual attempted to preserve some of the complexity of material found in early recollections through scoring several components initially judged to be relevant to the construct of locus of control. Including the components of Rational-Impulsive and Direct-Indirect Causality promised to tease out kinds of data in the early recollections relevant to the construct of locus of control, but they proved to make scoring both more difficult and less reliable. The revised scoring system sought simpler criteria in order to increase reliability.

When the Active-Passive dimension of the revised scoring
system was found to have only moderate inter-rater reliability, it too was omitted. This reduced the scoring system to a single component, the Internal-External dimension, which seemed to most directly measure what Rotter conceptualized as the locus of control. Using a single global score not only simplifies scoring, but makes it closely resemble the scoring system Dies (1968) devised for TAT stories. Dies' system used a single rating based on a five-point scale for each TAT story. The reliability attained in the revised scoring system for the Internal-External dimension was \( r = 0.823 \) and \( r = 0.826 \) for each of the judges with the author, and \( r = 0.769 \) between the two independent judges.

**Validity**

Three measures of locus of control were used to establish concurrent validity: the Rotter I-E Scale, the Dies TAT scoring system for I-E, and the developed Early Recollection I-E score. The Rotter I-E was also broken down into the two Mirels Factors of personal (I) and political (II) control, as well as the sum of these two factors. Since these three instruments purport to be measuring the same construct by different methods, high correlations among them would support convergent validity.

If one regards reliability and validity as different regions of a continuum, as suggested by Campbell and Fiske (1959), the subscales of the Rotter I-E would be placed toward the reliability end of the continuum. Reliability represents the agreement between
efforts to measure the same trait through maximally similar methods; validity represents the agreement between efforts to measure the same trait through maximally different methods. Since the Mirels subscales of the Rotter involve different items of the same scale, they would fall toward the reliability end of the continuum according to this view. To the extent that both Factors represent the more generalized locus of control trait, the two subscales overlap, and so correlate positively. To the extent that the items selected for the subscale Factors differentiate two non-overlapping constructs of personal and political control, they could have a low correlation.

The correlations obtained between Mirels Factors I and II with the full scale Rotter I-E are quite high and positive, $r = 0.747$ and $r = 0.537$ respectively. The combination of these two Factors also correlates highly with the full scale Rotter I-E ($r = 0.761$) as is expected, since each Factor individually does. However, the correlation between Factors I and II is rather low ($r = 0.127$), suggesting that they tap different subconstructs and that these are not necessarily present together in the same subjects. A person may feel he has control of his personal life but has little political control. A clue to this differentiation may be in the correlation of each of these factors with social desirability. Factor I correlates moderately highly in a negative direction ($r = -0.241$, $p < .05$) with social desirability, whereas Factor II correlates only slightly and in a positive direction ($r = 0.028$). Those who answer in a socially desirable direction tend to indicate belief in personal control,
whereas belief in political control shows no clear pattern with respect to its social desirability.

The correlations between measures of locus of control using different methods are not so high. Some positive correlation is obtained between the Dies TAT I-E and the Rotter I-E, $r = 0.239$, $p < .05$. There is little difference, however, between the level of correlation obtained between the Dies TAT I-E and Factors I and II ($r = 0.191$ and $r = 0.222$). Whatever difference there may be between these Factors does not appear in the TAT scores. The correlation obtained here between the Rotter I-E and Dies (1968) is not as high as the correlation of 0.44 that he reported. The difference in sample size between the present study of 84 subjects and the 40 subjects in Dies' study allows for significance at a lower correlation. In a sample of 40, a correlation of 0.358 is required for significance at the .01 level; with a sample of 80, a correlation of 0.256 is significant at the same level (Edwards, 1960).

As a measure of discriminant validity, social desirability has had various reported correlations with Rotter's full scale locus of control (Joe, 1971). When significant correlations are found, they have been in a negative direction. This study confirms this expectation. It also suggests a higher correlation with Mirels Factor I of personal control than with Factor II, political control. This is the only correlation between locus of control and social desirability that reaches a significance level of .05.

The correlations between the Early Recollection I-E and other
measures of locus of control were low. The data do not support its validity as a measure for locus of control.

Failure to attain significant correlations with other measures of the same trait does not logically disprove the possibility of using early recollections as indicators of personal beliefs, but insight into failure can suggest more productive alternative approaches. Suggestions to account for the low correlations will be made in terms of the sample, the measuring method, and the theory of early recollections.

The sample consisted of 84 students of an all male senior class. The mean Rotter I-E score for this group was 11.381. Among the groups cited by Rotter (1966), the means range from 6.06 in Peace Corps trainees to 10.00 for a group of 18 year old subjects. The sample of this study was more externally oriented than any group cited by Rotter. The standard deviation of this sample, 3.512, is also somewhat smaller than most of the standard deviations of the samples cited by Rotter. The variability then is clustered around a narrower range at the external end of the scale than might be expected in other samples.

The method of scoring used here makes it possible for each recollection to be scored, thus making a range of possible scores based on precisely eight data units, each recollection receiving a score from 0 to 5. It was thought desirable to collect exactly eight early recollections from each person in order to match the number of units of TAT stories, and to insure an equal amount of
material from each subject. This avoids the difficulty of arriving at a score when one person recalls only two early recollections, another recalls five, another eight. The problem created by this method of data collection is that not all early recollections are equally significant. The first three incidents a person spontaneously recalls may be highly significant, but the next five may be less relevant. People vary in the number of recollections they spontaneously recall. While it was possible to collect eight recollections from each person, with some it was necessary to probe more to elicit all eight. Collecting TAT stories does not have the same problem. Not only does each card suggest a theme for the story, but there are many possible stories. One does not run out of stories, although he may fail to follow instructions and write a description rather than a story or neglect to put an outcome to it.

Related to this difficulty of eliciting eight significant early recollections is the difficulty discussed earlier affecting reliability, i.e. not all early recollections are equally relevant to the construct of locus of control although they are important in terms of other idiographic material. They may be scorable on the dimension of locus of control, but their main point is something else. Examples were given previously.

A further difficulty for validity may lie in the theory of early recollections. Early recollections express the cognitive expectations, not behavior patterns. The possibility arises of a defensive life style that compensates for the cognitive expectations.
Rotter (1966) talks about a defensive externality which occurs when taking an internal stance would result in self-blame. Since an internally oriented individual must blame himself for failure, he protects himself against this self-accusation by taking an external stance, by blaming fate, poor upbringing, circumstances. The inventory measure might pick up the compensatory stance, i.e. the behavioral descriptions, whereas the internal control might well be masked but appear in the early recollections. For example, the person who feels that control is necessary (over others, over feelings, over events in his life) may give early recollections where there is loss of control and consequent discomfort, embarrassment, distress. The issue at stake is that control is required, however it is arranged. His response to an inventory might show an insistence on personal control which is compensatory for the underlying fear of losing control which appears in the early recollections.

The following early recollections given by Mosak (1968) illustrate the point.

ER 1 My baby sister was in the bassinet in the bedroom. Mother was taking a group of ladies in to see her, and I went in with them. They were all ogling her, and one of them reached in to touch her. I said, "Don't touch the baby!" They all said, "OK." I was pleased like I was a policeman or something.

ER 2 I had my tonsils out. Someone told me to breathe in deeply as they put the cone over my nose. I was frightened and I struggled.

In the first recollection the person has control of the situation and enjoys it. It would be scored in the internal direction. In the second, the person is afraid of losing control and is strug-
gling. Since there is no indication that the efforts are effective, the second recollection would be scored in an external direction. We can say that for this person control is important, but we do not know how successful the person currently feels about her ability to have control, what she does about it, nor to what areas of life it extends.

Internal control behaviors, which may be reflected in an inventory such as the Rotter I-E, might be a defense against the fear of losing this control. Such a fear of losing control, on the other hand, might be more directly expressed in early recollections. The expression of internal control that arises out of calm confidence in one's own ability is different from control maintained for fear that its loss may result in disaster. Each may score as highly internally oriented on an inventory of current beliefs, but the grounds for the belief differ markedly.
SUMMARY

Adlerian psychologists have used early recollections as a projective technique (Mosak, 1958) to obtain information about a person's cognitive goals, beliefs, and expectations. One such belief, conceptualized by Rotter (1966) as locus of control, is the degree to which a person ascribes events in his life as contingent on his personal action or as contingent on external factors such as fate, luck, chance, or powerful others. Internal control refers to individuals who believe that reinforcements are contingent upon their own behavior, capacities, or attributes; external control refers to individuals who believe that reinforcements are not under their personal control but the result of external determinants. A method for scoring early recollections for locus of control was developed, its reliability and concurrent validity determined.

Eight early recollections were collected from each of 84 male high school senior students through personal interviews, following the procedure described by Gushurst (1971). Each student wrote stories to eight TAT pictures and completed the Rotter I-E scale (1966) and the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960). The TAT stories were scored according to Dies' (1968)
system for locus of control. The Rotter I-E scale was broken down into subscales for Mirela's (1970) Factors of personal (Factor I) and political (Factor II) control as well as for the sum of these two factors.

A method for scoring early recollections for locus of control was developed which was found reliable. Inter-rater reliability of 0.823 and 0.826 was obtained between each of two independent judges and the author, and 0.769 between the two judges, using a randomly selected sample of twenty records of eight early recollections each.

A modification of the multitrait-multimethod matrix (Campbell & Fiske, 1959) was used to determine convergent and discriminant validity. Two traits, locus of control and social desirability, were measured. Locus of control was measured by three methods: the Rotter I-E, the Dies system for scoring TAT stories, and the developed measure based on early recollections. Social desirability was measured by one method, the Marlowe-Crowne Social Desirability Scale.

Each of the subscales of the Rotter I-E, Mirela Factors I and II, had high positive correlations with the full scale Rotter I-E, 0.747 and 0.537 respectively. The Dies TAT I-E had a moderate positive correlation of 0.239 with the full scale Rotter I-E. The Early Recollection I-E scores had low correlations with other measures of locus of control, -0.114 with the full scale Rotter I-E, -0.064 with the Dies TAT I-E.

Low correlations, generally in a negative direction, were obtained between the measures of locus of control and social desirability. The NC-SDS correlated -0.182 with the full scale Rotter I-E,
-0.241 with Mirels Factor I, +0.028 with Mirels Factor II, -0.068 with the Dies TAT I-E, and -0.126 with the Early Recollection I-E.

Failure to obtain correlations satisfactory to establish validity of the developed measure of locus of control using early recollections was discussed in terms of the sample, the method of measurement, and the theory of early recollections.
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Taking the Import

A useful preliminary step to scoring the early recollection is to take its import. Arnold (1962) devised this procedure for TAT stories in *Story Sequence Analysis*, but it can be adapted also to early recollections. Guahurst (1971) used a comparable method specifically for positive early recollections. Positive early recollections are those that describe incidents pleasant or "positive" in themselves. By consulting Arnold as well as Guahurst, the procedure can be extended to include negative early recollections, i.e. those incidents that are unpleasant or where pleasure results from the cessation of unpleasant situations. Guahurst's method is particularly useful for the recollections (i.e. positive) to which it applies because he gives a more detailed and step by step procedure along with a precise rhetoric for formulating the import. Following either Arnold or Guahurst, the process is to condense the recollection to a sentence that preserves the kernel and leaves out
incidentalts. It captures the message of the recollection in a short sentence, resembling a headline, a slogan, or an aphorism. It is not merely a summary, where the concrete sequence of actions is abridged, but a sentence that catches the private "wisdom" or moral of the recollection. Like a fable, the recollection makes a point, contains a lesson for life, and the import concisely expresses it.

In initially formulating the import, a cumbersome rhetoric may be used. With a positive recollection this is in the form of "I want...or I like...(such and such)" with various qualifiers indicating conditions or means by which the goal is to be attained. The first person may be used because the person is overtly telling about his own life and how things happen in it. The goal is expressed by what the person wants or likes, either implied or stated directly in the recollection. The reason the person feels the way he does expresses why the goal is important to him. How the person is to achieve the goal is often expressed by what or by whom the goal is reached. How the goal is to be attained is, of course, quite important in determining the locus of control.

For negative recollections, the import may often be phrased "I expect...or I anticipate that...(such and such happens)" together with qualifiers or conditions. Alternatively, it may be phrased as a conditional clause followed by a conclusion: "when (such and such is the case), then (such and such happens)." It is important to indicate the conditions given by a recollection, although there is danger in extending the generalization beyond the concrete situation
given in the recollection. The specific situation of the recollection is taken as a prototype for other life situations, but it is not always evident to what range of other situations the recollection can be extended.

The message of the recollection may often be expressed in a short syllogism. One or the other part of the syllogism may be implied rather than directly stated. Such syllogisms may be:

A. Implied Major: Special people deserve nice things coming to them.

Minor: I am a special person.

Conclusion: I deserve nice things coming to me.

B. Major: When life is dangerous, the weak need protection.

Minor: But life is dangerous and I am weak.

Conclusion: I need protection.

By formulating a series of statements about how the person sees life, people, and himself in the recollection, these statements can often be inter-related through syllogisms such as the above. Although the particular rhetoric may be cumbersome, it provides a convenient logical framework for formulating the import initially. It can later be re-written for a more readable style. Each of these syllogisms may be more simply expressed:

A. Because I am precious, I deserve to have good things come my way.

B. Since I am weak, I need to be protected from the dangers of life.
Where possible, the actual words of the narrator should be kept in the import. Whatever the final wording, it is the message (not the theme or a summary of the action) that is expressed in a concise statement. It expresses what "one holds before his mind's eye" as a lesson about life, about others, or about himself as gleaned from this particular personal incident as recalled.

Generalizations may be carefully made from the concrete persons or situations of the recollection. There is always some danger that the generalizations will be over-extended or inappropriately extended, but these can be checked clinically by asking the person who gave the recollection.

Although early recollections may be scored directly, the process of explicitly formulating an import assists in clarifying the message of the recollection apart from its concrete details. It prevents the scorer from getting sidetracked from the main point by interesting but less relevant details. Even if the scorer does not explicitly formulate an import, his score is based on the message of the recollection which he perceives intuitively or implicitly.

Components of Locus of Control

According to Rotter (1966), "if a person perceives a reinforcement as contingent upon his own behavior, then the occurrence of either a positive or negative reinforcement will strengthen or weaken potential for that behavior to recur in the same or similar situation. If he sees the reinforcement as being outside his own
control or not contingent, that is depending upon chance, fate, powerful others, or unpredictable, then the preceding behavior is less likely to be strengthened or weakened (p. 5)."

For the purpose of scoring, the locus of control concept has been divided into four components: two of these may be regarded as main components; two as additional components. These components are:

A. Main components:
   1. The degree of activity (internal) or passivity (external) expressed;
   2. The extent that what happens is seen as a result of personal action (internal) as opposed to externally determined or caused (external).

B. Additional components:
   1. The extent that action is rational or planned (internal) as opposed to irrational or impulsive (external);
   2. The extent that what happens is intrinsically related causally or intentionally to the person's action (internal) as opposed to an extrinsic, accidental, or unintentional relation to the action (external).

In scoring, it is important to determine what is implied by the message or import. Whereas with positive recollections, this is usually straightforward; in negative recollections it may be more difficult to ascertain. For example, when failure is an outcome, it is important to determine whether the failure is attributed to accident (external control) or to one's own poor planning or error.
(internal control). Similarly, when activity is seen as unrelated to or ineffective in dealing with a situation, this indicates an external locus of control even though activity generally suggests an internal locus. Punishment seen as deserved for one's actions suggests an internal locus of control, while punishment regarded as unfair or arbitrary indicates externality.

Scoring

Most recollections can be scored directionally on the two main components, but many recollections do not contain information relevant to scoring on the additional components. These may then be seen as additional weights to the main scoring dimensions.

1. Main component: degree of activity

Except when activity is seen as unrelated to outcome (success or failure), the degree of activity a person puts into attaining his goal or avoiding a situation is taken to mean that the person sees his action causally related to and effecting what happens. Thus activity is seen as indicating an internal locus of control.

There are two degrees of activity (+2, +1):

Score +2, when it is clearly indicated that activity, effort, positive initiative is occurring, and this contributes to the outcome.

Score +1, where there is activity, but it is qualified or limited in its extent or effectiveness, e.g. effortful,
constrained, done under protest, requires help, regarded as only somewhat effective.

Passivity is an indication of external locus of control, since it implies that a person does not see positive goals as the consequence of his action. Either he does not see the goal as worth his effort, or he does not see his activity as related to attaining the goal. Passivity is here seen as the absence of activity. Where a person consciously chooses a "passive" means to attain a goal, score +1 for activity, e.g. deliberately waiting someone out, holding one's tongue.

There are two degrees of passivity (-1, -2):

Score -1, when there is simply absence of effort, activity, initiative; when the person is a spectator to action rather than involved, when he is the passive recipient of either desired or undesired objects, when there is fantasy without action.

Score -2, when besides mere absence of activity, activity is seen as futile, ineffective, avoided, or when passivity is resorted to when action is clearly called for.

2. Main component: internally vs. externally determined

This component most nearly matches the main notion of locus of control. It reflects whether one sees the control of events around him as being within him or outside him.

There are two degrees of internal determination (+2, +1):
Score + 2, when the action is clearly self-determined without outside influence, when the desired outcome is clearly the result of this self-determined course of action.

Score +1, when the action is self-determined with some outside influence or limitation. Also when others are seen as trustworthy, cooperative, benevolent, helpful.

There are two degrees of external determination (-1, -2):

Score -1, when events are simply the result of external factors or beyond one's control: fate, circumstances, sickness, accident, influence of others.

Score -2, when events are the result of external factors regardless of one's own effort and good intentions. Life is seen as dangerous, unpredictable; others are seen as hostile; one's self is seen as victim, helpless.

Note: When "accidents happen" but there is no emphasis on life being dangerous or the person as helpless, score -1.

3. Additional component: rational vs. impulsive action

Rational or planned behavior is regarded as indicative of an internal locus of control, because a person who thinks through a situation and his action in it, showing foresight and planning, would by implication feel that this leads to effective action. The person who acts impulsively may be considered to not take into account the
effectiveness of his actions and so has an external locus of control.

Score +1, when action follows reason, planning, foresight, or deliberation.

Score -1, when action is impulsive.

4. Additional component: outcome intrinsically related vs. extrinsic to action or expectation

When an action is intrinsically related (causally or intentionally) to its goal, the link between action and outcome is clearly seen and so control is regarded as internal. When the outcome of an action or expectation is not causally or intentionally related to it, e.g. when one thing is intended and another happens, or one thing is expected but results are otherwise, the locus of control is external. This requires a sequence of events with intention or expectation. When there is no antecedent expectation, e.g. sheer surprise, this category is not scored.

Score +1, when the action is intrinsically related, causally or intentionally to its outcome, as means to an end.

Punishment received is felt deserved. What the person hoped for happens. Awareness of taking consequences for behavior.

Score -1, when the result of an action is extraneous to it, not causally or intentionally related, or the relation is only temporal or circumstantial. A good the person expects does not turn out. Punishment is seen as unfair,
arbitrary. While trying to do one thing, something else happens.

The score for each recollection is the algebraic sum of the scores of the four components. When there is no indication of a particular dimension in a recollection, this component is scored zero. The scores for all imports are summed to form the total locus of control score.
The following examples are given to illustrate the scoring categories. AP = Active-Passive, IE = Internal-External, RI = Rational-Impulsive, DI = Direct-Indirect.

1. Age 7. I learned to ride a bike. My brother borrowed a bike. I was excited. He was holding me up. I was falling over. Being real clumsy. After a while, I was getting the hang of it. Learning something new, looking forward to it.

   AP +2   IE +2   RI +1   DI +1

2. Age 9. Almost started the house on fire with nail polish. A guy down the street, older than me, had nail polish, and brought it to the alley, lighting it. I went, got my Sis's nail polish. Was lighting it. Threw it on the wall (outside) of the house. Started on fire. I ran, got a bucket of water. Felt scared--know I had to get it out before anybody saw it, because my parents would get angry.

   AP +2   IE +1   RI +1   DI +1

3. There was a baby sitter who came over after school to take care of us. She was 19. I was sort of scared to mess with her. She was trying to mess with me, but I'd run. I was lying down, playing like I was asleep. I wouldn't open my eyes. She kissed me. I woke up, ran, and wiped it off. Felt shy, but good about it. Liked it, but trying not to show it. I had wanted her to do it for a long time, but if I acted like I didn't like it, she might do it again.

   AP +1   IE +1   RI +1   DI +1

4. Summer day, going to cousin's house. There was an old man lived on the block. We used to knock on his door to bother him. We were sneaking up in back, getting up to the porch. He threw a bucket of hot water on us. We were going to get back, so got a bucket of mud and put it in front of his door and he stepped in it. Felt happy when we got him back for throwing the hot water.

   AP +2   IE +2   RI +1   DI +1
5. Age 8. I went to the museum. To see the submarine. I was mad because I found out the submarine didn't go under water. It's a submarine and it should go under water. Mad that it didn't. Mad and disappointed.

AP +1 IE -1 RI 0 DI -1

6. Age 6. We had a big fruit tree in our yard that my brothers and friends would always climb. My mother told me never to go up because I would fall. One day I did climb and fell, but my foot caught between two branches and I was hanging upside down until my mother came and got me down. I felt I shouldn't have done it in the first place. Mother was right.

AP -1 IE -2 RI -1 DI +1

7. Age 7. A friend of my brother knocked my brother's bike over and broke the mirror on it. I was on the porch, watching it. Detached. Not involved. Didn't dislike the guy for breaking it. He was my friend too.

AP -1 IE -1 RI 0 DI 0

8. Age 6. Another guy and I were sitting in the back of the school room making paper airplanes, throwing them at the waste basket, trying to hit it. It was fun, afraid of getting caught, but exciting.

AP +1 IE +1 RI +1 DI 0

9. Age 4. I bit my little brother's finger, because I just felt like it. I got hit for it; it was just senseless. He was in a high chair, getting ready to eat. I just bit his finger, I don't know why. Father came and hit me.

AP +1 IE 0 RI -1 DI +1
REFERENCES


Taking the Import

There are no changes in this part of the scoring procedure. Refer to the Preliminary Scoring Manual.

Components of Locus of Control

Two components of locus of control are scored: a dimension of activity (competence) versus passivity (incompetence) and a dimension of internal versus external determination. The components of Rational-Impulsive and Direct-Indirect causality have been eliminated.

Scoring

The scoring criteria for the two components are given below.
A. Active (competent) - Passive (incompetent)

Score 1  Self-determined, effective, unhindered action.

Score 2  Action somewhat ineffective, limited, qualified, with some negative consequences, done under influence of someone else.

Person uses planning, deliberation, although no overt action.

Person is active and a dire (unpleasant) event follows but this consequence is not causally or intentionally related to the action. The action is circumstantial or temporally related but not causally.

Score 3  No indications of activity or passivity.

Score 4  Sheer passivity: watching, seeing, spectator, uninvolved, waiting--no action.

Person uses passive means to get out of a situation, e.g. pouting, feigning sickness or sleep, waiting.

A dire (unpleasant) consequence follows action causally as a result, even though not intended.

Action is ineffective, although ineffectiveness is not stressed.

Score 5  Action is futile, clearly ineffective.

Person tries but fails.

Despite preventive action, dire consequences follow.
B. Internal - External Control

Score 1  Self-determined effective action.

The person is clearly seen as the source determining the incident.

Sense of confidence clearly conveyed of the person's ability.

Score 2  Person seen as the cause of what happens, but with qualifications, limitations, some outside influence. He has at least partial control of the outcome.

Person not actively in control, but clearly feels "at home", competent, confident.

Punishment seen as deserved, clearly causally related to the person's action.

Mixed outcome: When the incident appears to have both internal and external control factors, but internal is more emphasized.

Score 3  Both internal and external factors present, neither appears more predominant.

Score 4  Person is passive recipient of the event, e.g. accident happens or a lucky find, pleasant or unpleasant. Person is not seen as victim, unfortunate or helpless. "Accidents happen" or "lucky me" might capture the import.

Punishment seen as unfair, undeserved, or unrelated to previous action, arbitrary.

Mixed outcome: When the incident appears to have both external and internal control factors, but external factors are more emphasized. E.g. Person is active, but his activity has accidental or unintended consequences.

Score 5  Person clearly seen as victim, helpless, overpowered, unfortunate, with no escape to events happening around him or to him. "Poor me--it always happens to me" or "Why only me" might capture the import.
Despite action to prevent it, dire consequences follow.

Emphasis on being little, helpless, weak, ineffective.

A rating scale from 1 to 5 with Score 1 indicating most internal and Score 5 most external has been adopted to facilitate calculations and make the direction of the scoring comparable to other measures of locus of control.

Each early recollection is scored on each of the components. The sum for all early recollections of the record is taken as the total locus of control score.
Examples

The following examples are given to illustrate the scoring categories. AP = Active-Passive, IE = Internal-External.

1. Age 5. The kid upstairs, about 17, had speakers hidden all around the house. I went up there. He would trick me by talking into different ones. Eventually I found the wires. He didn't think I would find them. Like a game. I saw the speakers and figured it out. Fun.

AP 1    IE 1

2. Age 4. Teacher was kidding us that we were kidding around, acting like monkeys. So I started acting like a monkey. She made me go to the front of the room and act like a monkey. Funny, I enjoyed it.

AP 1    IE 1

3. One day my mother sent me around the corner to get a loaf of bread. I felt like I was growing up. She sent me out by myself. I didn't need somebody with me. Felt big.

AP 1    IE 1

4. Age 8. First time I learned to swim. I slipped in the pool. Before this, people would hold me and they'd let go. I'd sink. This time I slipped and fell, and then started swimming. Felt good. By accident, by reflex, I started swimming.

AP 2    IE 4

5. Age 6. I broke a gallon of milk on the front porch. I was just walking up the stairs, holding it too low. It hit the stairs and broke. Feeling: Now, I'll just have to clean it up.

AP 2    IE 4
6. Age 6. By the house was a barbed-wire fence. I was climbing it when a piece of the wire caught in my leg. Got taken to the hospital. Stitches put in the leg. Feeling hurt.

AP 2 IE 4

7. Age 4. I took my first airplane ride. It was my birthday and we were coming home from Cleveland. I sat next to the window. When the propellers started turning and the flames began shooting out from the engines, I got scared, and began to cry. The two stewardesses came and gave me milk and a comic book to look at. I calmed down then.

AP 4 IE 4

8. Age 4. Getting a haircut. One of the first. Sitting on a phone book. Father was cutting it. He shaved it off. Felt angry that he cut it all off. Didn't have any hair. Didn't like it.

AP 4 IE 4

9. Age 5. While running around the house, I fell on the bath tub and cut my eye. My Mother had told me not to run. There was a little step before the bathroom. The way I fell, I was just the height to hit the bath tub. They brought me to the hospital. I was screaming and kicking when the doctor put stitches over my eye. Everybody was trying to hold me while the doctor was approaching my eye with something. I kept seeing that and kicking to get away.

AP 5 IE 5

10. Age 4. Father and Mother had an argument. Father got mad about something. Started arguing, fussing, getting loud. Mother hollering at Father, Father screaming back. I'm looking at both of them, not knowing what to do. I ran downstairs, had to get out. Felt scared, didn't know what to do, where to go. I went down the steps outside.

AP 5 IE 5
11. Age 8. The day my watch was stolen. We were playing in the playground. About ten guys came up and asked for money. They took my watch. Felt angry, but couldn't do anything about it.

AP 5 IE 5

12. Age 7. Losing a ring my Father gave me. It was his as a boy and it had been given to him by my Grandfather who wore it as a boy also. I was playing catch with Father. The ring was big. I threw the ball, and it fell off my finger. We were looking for it in the grass. We spent most of the day looking for it, but couldn't find it. Felt bad.

AP 5 IE 5

13. Age 8. My sister was in the band. She (and the band) used to practice in the house. Freddie played the piano. He banged so hard that it vibrated the ash tray off the piano. I was standing watching the band. Felt funny, laughing—him playing so hard it shook the ash tray off.

AP 4 IE 4

14. Age 7. Used to go with a friend every day to play fast-pitch league ball. This day he hit me. I got mad. Threw the ball back. Got in an argument. Stupid. Started playing again. Felt fun, but stupid to be arguing with a friend.

AP 2 IE 2

15. Age 8. I got jumped by some boys. I was coming home from summer school. These dudes jumped us, my brother and me. One of them hit me; I hit him back. Asked us for our money. When I hit back at them, they ran off.

AP 1 IE 1
Items of the Rotter I-E Scale
scored for Factor I of Mirels

5. a. The idea that teachers are unfair to students is nonsense.
   b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

10. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
   b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
   b. Getting a good job depends mainly on being in the right place at the right time.

15. a. In my case getting what I want has little or nothing to do with luck.
   b. Many times we might just as well decide what to do by flipping a coin.

16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
   b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.

18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
   b. There really is no such thing as "luck."

23. a. Sometimes I can't understand how teachers arrive at the grades they give.
   b. There is a direct connection between how hard I study and the grades I get.
25. a. Many times I feel that I have little influence over the things that happen to me.

b. It is impossible for me to believe that chance or luck plays an important role in my life.

28. a. What happens to me is my own doing.

b. Sometimes I feel that I don't have enough control over the direction my life is taking.

Note: The underlined alternative is scored in the external direction.
Items of the Rotter I-E Scale

scored for Factor II of Mirels

12. a. The average citizen can have an influence in government decisions.

   b. This world is run by the few people in power, and there is not much the little guy can do about it.

17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.

   b. By taking an active part in political and social affairs the people can control world events.

22. a. With enough effort we can wipe out political corruption.

   b. It is difficult for people to have much control over the things politicians do in office.

29. a. Most of the time I can't understand why politicians behave the way they do.

   b. In the long run the people are responsible for bad government on a national as well as on a local level.

Note: The underlined alternative is scored in the external direction.
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The dissertation submitted by Bede Smith has been read and approved by the following Committee:

Dr. Thomas P. Petzel, Director
Assistant Professor, Psychology, Loyola

Dr. James E. Johnson
Associate Professor, Psychology, Loyola

Dr. Emil J. Posavac
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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

3/25/74
DATE

[Signature]
DIRECTOR'S SIGNATURE