

A PSYCHOMETRIC ANALYSIS OF THE INTERNAL-EXTERNAL CONTROL SCALE

TERRY JOHN PROCIUK

A dissertation submitted to the Faculty of Graduate Studies
in partial fulfillment of the requirements for
the degree of

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University of Manitoba
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To my mother and father

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ABSTRACT

Although research has demonstrated the importance of internal-external locus of control as a personality determinant of behavior, a number of recent studies have questioned the psychometric characteristics of the most widely-used measure of this construct; the Rotter Internal-External Control (I-E) scale. Consistent with such research, the present investigation, consisting of four interrelated experiments, was conducted to examine several fundamental psychometric properties of the I-E scale.

In Experiment 1, the factorial invariance of the I-E scale was evaluated. Factor analyses of item responses yielded a two-factor structure for both male and female subjects. The factors were designated as Fatalism and Social Political Control. In subsequent analyses, four measures of factorial invariance (i.e., correlation of factor loadings, coefficient of congruence, salient variable similarity index, and Kaiser relate method) were used to compare the obtained factor structures as well as those reported in previous research employing male and female samples from Canadian, American, and Australian student populations. Obtained results demonstrated a relatively high degree of consistency in the two-factor structure of the I-E scale across populations within sexes, within populations between sexes, and within a population within sexes.

Two experiments were conducted to examine whether the theoretical conceptualization of locus of control as a bipolar dimension is reflected in its measurement by the I-E scale. In Experiment 2, the 46 internal and external control statements comprising this measure were scaled in terms of Rotter's theoretical definition of locus of control. Subsequent comparisons of the scale values of paired internal and external control statements, ob-

tained from successive internal scaling analyses, indicated that only 9 of the 23 items consist of statements which constitute opposite ends of a bipolar dimension. In a further evaluation of I-E scale bipolarity, the statements were scaled in terms of the Fatalism and Social Political Control dimensions identified by previous factor analytic research. Results of Experiment 3 demonstrated significant dimensional differences between the scale values of statements referring to fatalism versus social political control expectancies. However, an examination of I-E scale bipolarity, employing dimension-specific scale values, yielded overall findings which were similar to those of Experiment 2. Of the 23 items, only 10 were shown to consist of statements representing opposite ends of a bipolar continuum.

In Experiment 4, the homogeneity of the I-E scale was evaluated by determining the proportion of total scale variance due to person, item, and remainder components. Results of this analysis, for male and female subjects, demonstrated that the remainder component which reflects idiosyncratic responding accounted for the majority of the variance (i.e., approximately 74%) while persons and items each accounted for about 13% variance. Further calculation, redefining items as situations, involved a partitioning of total scale variance into the relative contributions of persons, situations, and person X situation interaction. Obtained results, for males and females, indicated that person X situation interaction accounted for approximately 33% of the total scale variance while persons and situations accounted, on the average, for 9% and 8% variance, respectively. Such findings suggest that locus of control expectancies are not uniform and invariant across all situations and that the heterogeneous item content of the I-E scale imposes a restriction on the reliability of this personality meas-

ure.

Issues including generalizability of the present findings, methodological limitations, and implications for future use of the I-E scale were considered. Several topics for further research were identified and a multidimensional approach to locus of control measurement was suggested. Finally, results of the present investigation were compared to those typically obtained in the general area of personality measurement.

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CHAPTER I

INTRODUCTION

Since the introduction of the internal-external locus of control construct (Rotter, 1966), a substantial amount of research has been conducted examining the relationships between this personality dimension and numerous other personality and behavioral measures. Recent literature reviews (e.g., Joe, 1971; Lefcourt, 1972; Phares, 1973, 1976) and research bibliographies (e.g., Prociuk & Lussier, 1975; Thornhill, Thornhill, & Youngman, 1975) indicate that over 1500 studies on locus of control have been reported during the period from 1966 to 1975. Today, even a casual glance at the research literature reveals a considerable amount of continued interest in this personality construct. Reported research findings indicate that internal-external control has proven to be useful in predicting a variety of behaviors, and the relationships found between this construct and certain important social variables have undoubtedly contributed significantly to its present popularity as an area of personality research. For example, internal-external control has been shown related to such diverse criteria as job involvement (Durand & Shea, 1974; Runyon, 1973), belief in supernatural phenomena (Scheidt, 1973), personal adjustment (Miller & Seligman, 1973; Warehime & Foulds, 1971), study habits and attitudes (Prociuk & Breen, 1974), birth control (MacDonald, 1970; Segal & DuCette, 1973), and learned helplessness (Hiroto, 1974). However, despite the obvious importance of this personality dimension for understanding human behavior, a number of recent investigations (e.g., Hjelle, 1971; Kleiber, Veldman, & Menaker, 1973; Klockars & Varnum, 1975; Levenson, 1974; Reid & Ware, 1973, 1974) have suggested several possible weaknesses in the most

widely used measure of this construct; the Rotter (1966) Internal-External Control (I-E) scale.

Consistent with such research, the present investigation attempts to provide information on a number of psychometric properties of the I-E scale. Specifically, the present research consists of four interrelated experiments which focus on the following characteristics of this personality measure: factorial invariance, bipolarity, and homogeneity. Although recent factor analytic research has consistently demonstrated the presence of two independent factors in the I-E scale, questioning the unidimensional assumption, the factorial invariance of this factor structure has not been demonstrated. Therefore, Experiment 1 evaluates the factor analytic findings of comparable solutions based on Canadian (Abrahamson, Schludermann, & Schludermann, 1973), American (Mirels, 1970), and Australian (Viney, 1974) subject samples employing several different measures of factorial invariance (see Gorsuch, 1974). Experiment 2 represents an initial attempt at examining the assumption of item bipolarity in the I-E scale. Specifically, the 46 statements comprising the 23 forced-choice I-E items are scaled employing the method of successive internals (Edwards, 1957, 1970), and the scale values of the internal and corresponding external statements are compared to determine whether they represent equivalent degrees of internal control and external control, respectively. Experiment 3 extends the analyses of the previous study in a number of directions. This study includes a scaling of the I-E statements on two dimensions, Fatalism and Social Political Control, as identified by previous factor analytic research. Subsequently, the bipolarity assumption is examined on the basis of multiple scale values. Also, the unidimensional assumption of the I-E

scale is re-examined from a scaling methodology perspective and the results are compared to those of factor analytic research (Edwards, Note 2). In Experiment 4, the homogeneity of the I-E scale is examined by determining the variance components of this measure and, correspondingly, by evaluating the extent of idiosyncratic responding to scale items. The specific analyses include a partitioning of the variance in I-E scores into person, item, and remainder components (Fiske, 1963, 1966, 1971) from the single administration case, to a subsequent specification of the person X item component (i.e., idiosyncratic responding, Fiske, 1971; "higgledy-piggledyness", Walker, 1931) from the two administration case (e.g., Endler, 1966; Rogan, Note 6; Vaughan & Corballis, 1969).

Since the development of the I-E scale, a number of researchers (e.g., Hersch & Scheibe, 1967; Joe, 1971; Lefcourt, 1972; Phares, 1973; Tyre, 1972) have indicated that in spite of the considerable amount of research substantiating its usefulness, further improvements and additional psychometric data on this personality measure are required. In its present form, the I-E scale may be considered as providing a somewhat crude measure of generalized expectancies for reinforcement with, for example, the often employed distinction between internal and external control confounded by the multiplicity in the meaning of externality (e.g., Abramowitz, 1973; Levenson, 1974). Therefore, a specific objective of this research is to provide information concerning the overall structure of this measure, and data specific to individual items so that a subsequent revision, refinement, or extension of the scale might result in providing finer discriminations of belief in internal versus external control expectancies.

Within the broader context of personality theory and measurement, the

present research is seen related to some of the issues recently discussed in the controversy involving the personologist, situationist, and interactionist approaches to personality (e.g., Ekehammar, 1974). Specifically, a primary criticism of the traditional trait (i.e., personologist) approach has been that the various measures of generalized dispositions account for only a trivial amount of the variance in the behaviors under investigation (e.g., Mischel, 1968, 1969). As Sarason, Smith, and Diener (1975) indicate, "what has aroused controversy has not been the abstract idea that individual differences by themselves and in interaction with environmental variables influence behavior, but the success with which existing assessment methods provide meaningful measures of individual differences"(p.199). Therefore, a more general objective of this research is to demonstrate the need and importance of employing a variety of psychometric procedures when developing, evaluating, or refining measures of personality dimensions.

Consistent with the views of Sarason et al. (1975), it is suggested that the measurement of individual differences continues to be an important issue in personality research and the incorporation of both dispositional and situational variables into experimental designs (i.e., an interactionist approach) may be the paradigm which will ultimately result in the greatest epistemic yield for the study of personality. Although the concept of interactionism is not new (Ekehammar, 1974), it has recently been more explicitly restated (e.g., Bowers, 1973; Endler, 1973, 1975) as part of the personologism-situationism-interactionism controversy. In an attempt to place the objectives of the present research into a somewhat broader perspective and to establish its relationship to that of current personality research, some of the more important recent theoretical and methodo-

logical statements within this controversy are summarized.

Current Issues in Personality Research

Situational specificity versus cross-situational consistency. In recent years, a number of important and influential accounts (Mischel, 1968, 1969, 1971) have questioned the viability of the traditional assumptions of personality psychology. Previously, much of the research in this area of psychology had been dominated by two main approaches; trait theories (e.g., Allport, 1966; Cattell, 1950), and psychodynamic theories (e.g., Freud, 1959; Rapaport, 1959). According to Mischel (1968), the two approaches share a number of common assumptions. Specifically, both dynamic and trait theories focus on responses as signs of pervasive underlying mental structures and both assume that underlying inferred dispositions (e.g., traits, states, motives) exert generalized and enduring causal effects on behavior. Guided by these assumptions, personality research has typically involved a search for broad underlying dimensions, for basic factors, or for enduring motives. Concomitantly, in personality measurement, this approach has led to the development of numerous tests (e.g., personality scales, projective measures) to assess generalized behavioral dispositions.

A central issue in the recent evaluation of the traditional approaches has been the accumulating evidence that conventional concepts and measures fail to account for much of the complexity and intricacy of human behavior (Reid, Note 5). Mischel (1968) notes, for example, that the correlation coefficients between measures of underlying personality dispositions and behavioral criteria usually range from .20 to .40 and are typically about

.30. Since a correlation of .30 accounts for only about 10% of the relevant variance, this amount has been regarded as negligible. Mischel (1968) emphasizes that "these weak associations, accounting for a trivial amount of variance, become understandable when the enormous variance due to situationally specific variables that determine the consequences for behavior in any particular context is recognized" (p. 83).

In contrast to the trait and psychodynamic approaches which assume cross-situational consistency, Mischel (1971) notes the importance of situational determinants of behavior stating that "a person will behave consistently across situations only to the extent that similar behavior leads, or is expected to lead, to similar consequences across those situations" (p. 74). According to social behavior theory, behaviors become generalized only to the extent that they are uniformly reinforced across many stimulus conditions. However, since many social behaviors are not reinforced uniformly across different situations discrimination learning occurs, i.e., behaviors tend to become discrete and controlled by relatively independent causes and maintaining conditions. Consequently, even subtle changes in the situation alter expectancies about the probable consequences of behavior. Therefore, behavior is considered situationally-specific (Mischel, 1968, 1969, 1971).

While advocating situationism, Mischel (1969) acknowledges that the issue of consistency versus specificity is a complex one since the discriminativeness found in behavior is not so great that continuity in persons' behaviors cannot be recognized. For example, there is substantial evidence that persons' cognitive constructions about themselves and the world are often stable and highly resistant to change (e.g., self concept, impression

formation). Research, moreover, has demonstrated impressive consistencies for intellectual functions of personality, and for behavior patterns such as cognitive styles and problem-solving strategies, which are strongly correlated with intelligence (e.g., Witkin, 1965). Consistency has also been found when individuals rate their own traits as in questionnaires and self-reports (e.g., Kelly, 1955), or when individual behavior is sampled at different times but in similar situations. However, when research has focused on personality and interpersonal behavioral variables, consistency evidence has been much more difficult to establish. Also, when personality has been sampled by diverse methods and not just by self-report inventories, the data have tended to undermine the utility of inferring global personality dispositions from behavioral signs (Mischel, 1968).

Evidence of observed instability and inconsistency in behavior has often been interpreted by trait and psychodynamic proponents as reflecting imperfections in the tests and measures resulting in unreliability and error of measurement. In response, Mischel (1968) notes that the interpretation of correlation coefficients does depend on a number of considerations. For example, a test may be reliable at one score level but unreliable at another. Also, reliability coefficients are influenced by the relative homogeneity in the tested behavior range of the subject sample. However, while acknowledging that these and other sources of error (e.g., response sets) constitute real difficulty Mischel (1969) believes, on the basis of both theoretical and empirical grounds, that "the observed inconsistency so regularly found in studies of noncognitive personality dimensions often reflects the state of nature and not merely the noise of measurement" (p. 1014).

Arguing for cross-situational consistency, Alker (1972) has asserted that personality variables can explain individuals' behaviors even though those behaviors may vary from one situation to the next. Specifically, Alker indicates that Mischel (1968) has ignored a number of factors attenuating correlation coefficient size (e.g., restriction of range), and has omitted relevant research employing alternative measurement and combination procedures (e.g., multiscale inventories, regression-compounded indices) which tends to demonstrate high cross-situational consistency. As an alternative to current methodology, Alker proposes that the moderator variable approach (e.g., Kogan & Wallach, 1964) may represent a new personality research paradigm. According to Alker, such an approach would provide a more promising method for detecting personality differences which reflect cross-situational generality, and it could be used to examine person X situation interaction effects which might be stronger than either situation or person effects.

In a reply to Alker (1972), Bem (1972) defends the situational-specificity approach noting that most of Alker's observations are based on a simple misreading or misunderstanding of Mischel's (1968, 1969) accounts. According to Bem, Mischel (1968) discusses factors attenuating correlation coefficients and notes the limitations of nearly every trait-based methodology including multiscale personality inventories and regression-compounded indices. While challenging Alker's conceptual arguments for cross-situational consistency, Bem agrees that the moderator variable approach may be a useful strategy for personality research. He indicates that although previous research (e.g., Kogan & Wallach, 1964) has employed personality variables in a moderator role, situational variables may also be con-

ceptualized in a similar manner. Bem notes, however, that the full heuristic potential of the moderator variable approach can only be realized if researchers can begin to predict, on a priori grounds, which moderators are likely to divide subjects into useful equivalent classes.

Although both Alker (1972) and Bem (1972) agree that the moderator variable approach represents a promising research methodology, Wallach, an early proponent of moderator variables, indicates (Wallach & Leggett, 1972) that the usefulness of this strategy may be more apparent than real. For example, this method, which employs selected subsamples, does not provide correlation coefficients which are consistently higher than those obtained with total samples. Also, the approach is statistically and methodologically complex (Zedeck, 1971) and there is often difficulty in interpreting results of research employing moderator variables. Alternatively, Wallach and Leggett (1972) suggest that consistency might be more appropriately investigated by focusing on behaviors and on the effects of behaviors, which are of interest in their own right, and not on test responses which are of interest only if they function as signs of some hypothetical trait. Results of their research, examining stylistic consistency in size of childrens' drawings, are interpreted as demonstrating cross-situational consistency and supporting an approach which focuses on direct behavioral measurement.

Interactionism. In a paper summarizing and analyzing some of the issues of the personologism versus situationism controversy, Endler (1973) indicates that the question of whether individual differences or situations are a major source of behavioral variance is an important recurrent issue. However, the manner in which the question has been raised makes it a pseudo

issue. "Asking whether behavioral variance is due to either situations or persons, or how much variance is contributed by persons and how much by situations (an additive approach) is analogous to asking whether air or blood is more essential to life or asking one to define the area of a rectangle in terms of length or width. The more sensible question is 'How do individual differences and situations interact in evoking behavior?' "

(Endler, 1973, p. 289). Concerning the present controversy, Endler states that the low correlations of personality traits neither proves nor disproves the existence of consistency, and in like manner, differences across situations do not conclusively prove the primacy of situational effects. Endler concludes that the question, in the past, has not been properly phrased as it is "obvious to everyone that both situational and personal factors are important determinants of behavior, yet the question has been frequently phrased as an either-or proposition" (1973, p. 300).

In summary, Endler (1973) suggests that a new paradigm (Kuhn, 1962) is necessary so that researchers may examine the interaction of personal and situational factors within the same experimental design. One method is to assess the relative variance contributed by persons, situations, and person X situation interactions to behavior through the computation of variance components. In research employing self-report measures, this methodology has indicated the importance of such interactions with respect to the variables of hostility and anxiety (e.g., Endler & Hunt, 1968, 1969). Endler (1973, 1975) suggests that the next step should involve behavioral as well as self-report measures and experimental evaluations of the joint effects of persons and situations on behavior.

Consistent with Endler's views, Bowers (1973) argues that both the

trait and situationist positions are inaccurate and misleading, and that a position stressing the interaction of the person and situation appears more conceptually secure and empirically warranted. Bowers also provides a thoughtful critique of situationism which he considers as having gone too far in rejecting the trait approach. He states that the situationist or stimulus-response (S-R) analysis of behavior appeals to many personality psychologists since it appears to be an explicitly causal analysis in contrast to R-R relationships which are "merely correlational". Bowers indicates that such a view reveals two "metaphysical foibles" of situationism. First, there is a misidentification of an S-R point-of-view with the experimental method. Situationism tends to identify S-R relationships with the independent-dependent variable relationships yielded by the experimental paradigm; however, this paradigm is differentially sensitive to the impact of situational variables and correspondingly insensitive to organismic variables. Since individual differences tend to be reduced to the cumulative impact of empirical differences in the situation, they are frequently considered to be of relatively little importance. Second, situationism has adopted a limited understanding of scientific explanation and causality. Bowers indicates that causation does not derive from the isolation of observed regularities in nature (i.e., antecedents "cause" consequences), as has often been assumed the case. Rather, inferences about causality are dependent upon a theoretical understanding of the empirical relationships, and such relationships may be either S-R or R-R in nature.

In addition to a critique of the situationist position, Bowers presents the results of 11 articles which evaluate the relative magnitude of person and situational differences on behavior. Results of these studies indicate

that the total variance due to persons is small ($\bar{X} = 12.71\%$) as is the percentage due to situations ($\bar{X} = 10.17\%$). The mean percentage of variance attributable to the person X situation interaction is 20.77%. Also, the interaction of persons and situations accounts for a higher percentage of variance than either main effect in 14 out of the 18 possible comparisons, and in 8 out of 18 comparisons the interaction term accounts for more variance than the sum of the main effects. On the basis of these data, Bowers (1973) indicates "clearly, some kind of reformulation of the situationist-trait issue is in order ... obviously, and to some considerable extent, the person and the situation are co-determiners of behavior, and they need to be specified simultaneously if predictive validity is desired" (p. 322). As an alternative, Bowers (1973) suggests an interactionist approach to personality which stipulates that situations are as much a function of the person as the person's behavior is a function of the situation. Moreover, this approach recognizes that whatever main effects do emerge will depend entirely upon the particular sample of situations and individuals under consideration.

In a recent theoretical statement, Mischel (1973) reemphasizes the limitations of the basic assumptions of the traditional global-dispositional theories of personality, and discusses some of the misconceptions and issues arising from the challenges of those assumptions. Mischel indicates, however, that "progress in the area of personality will require more than criticism of existing positions and hinges on the development of an alternative conceptualization" (1973, p. 264). He indicates that research on social behavior and cognition (e.g., Bandura, 1969; Mischel, 1968) has tended to focus mainly on the processes by which behaviors are acquired, evoked, and

maintained. Correspondingly, less attention has been devoted to the psychological products of cognitive development and social learning experiences within the individual. Therefore, based on theoretical developments in the fields of social learning (e.g., Bandura, 1971) and cognition (e.g., Neisser, 1967), Mischel proposes a cognitive social learning approach based on a set of five person variables (i.e., construction competencies, encoding strategies and personal constructs, behavior-outcome and stimulus-outcome expectancies, subjective stimulus values, and self-regulatory systems and plans) which deal specifically with how persons mediate the impact of stimuli and generate distinctive complex molar behavior patterns.

Mischel's cognitive social learning approach shifts the focus of study from broad underlying dispositions to the individual's cognitive activities and behavior patterns, studied in relation to specific situational conditions. Furthermore, the focus shifts from attempting to generalize about what individuals "are like" to "what they do", behaviorally and cognitively, in relation to their immediate psychological conditions. Finally, focus is shifted from describing "situation-free" individuals to analyzing specific interactions between situations and the cognitions and behaviors of interest.

In summary, Mischel (1973) indicates that the cognitive social learning approach represents one of three complementary perspectives to the study of human behavior. The other two perspectives are identified as social behavior and phenomenological approaches. It is thus apparent that Mischel's (1973) cognitive social learning reconceptualization of personality, emphasizing both person and situation variables, represents an interactionist orientation to the study of behavior.

On the basis of a recent survey of personality research, Sarason, Smith, and Diener (1975) provide additional data relevant to the person-ologism-situationism-interactionism controversy. From their analysis of personality research reported in the 1971 and 1972 volumes of Journal of Personality and Social Psychology, Journal of Personality, and Journal of Consulting and Clinical Psychology, these authors indicate that surprisingly low percentages of the behavioral variance are accounted for by all classes of variables examined (i.e., situational, personality, demographic, and interactions among these variables). While the conclusions are based on a number of different analyses, Sarason et al. state that however one views the survey results regarding the potency of individual difference variables, the state of affairs for situational variables, appearing alone, is only slightly more favorable. The results do not support Mischel (1968, 1969) and others (e.g., Bem, 1972) whose views have resulted in the increasingly widespread conviction that situational variables are the prepotent determinants of behavior, and that individual differences, in comparison, are only of minor importance. As Sarason et al. (1975) indicate, the survey suggests that while situational variables do account for a slightly higher proportion of variance, "their margin of superiority is by no means striking enough for them to be considered prepotent by comparison" (p. 204).

In their conclusion, Sarason et al. (1975) state that the results of the survey are encouraging in at least one respect; namely, the proportion of research studies in which both dispositional and situational variables are incorporated into experimental designs has increased during the period from 1950 to 1970. The authors indicate that while a knowledge of situa-

tional variables may permit effective prediction of behavior in similar situations, personality X situation interactions may contribute substantially to the specification of the processes which mediate the situational behavior relationships. Therefore, the entire issue of the relative potency of situational versus dispositional variables becomes of secondary importance (a pseudo issue?) to the question of how these variables might best be studied concurrently, with the view of advancing knowledge of personality and behavior.

Some observations and conclusions. The theoretical and empirical studies reviewed demonstrate the fundamental assumptions of the three competing approaches to the study of personality, i.e., personologism, situationism, and interactionism. Moreover, these accounts illustrate some of the more salient theoretical and methodological issues which have been raised in the current controversy over which approach most clearly accounts for human behavior. As is the case in a brief overview and summary, a number of accounts have not been considered directly (e.g., Argyle & Little, 1972; Ekehammar, 1974). However, the statements which have been selected for discussion are considered representative of the issues involved and demonstrative of the current trends in personality psychology.

Viewed within the broader context of scientific evolution, the existence of competing viewpoints is apparently not unique to the area of personality. In fact, there is reason to believe that this state of affairs constitutes a distinct stage in the development of most, if not all, scientific fields of inquiry. As Kuhn (1962) indicates, "the early developmental stages of most sciences have been characterized by continual competition between a number of distinct views of nature ... (owing to) their incommen-

surate ways of seeing the world and practicing science in it" (p. 4). Such remarks appear to represent some of the main themes found to exist in the current "paradigm-clash" stage of personality psychology, i.e., most points of contention tend to involve fundamentally different ways of viewing personality. Personologists, for example, emphasize dispositional factors as the major determinants of behavior while social behaviorists assert the predominant importance of situational determinants.

As one consequence of a "paradigm-clash", Kuhn (1962) notes that a trend of support often emerges for one of the conceptual alternatives. In personality psychology, recent research (e.g., Kent, 1975; Snyder & Monson, 1975; Srull & Karabenick, 1975) would suggest that such support is currently developing for the interactionist approach. Sarason et al. (1975) indicate that this research strategy lends itself to the investigation of either person (i.e., idiographic) or personality (i.e., nomothetic) variables in their interaction with situational variables. As in the case of research summarized by Endler (1973, 1975) and Bowers (1973), persons serve as one variable in the design and the reported person X situation interactions are composites of all possible personality X situation interactions for the particular situations of interest. Such an idiographic approach appears particularly applicable for such areas as clinical and counseling psychology where the emphasis is on individual assessment and on the development of specific therapy/counseling programmes. Where interest is focused on delineating important personality dimensions (i.e., nomothetic approach, Fiske, 1971), it would appear relevant to examine personality variables within the context of situation variables and hence concentrate on personality X situation interactions (e.g., Sarason et al., 1975). This research strategy could ultimately provide im-

portant information relevant to the traditional personnel decision problems encountered in such areas as educational and industrial psychology (see Wiggins, 1973). It should be noted that the idiographic and nomothetic assessment strategies are by no means antithetic (e.g., Bem & Allen, 1974; Cronbach, 1957, 1975). In fact, both approaches have been demonstrated as providing important data on cross-situational consistency, as a personality variable (Campus, 1974), and as a person variable (Bem & Allen, 1974).

It is suggested that whether person X situation or personality X situation interactions are examined will depend primarily on the orientation and interests of the investigator and on the specific objectives of the research. Both approaches should ultimately provide invaluable data on personality and behavior. However, it is important to recognize that the "discovery" of a new research paradigm, i.e., interactionism, is only a partial solution to the current dilemma faced by personality psychology. An improvement in the successful prediction of behavior also depends on the careful examination and re-evaluation of the various measurement procedures currently employed. As has been suggested by a number of researchers (e.g., Fiske & Pearson, 1970; Wiggins, 1973), the measurement of person variables will require a careful psychometric evaluation of the methods designed for this purpose (e.g., direct self-reports, indices of directly-relevant past behavior, etc.). Research focusing on the definition and specification of the nature of situations is also required. Although there have been some attempts to develop taxonomies of situations (e.g., Barker, 1965; Frederiksen, 1972), Endler (1975) indicates that "there has been no systematic attempt to study the situation psychologically. Situations do not exist in a vacuum but have psychological meaning and significance for people" (p.15).

Finally, and consistent with the specific objectives of the present research, it is important that personality psychologists examine and evaluate the scales and tests currently used to measure important personality dimensions.

Recently, Fiske (1971, 1973, 1974) has emphasized the need for a careful psychometric evaluation of the measures and methods used for assessing personality constructs. According to Fiske (1963, 1974), many of the operations for constructing, administering, and analyzing ability tests have been taken over rather uncritically for use in assessing personality and there has been too much concern with numbers and too little attention devoted to scores as measurements of concepts. It has been rare, for example, for the researcher to concern himself with the amount of variance accounted for by his instrument, or to directly examine whether the measure reflects the basic assumptions implicit in his theoretical formulation. As a consequence, when a researcher seeks to validate a construct and its abstract conceptualized relationships with other constructs, he may obtain positive support when employing one measuring procedure but no support when employing another procedure. Fiske (1973) thus concludes that "the delimitation of the construct must itself identify at least one (and preferably more than one) specific measuring operation congruent with the conceptualization" (p. 89).

It is suspected that when research interest in a given area of personality (e.g., internal-external control) gains momentum, the initial high enthusiasm often results in insufficient attention being devoted to both the refinement of the measure and to the development of a guiding theoretical rationale. For the sake of continuity in the research, pressure then devel-

ops for the continued use of the existing measure without further examination of the measure's operating characteristics or theoretical bases. When a measure is either less than fully refined, or is not sufficiently linked to a substantive theoretical rationale, the data which accumulate from its continued use are likely to be coarse in quality and equivocal in meaning. The accumulation of such research, in turn, increases the pressure for further use of the same measure, thus completing a spiraling cycle. Therefore, at some point in this spiraling cycle, it would appear necessary to examine and evaluate the psychometric properties as well as the theoretical assumptions implicit in the measure. Consistent with this view, the present research involves a psychometric evaluation of one of the most widely used personality measures; the Rotter (1966) Internal-External Control (I-E) scale. To rephrase Mischel (1969, p. 1014), it may well be the case that the disappointingly low correlation coefficients obtained by using this scale may reflect "the noise of measurement" as well as the state of nature.

Internal-External Locus of Control

The internal-external locus of control construct (Rotter, 1966), which refers to an individual's generalized expectancy for reinforcement, was developed from social learning theory (Rotter, 1954). In a recent discussion of this theory, Rotter, Chance, and Phares (1972) indicate that the basic unit for investigating personality is the interaction of the individual and his meaningful environment. In its complete form, this theory, emphasizing the importance of both situation and person variables, is consistent with the interactionist approach discussed by Bowers (1973) and Endler (1973, 1975). Implicit in each of the fundamental concepts of this

theory is the role of the psychological situation, i.e., the phenomenological interpretation of the situation by the individual. In other words, social learning theory (Rotter et al., 1972) recognizes both situational and dispositional variables as important co-determinants of human behavior.

According to Rotter et al. (1972) three basic concepts are employed in the prediction of behavior. Each of these concepts, in turn, has two forms - one form is used when predicting specific behavior while the second, more global form, is used when predicting a set of behaviors. In an excellent summary of these concepts, Reid (Note 5) states that when interest is focused on predicting a particular behavior in a given situation, behavior potential (i.e., the potentiality of a behavior to occur in a given situation as calculated relative to the available reinforcements) is a function of the reinforcement value of the goal and the expectancy that that behavior, in the given situation, will result in the attainment of the desired outcome. When predicting a set of behaviors, the more global forms for behavior potential, reinforcement value, and expectancy are employed, i.e., need potential, need value, and freedom of movement, respectively. Need potential refers to a set of functionally related behaviors which either individually or in combination lead to the increased likelihood of satisfying one's needs. Need value is defined as a set of reinforcements which may vary both in quality and quantity depending on the particular situation. The final global concept, freedom of movement, is of particular interest since it serves as the theoretical origin for the internal-external control dimension. Specifically, freedom of movement is defined as the "mean expectancy of obtaining positive satisfactions as a result of a set of related behaviors directed toward obtaining a group of functionally related re-

inforcements" (Rotter et al., 1972, p. 34). The mean expectancy for obtaining positive reinforcements is a function of a combination of specific and generalized expectancies. As indicated by Reid, "specific expectancies involve distinct experiences and situational judgements of the likelihood of attaining a reinforcement in a particular situation. In this case there is strong emphasis placed on situational determinants and recent experience with these determinants" (Note 5). In contrast, generalized expectancies are developed from long time experiences with similar behavior-reinforcement sequences, i.e., the individual generalizes to the present from his past experiences in similar situations. While it is conceivable that individuals perceive a great number of generalized expectancy dimensions (Phares, 1973) only two have been explicitly formulated, i.e., internal-external locus of control (Rotter, 1966), and interpersonal trust (Rotter, 1967, 1971b). Of these two personality dimensions, internal-external control has been the more widely investigated and is the primary variable of interest in the present research.

The internal-external locus of control construct specifies the location of those causal forces a person believes as being responsible for his reinforcements. Such causal forces can be derived from one's own personality, i.e., the potential to respond to a particular social environment in a given manner (Rotter, 1967), or from the situation in which one finds oneself. As stated by Rotter (1966), the means by which an individual's personality influences an expectancy for success or positive reinforcement is dependent upon the degree to which that individual believes that reinforcements are within or beyond his control. A person who has a generalized expectancy that reinforcements are contingent upon his own ability, effort, or

capacity is described as an internal. A person described as an external perceives reinforcements as under the control of powerful others, luck, chance, or fate. The locus of control construct is thus regarded as a generalized expectancy for reinforcement which is operative across a wide variety of situations and represents the individual's expectation of having control over the reinforcement consequences of his behavior (Rotter, 1966).

In addition to a generalized expectancy for reinforcement, a person may find himself in a situation where his control over reinforcement is defined by the particular task structure (Lefcourt, 1966). Specifically, the task may be experimentally varied to induce an expectancy of either high or low personal control. In the former case, the task structure is viewed as requiring one's own abilities and capacities to achieve success and is, therefore, defined as a skill situation. In the latter case, success is regarded as dependent upon luck, chance, or the decision of others and is thus defined as a chance situation.

Research involving internal-external control has typically followed one of two approaches - the first has involved task structure variation to induce a situational locus of control (e.g., Phares, 1962; Roth & Bootzin, 1974) while the second, more common approach, has considered perceived locus of control as a personality variable (e.g., Joe, 1971; Phares, 1973, 1976). Since the present research is concerned with the I-E scale as a measure of generalized expectancies for reinforcement, subsequent discussion will focus on the internal-external control dimension as a personality variable.

It should be noted that in addition to the I-E scale, a number of other measures have been developed to assess the locus of control orientation of college students and adults (e.g., Coan, Fairchild, & Dobyms, 1973; Leven-

son, 1972; Nowicki & Duke, 1974). However, the I-E scale is generally considered the standard measuring instrument for use with this particular subject group. Consequently, the majority of reported research investigating the internal-external control personality variable has been based on this scale (Joe, 1971; Phares, 1973).

Typical research employing the I-E scale has proceeded by classifying subjects as either internally- or externally-oriented on the basis of their responses to this scale. In the majority of studies, the scores have been divided at the median with the lower half indicating internal control and the upper half, external control (e.g., Gilmore & Minton, 1974; Lefcourt, Sordani, & Sordani, 1974). Other investigators have studied the behavior of subjects defined as internals, middles, and externals (e.g., Houtman & Scharf, 1970; Lipp, Kolstoe, James, & Randall, 1968) while yet other research has excluded the middle group and investigated the behavior of extreme internal and extreme external subjects (e.g., Phares & Lamiell, 1974; Ritchie & Phares, 1969). Phares (1973) and Rotter (1975) have indicated that based on the definition and description of locus of control, there should be specific and predictable differences in the behavior of persons obtaining different scores on the I-E scale. Therefore, the locus of control construct is considered a continuum and the classification of subjects, in terms of upper and lower halves or extreme quartiles of the score distribution, is not meant to imply the existence of a typology (Rotter, 1975). However, Phares (1973) states that "to facilitate communication and avoid the use of stilted phrases" (p. 9), subjects classified in terms of the upper and lower portions of the I-E score distribution are often referred to as "externals" and "internals", respectively.

Research methodology has usually involved a correlation of I-E scale scores with scores on other personality measures or, such classifications as previously indicated have been employed as a selection variable allowing the subjects to be placed into different experimental treatment conditions. Previously reported data have demonstrated numerous differences between internals and externals, both in terms of other personality dimensions and in terms of behavioral measures. Brief reviews of some of the representative literature pertaining to these two categories of investigation are presented.

Internals versus externals: Some personality differences. On measures of the California Psychological Inventory (CPI) and the Adjective Check List (ACL), Hersch and Scheibe (1967) found that internals scored higher on several socially-oriented variables. For example, on the ACL, internals were more likely to describe themselves as assertive, achieving, powerful, independent, effective, and industrious. Conversely, externals described themselves as inactive, nonachieving, powerless, and dependent. Hersch and Scheibe (1967) also found that internals scored higher on the dominance, tolerance, good impression, sociability, intellectual efficiency, and well being scales of the CPI, compared to externals. These findings between CPI variables and internal-external control have been replicated by recent research (Duke & Nowicki, 1973; Gough, 1974). In addition, Gough (1974) estimated persons' scores on the locus of control dimension from their scores on the CPI scales, employing a stepwise multiple regression analysis. Results from the analysis, yielding a five-scale regression equation including dominance, tolerance, responsibility, good impression, and self-control, produced cross-validated multiple correlation

coefficients of .43 and .44 for males and females, respectively.

In an early study examining personality correlates of external control, Feather (1967) obtained results indicating a significant tendency for externally-oriented persons, of both sexes, to report greater anxiety and more neurotic symptoms. These findings have been supported by subsequent research. Specifically, Shriberg (1972) reported a significant positive relationship between neuroticism and external control, and Emmelkamp and Cohen-Kettenis (1975), Ray and Katahn (1968), Strassberg (1973), and Watson (1967) found significant positive relationships between external control and various measures of anxiety. Congruent results have also been reported in other research indicating that belief in external control is significantly related to overt death anxiety (Tolor & Reznikoff, 1967), and to generalized fear (Farley & Mealiea, 1972). The totality of such findings appear consistent with the Mandler-Watson Interruption theory (Mandler & Watson, 1966) which suggests that perceived lack of control is anxiety arousing, and individuals who appraise the world as one in which they cannot complete organized response sequences are more anxious than persons who perceive themselves as in control over what happens to them. However, whether a belief in external control produces anxiety or whether anxiety produces a belief in external control remains an unresolved issue.

Williams and Vantress (1969) found a significant relationship between internal-external control and hostility, with externals scoring significantly higher than internals on the Buss-Durkee Hostility Inventory (Buss & Durkee, 1957). Such findings suggest that externals, having experienced more feelings of powerlessness and frustration due to external forces, are more prone to manifest aggression and hostility. These results are support-

ed by Abramowitz (1969) who noted that externals tended to report more feelings of anger, by Tolor and Leblanc (1971) whose research demonstrated significant positive relationships between internal-external control and alienation as well as hostility, and by Breen and Prociuk (1976) who found that internals reported greater hostility guilt than externals. Consistent data have also been reported in other studies. For example, research has demonstrated that externals report greater hopelessness (Prociuk, Breen, & Lussier, 1976), depression (Abramowitz, 1969; Calhoun, Cheney, & Dawes, 1974; Warehime & Woodson, 1971), engage in more escapism, i.e., fantasy activities (Baker, 1971), and are more accident and suicide prone (Williams & Nickels, 1969), than internals.

Hamsher, Geller, and Rotter (1968) and Massari and Rosenblum (1972) obtained significant negative correlations between internal-external control and interpersonal trust. Similarly, Miller and Minton (1969) found that when internals and externals were placed in either equal or subordinate roles, externals violated experimental instructions significantly more often than internals indicating the externals' attitude of interpersonal suspiciousness or mistrust. Miller and Minton (1969) also reported a significant positive correlation between Machiavellianism and internal-external control - a finding which has been supported by subsequent research (Christie & Geis, 1970; Prociuk & Breen, 1976; Solar & Bruehl, 1971). However, Prociuk and Breen (1976) also reported that Machiavellianism was more strongly related to the expectancy that powerful others as opposed to chance, luck, or fate, control reinforcements. Such results supported the prediction that Machiavellianism may be related to a specific external control expectancy (Minton, 1967).

Several research studies have demonstrated a significant relationship between internal-external control and self-esteem, with internals perceiving themselves more favorably than externals (Fish & Karabenick, 1971; Heaton & Duerfeldt, 1973; Ryckman & Sherman, 1973; Ryckman & Cannon, 1975). Other investigations support and extend upon these findings. For example, Hannah (1973) required subjects to complete the I-E scale three times; once for themselves, once for their best friend, and once for the average person. Based on a subdivision of self I-E scores, internals perceived both their best friend and the average person as significantly more external than themselves, with externals perceiving themselves and others as equally external. These results were interpreted as demonstrating internals' greater self-esteem. In another study, Miller (1970) hypothesized that physical characteristics would determine whether a person is perceived as either internal or external. Consistent with prediction, results demonstrated that greater internality was attributed to physical attractiveness which is associated with higher self-esteem. Also, Organ (1973) demonstrated that clarity of self-concept was positively and significantly related to an internal control expectancy.

Additional research has demonstrated a number of other personality differences between internals and externals. An early study by Rotter, Seeman, and Liverant (1962) demonstrated a significant relationship between authoritarianism and locus of control, with externals being more authoritarian. Clouser and Hjelle (1970) noted that external control varied positively with dogmatism and in a study on self-disclosure, Ryckman, Sherman, and Burgess (1973) found that externals reported disclosing less information about themselves to others than did internals. Tolor and Reznikoff

(1972), Altrocchi, Palmer, Hellman, and Davis (1968), and Shriberg (1972) reported that external control was significantly related to sensitization versus repression, measured by the Repression-Sensitization scale (Byrne, 1961). Belief in external control has also been shown significantly related to belief in afterlife and to fear of death (Berman & Hays, 1973).

In summary, research data tend to form an orderly description of personality differences which is logically and theoretically consistent with the internal-external control construct. These findings describe externals, compared to internals, as being relatively more anxious (e.g., Strassberg, 1973; Watson, 1967), dogmatic (e.g., Clouser & Hjelle, 1970), aggressive (e.g., Tolor & Leblanc, 1971; Williams & Vantress, 1969), depressed (e.g., Calhoun, Cheney, & Dawes, 1974; Prociuk, Breen, & Lussier, 1976; Warehime & Woodson, 1971), Machiavellian (e.g., Prociuk & Breen, 1976; Solar & Bruehl, 1971), less trustful and more suspicious of others (e.g., Hamsher, Geller, & Rotter, 1968; Miller & Minton, 1969), lacking in self-confidence and insight (Tolor & Reznikoff, 1967), having lower self-esteem (e.g., Fish & Karabenick, 1971; Ryckman & Sherman, 1973), having low needs for social approval (e.g., Gough, 1974; Hersch & Scheibe, 1967), and having more of a tendency to use sensitizing modes of defense (e.g., Altrocchi, Palmer, Hellman, & Davis, 1968; Shriberg, 1972).

Internals versus externals: Some behavioral differences. Rotter (1966) suggested that internals would be more resistive to manipulation and coercion attempts than externals, who do not perceive themselves as in control of their own destinies. A substantial amount of subsequent research has examined the reactions of internals and externals to social stimuli and influence attempts. For example, three investigations (Doctor, 1971;

Getter, 1966; Strickland, 1970), employing verbal conditioning paradigms in which locus of control was used to predict responses to verbal reinforcements, have supported Rotter's (1966) hypothesis. Getter (1966) reported that although there were no verbal conditioning differences between internals and externals during the acquisition stage, internals produced more conditioned responses during the extinction stage after the experimenter had ceased his own reinforcing responses. Strickland (1970) found that internals, who were aware of the response-reinforcement contingencies of the experiment, exhibited less verbal conditioning than unaware internals and less than all externals regardless of whether or not they were aware of the contingencies. Strickland also reported that internals denied having been influenced by verbal reinforcements more often than externals. Correspondingly, Doctor (1971) found that externals, selectively reinforced in a sentence construction task, showed significantly greater performance gains than internals. When reports of awareness were used to further differentiate subjects, results indicated that aware externals accounted for the conditioning effect, i.e., aware internals, unaware subjects, and controls responded comparably and showed essentially no changes in their performance levels. Results of these studies suggest that internals tend to respond in an oppositional manner, behaving contrary to others' suggestions.

Other investigations have indicated that the relationship between locus of control and susceptibility to influence may be somewhat more complex. Ritchie and Phares (1969) predicted differential patterns of attitude change for internals versus externals, as a function of the prestige attributed to the communicator. Results demonstrated that externals changed more in response to a high-prestige source than to a low-prestige source. Externals

also showed greater attitude change than internals when both groups received a communication from a high-status person. Such results suggest that externals may not be susceptible to influence in all situations, but are affected by the prestige of the source. More recently, Biondo and MacDonald (1971) examined the effect of subtle versus overt influence attempts upon the tendencies of internals and externals to resist such influence. When presented with either a subtle or an overt influence message concerning the desirability of a given course grading system, internals showed no reactance to the subtle influence message but moved away from the position presented in the overt influence condition. Externals, on the other hand, conformed under both levels of influence. Likewise, Hjelle and Clouser (1970) and Sherman (1973) reported that externals manifested greater attitude change than internals, when the subjects were presented with persuasive communications advocating positions contrary to their previously-reported attitudes.

Results of these and other studies tend to support the prediction that internals resist manipulation and social influence attempts to a greater extent than externals. This general conclusion, however, is not true in all instances although the exceptions are revealing in themselves. Internals do tend to yield to influence attempts, but not the same attempt forms as externals. Internals respond to reasoned arguments regardless of source status, respond to influence which is in agreement with their own attitudes, and shift their behavior when it allows for greater participation and self-directiveness. Externals, on the other hand, appear more responsive to prestigious influence sources readily accepting suggestions and directives. The merits of the arguments appear to be secondary to the status of the influencer, and the desire for dependency and conformity appears more impor-

tant for externals than internals (Lefcourt, 1972).

Another area of extensive research on locus of control has concerned the theoretical prediction that internals, compared to externals, would show a greater tendency to seek information, use gained information more effectively, and manifest behaviors which facilitate personal control over the environment. Early research (Seeman, 1963; Seeman & Evans, 1962) provided initial evidence that internals had more information relevant to their personal conditions than externals. Among tubercular patients, internals acquired more information concerning their illness (Seeman & Evans, 1962) and among reformatory inmates, internals demonstrated greater knowledge about parole procedures than externals (Seeman, 1963). Subsequent investigations have supported and complemented these findings. For example, Davis and Phares (1967) required subjects to attempt to influence another person's attitudes toward the Viet Nam war. The subjects were led to believe that there was a file of data available on each of the prospective influencees. Results of this research demonstrated that internals made more active attempts to obtain information relevant to influencing another's attitudes than did externals. In addition, Phares (1968) compared the tendencies of internals and externals to use information for decision making in a computer-simulated task. Results indicated that internals were more effective in making use of information that externals were equally aware of, suggesting that internals have a greater potential for effectiveness in their social environment. Recent research has provided additional support for these conclusions. DuCETTE and Wolk (1973) demonstrated that internals, compared to externals, were more effective in a variety of information extraction and utilization procedures. Employing a simple problem-solving task, the

solution to which was dependent upon a non-verbal cue, internals were shown to require fewer trials to ascertain the solution rule than externals. In another study (Wolk & DuCETTE, 1974), locus of control was used as a predictor of intentional performance and incidental learning. In two separate experiments, subjects were presented with verbal material to be scanned for typographical errors. Results demonstrated that internals were more effective on both intentional performance (i.e., isolated more errors) and incidental learning (i.e., retained and recalled greater content) tasks than were externals. Also consistent with previous results, recent research (Prociuk & Breen, in press) has indicated significant internal versus external control differences associated with information-seeking in a college-academic situation. Internals were shown to more actively seek and acquire information relevant to the completion of course requirements than externals. Data further suggested that internals, compared to externals, used gained information more effectively to improve their final grade standings.

Other research has indicated consistent differences between internals and externals in terms of their attempts to control their environment and their own impulses. For example, Straits and Sechrest (1963) and James, Woodruff, and Werner (1965) reported that smokers were more external than nonsmokers. Recent research has also demonstrated that internals, compared to externals, were more successful in a weight reduction program (Balch & Ross, 1975), and that persons with an internal versus external locus of control were better able to use biofeedback training to increase their alpha rhythm activity (Goesling, May, Lavond, Barnes, & Carreira, 1974; Johnson & Meyer, 1974). Internals, motivated to exert personal control over their environment, have been shown as more likely to practice some

form of birth control (MacDonald, 1970; Segal & DuCette, 1973), take voluntary influenza inoculations (Dabbs & Kirscht, 1971), and engage in more anti-pollution activities (Trigg, Perlman, Perry, & Janisse, 1976) compared to externals. Also related to control over one's environment, is a recent line of investigation examining locus of control and learned helplessness (e.g., Hiroto, 1974). Results of this study suggest that the inability to control environmental events (i.e., failure to avoid aversive stimuli) is related to external control expectancies or the perception that responses and reinforcements are independent.

The studies in this area of internal-external control research tend to support the prediction that internals, in contrast to externals, show a greater tendency to seek information, employ obtained information more effectively, and show greater initiative and effort in controlling their own impulses and their environment. Results suggest that internals seem to know more about what is important to them, and seem to be more eager to gain information which will improve their probabilities for successful control over environmental outcomes. Conversely, externals appear more involved with chance-like activities, expending time and effort on decisions which seem of little concern to internally-oriented persons (Lefcourt, 1972).

The areas of locus of control research previously summarized represent some of the topics which have been subjected to rigorous and extensive examination. While the now considerable amount of research involving this personality variable defies a brief overview, there are several other behavioral differences between internals and externals which deserve mention. Specifically, research has demonstrated that internals, compared to externals, avoid risk-taking behavior (Baron, 1968; DuCette & Wolk, 1972; Julian,

Lichtman, & Ryckman, 1968), persist longer at a given task (DuCETTE & Wolk, 1972; Thurber, Heacock, & Peterson, 1974), are less likely to use alcohol and drugs (e.g., Currie, Perlman, & Walker, 1976; Segal, 1974), tend to avoid cheating (Johnson & Gromley, 1972; Miller & Minton, 1969), predict own academic performance more accurately (Steger, Simmons, & Lavelle, 1973; Wolfe, 1972), participate in a greater number of college activities (Brown & Strickland, 1972), are more perceptually vigilant (Lefcourt, 1967; Lefcourt & Wine, 1969), use persuasion rather than coercion as a means of supervision (Goodstadt & Hjelle, 1973), perform more effectively when feedback is intrinsic (Baron, Cowan, Ganz, & MacDonald, 1974), are more receptive to both positive and negative reinforcement (Holmes & Jackson, 1975), and express greater job competence and satisfaction (Heisler, 1974; Organ & Green, 1974). The totality of such findings are consistent with theoretical prediction, and support the usefulness of the internal-external locus of control dimension across several areas of psychology.

Some observations and conclusions. From the overview of some of the locus of control literature of the past decade, it would appear clear that Rotter's (1966) internal-external control construct has stimulated a considerable amount of research interest. Moreover, such research has generally supported the predictive usefulness of this personality dimension in several different areas of psychology. However, the research considered in the preceding sections was selected on the basis of three criteria. First, the findings were considered as demonstrating important personality and behavioral differences between internals and externals. Second, the studies indicated the general applicability of the locus of control dimension to different areas of psychology (e.g., personality, social, educational, clin-

ical, organizational). Third, and perhaps the most important, the findings of the studies had been replicated or other research had provided convergent data. It seemed a much more reasonable approach to consider substantiated findings rather than to cite numerous studies reporting equivocal data or results which were not supported by subsequent research. Consequently, on the basis of the summarized research, one might be led to the conclusion that research on the locus of control dimension has produced remarkably consistent findings providing significant evidence for its theoretical rationale and attesting to the validity of the I-E scale. Such a conclusion would be only partially correct. Undeniably, research has demonstrated locus of control to be an important personality dimension, and has supported Rotter's (1966) conceptualization of internal versus external control of reinforcement as a generalized expectancy operating across a number of situations. However, the degree of such support has varied from one topic of investigation to the next. Perhaps the most consistent evidence for the utility of the internal-external control construct has been shown in the area of personality functioning. On the other hand, locus of control research focusing on social-political activism and on academic achievement has provided inconsistent, equivocal, or null findings. Since such findings have had implications for both the conceptualization and the measurement of locus of control, some representative research in these areas of investigation will be briefly considered.

As a logical extension of the internal-external control construct, Rotter (1966) predicted that internals would show more overt striving for achievement and consequently demonstrate greater academic success than externals. Research with elementary and high school students (e.g., Crandall,

Katkovsky, & Crandall, 1965; McGhee & Crandall, 1968), employing the Intellectual Achievement Responsibility scale (Crandall, et al., 1965), generally supported this prediction. Results demonstrated that internals spent more time in academic activities and obtained higher achievement test scores and course grades. However, research employing the I-E scale (e.g., Allen, Gait, & Cherney, 1974; Eisenman & Platt, 1968; Hjelle, 1970; Prociuk & Breen, 1973) did not show a significant relationship between college academic achievement and internal-external control.

Prociuk and Breen (1973, 1974, 1975) suggested two possible explanations for these null findings. First, it was suggested that the item content of the I-E scale may be insufficient to assess an individual's reinforcement beliefs in certain areas of experience (e.g., college academics). Specifically, the I-E scale tends to favor items concerning social and political events as opposed to items regarding personal habits, academic goals, etc. Second, it was suggested that some individuals who find themselves in a highly competitive academic environment might arrive at an external "world view" as a defense against failure. Such individuals, defined as defensive externals, would be expected to maintain a comparatively strong achievement motivation and thus obtain high grades. However, they would defensively account for failure by externally-oriented attitudes. Therefore, in previous research which differentiated internals from externals on the basis of their scores on the I-E scale, any potential grade point average difference between these two groups might have been attenuated as a result of the higher level of academic performance by defensive externals compared to congruent externals (Prociuk & Breen, 1974, 1975).

Employing Levenson's (1972, 1974) differentiation of external control

into powerful others and chance dimensions, Prociuk and Breen (1975) provided a theoretical rationale for defining defensive externals as individuals who perceive their reinforcements (e.g., grades) as controlled by powerful others (e.g., professors). Congruent externals were defined as those persons who believe that their reinforcements are controlled by chance, luck, or fate. In a recent paper, Rotter (1975) has concurred with this dichotomy, stating that "it is possible that Levenson's distinction of belief in powerful others versus belief in chance overlaps that of defensive and passive (congruent) externals" (p. 65).

Consistent with prediction, results (Prociuk & Breen, 1975) demonstrated that internals were academically superior to both defensive and congruent externals. Also, defensive externals were shown to have significantly higher grade point averages than congruent externals and female defensive externals achieved greater academic success than their male counterparts. The latter findings supported the a priori prediction that female defensive externals, for whom defensive externality simultaneously affirms traditional feminine characteristics such as conformity and dependency, would be more successful academically than male defensive externals.

In summary, the results of research on internal-external control and academic achievement have, at best, been equivocal. While some investigators (e.g., Prociuk & Breen, 1974, 1975) have suggested that Rotter's (1966) definition of external control may be too broad for making useful internal-external control predictions in this area of experience, Prociuk and Breen (1975) indicate that the application of a multidimensional definition of locus of control (e.g., Levenson, 1972, 1974) requires an a priori theoretical rationale for distinguishing between different locus of control ex-

pectancies (e.g., Prociuk & Breen, 1976). Another possible explanation for the predominantly nonsignificant findings in this area of research relates to the previously suggested limitations of the I-E scale. Very few of the items of this scale are concerned with academic activities, goals, etc. In the development of the I-E scale, the majority of the items dealing with academic achievement were removed due to their significant correlation with a social desirability measure. The advisability of employing such a criteria would appear to be somewhat questionable, particularly since college grades have been shown as a way of obtaining social recognition as well as representing actual achievement (Eisenman, 1967).

In the area of research on social-political activism, there have been inconsistencies at both the theoretical and empirical levels. Originally, and as an obvious implication of the internal-external control construct, it was expected that internals should take more direct action in an attempt to control their social-political environment (Rotter, Seeman, & Liverant, 1962). A number of investigations have supported this theoretical prediction. For example, Gore and Rotter (1963) reported that Southern Black college students, characterized as internally-oriented, indicated a greater commitment to civil rights activism. Correspondingly, Rosen and Salling (1971) reported significant positive relationships between internal control with reported political participation and with a measure of political activeness. The data of several other investigations have, however, failed to support the predicted relationship between locus of control and social-political involvement. Rotter (1966) failed to find evidence that internals, compared to externals, would be more willing to sign a controversial petition. Similarly, Evans and Alexander (1970) found no reliable internal-

external control differences across several groups of students in terms of their participation in student civil rights demonstrations and Gootnick (1974) reported a lack of relationship between locus of control and registration to vote in the 1972 Presidential election.

Recently, Rotter (1971a) reformulated the theoretical relationship between internal-external control and social-political activism suggesting that the increase in protest and activist activities, during the last decade, is not because students believe that they can control their own destinies or that they can change society for the better, i.e., internal control expectancy. Rather, the increase in such activities is because students "feel that they cannot change the world, that the system is too complicated and too much controlled by powerful others to be changed through the students' efforts (i.e., external control expectancy) (Rotter, 1971a, p. 37). While this suggested relationship between locus of control and social-political activism is inconsistent with the results of earlier studies (e.g., Gore & Rotter, 1963; Rosen & Salling, 1971) it has been supported by other research. For example, Silvern and Nakumara (1971) reported that external control was positively related to self-reported protest activity, leftist political orientation, and countercultural belief. Also, Gurin, Gurin, Lao, and Beattie (1969) and Ransford (1968) found that Negroes who were willing to participate in protest behavior scored the lowest on internal control expectancies.

Several researchers (e.g., Abramowitz, 1973, 1974; Levenson, 1974) have attempted to resolve some of the apparent confusion in this area of research. For example, Abramowitz (1973) suggested that the disparate findings of research on locus of control and social-political activism may re-

flect a possible limitation of the I-E scale. Specifically, factor analytic research (e.g., Mirels, 1970) demonstrated the presence of two independent factors in the I-E scale; Fatalism and Social Political Control. Therefore, Abramowitz (1973) reasoned that only the political dimension may be relevant for the prediction of social-political action. Results supported this prediction demonstrating that the political, but neither the non-political nor the overall, I-E scores were found to be associated with the political involvement criteria. Moreover, data suggested that the addition of scores from the nonpolitical dimension attenuated the relationship between activism and total I-E scores. Abramowitz concluded that "the researcher who relies on a global Rotter I-E scale score thus appears to be combining variation on two independent dimensions of one's sense of mastery. A consequence may be a decrease in predictive efficiency or, as the evidence of this study demonstrates, an unwitting obfuscation of meaningful findings" (1973, p. 201).

Most recently, Reid (Note 5) has presented a thoughtful analysis of the seemingly contradictory findings in this area of research. In studies which demonstrated a significant relationship between internal control and activism (e.g., Gore & Rotter, 1963; Rosen & Salling, 1970), Reid indicates that the activism criteria employed were direct measures, i.e., self reports or self ratings, allowing for a greater degree of overlap with the Social Political Control dimension of the I-E scale. In research demonstrating no relationship between locus of control and activism (e.g., Evans & Alexander, 1970; Gootnick, 1974), the activism criteria employed were more complex. Reid suggests that in these cases, if the Social Political Control dimension was the only component relevant to activism, the additional use of the

Fatalism dimension may have contributed irrelevant variance thus obscuring the relationship between locus of control and activism. Finally, Reid indicates that research demonstrating external control to be related to social-political activism (Silvern & Nakamura, 1971) may be explained in terms of a conceptual analysis of the criterion variable which suggests that this relationship was due primarily to the Fatalism dimension of the I-E scale.

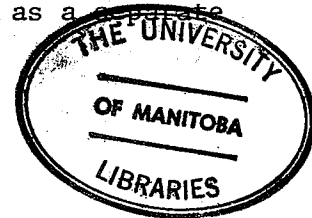
In summary, research on internal-external control and social-political activism has provided contradictory data. Recently, several researchers (e.g., Abramowitz, 1973; Levenson, 1974; Reid, Note 5) have indicated a clarification of these inconsistent findings by demonstrating that the relationship between locus of control and social-political activism is contingent upon a specific internal-external control dimension (i.e., Social Political Control). Furthermore, these researchers suggest that the I-E scale confounds two independent locus of control expectancies which when used separately, increase the predictive utility of the internal-external control construct.

In a recent paper, Rotter (1975) discusses a number of problems which he considers to have been associated with both the conceptualization and the measurement of internal-external control. To a large extent, the discussion focuses on the problematic areas of research previously discussed, i.e., academic achievement and social-political activism. Rotter (1975) indicates that in these areas of research, the most frequent conceptual problem has been the failure of researchers to treat reinforcement value as a separate variable; "to make a locus of control prediction, one must either control reinforcement value or measure it, and systematically take it into account" (p. 59). Rotter (1975) further states that an internally-oriented individ-

ual may or may not protest or sign a petition depending on whether he believes in the cause, or he may or may not strive for achievement depending on the value which he places upon academic achievement reinforcements versus other competing reinforcements.

Since reinforcement value is an important variable of social learning theory (Rotter, 1954; Rotter, Chance, & Phares, 1972), its use in locus of control research may well result in more accurate prediction. However, Lefcourt (1972) states that "it is obvious that when I-E is paired with other related but distinct variables such as self-esteem and differentiation, more powerful prediction of the criteria under investigation becomes possible" (p. 32). It is thus suggested that whether variables are included in an experimental design ultimately depends upon their theoretical relevance to the criteria of interest. Therefore, whether it is mandatory that reinforcement value be considered as part of every locus of control prediction remains an empirical question.

If reinforcement value has not been considered as a separate variable in much of the locus of control research, why has this been the case? A careful re-reading of Rotter's (1966) monograph, the stimulus for subsequent internal-external control research, indicates only one direct reference to reinforcement value. Rotter states "such generalized expectancies (locus of control) in combination with specific expectancies act to determine choice behavior along with the value of potential reinforcements" (1966, p. 2, italics added). This reference to reinforcement value does not appear to convey the same importance of this variable as now ascribed to it (Rotter, 1975). Moreover, a review of the research discussed by Rotter (1966) demonstrates the apparent failure to consider reinforcement value as a separate



variable. Rotter (1975) explains that in some of the early research demonstrating locus of control differences, e.g., information seeking differences of tubercular patients (Seeman & Evans, 1962) or differences of Southern Blacks in their civil rights activities (Gore & Rotter, 1963) there was "a strong reason to assume high motivation for all subjects toward the same goals" (p. 60). It is suggested that other researchers may have similarly and reasonably assumed a high motivation on the part of subjects in studies where no locus of control differences were demonstrated. For example, in research on college academic achievement, it appears reasonable to assume a high level of motivation (i.e., high reinforcement value of academic grades) on the part of college students who are seeking post-secondary education. In fact, even when reinforcement value was considered as a separate variable, the predicted relationship between locus of control and academic achievement was not obtained (Naditch & DeMaio, 1975). These researchers note several limitations of the I-E scale as the most likely source of difficulty in this area of locus of control investigation.

Although Rotter (1975) suggests that the general lack of significant findings of locus of control research examining social-political involvement and academic achievement is due to researchers' neglect of reinforcement value as a separate predictor variable, there exists a substantial amount of evidence suggesting at least one other plausible explanation for the null or equivocal findings in these, and other areas of locus of control research. This alternative explanation involves some of the demonstrated limitations of the I-E scale as a measure of locus of control orientation, e.g., multidimensionality, social desirability. While Rotter (1975) acknowledges some of these limitations, his discussion suggests a defense of the methodology

employed in the construction of the I-E scale. Moreover, his conclusions concerning future research on locus of control measurement appear somewhat indefinite. Rotter (1975) states, for example, "new methods of measurement and new scales, general or more specific, may be justified and needed, but the mere development of instruments without theoretical or practical justification based on the factor structures of old ones does not seem promising" (p. 66). This conclusion is in apparent contrast to another recommendation; "factor analysis ... may be important as a first step toward the building of new instruments ... It is possible, as was done in one such factor analysis (of the I-E scale), to develop subscales that do not intercorrelate by throwing out those items that load highly on more than one factor" (p. 63). Other reviewers, however, recommend the refinement of the I-E scale as a measure of generalized expectancies for reinforcement. Joe (1971) indicates that "further improvements and additional psychometric data on the I-E scale are needed" (p. 634), and "there appears to be a demand for further improvement of the I-E scale to provide finer discriminations of belief in internal-external control" (p. 635). Tyre (1972) states "the I-E control scale (Rotter, 1966) continues to need attention in terms of discriminative validity for related variables such as political affiliation and social desirability" (p. 38). Lefcourt (1972) notes "studies which have examined the psychometric properties of I-E measures provide consistent evidence that among many diverse samples the unidimensional character of I-E no longer obtains ... many refinements in assessment techniques and theoretical interpretations of locus of control-related phenomena have been, and hopefully will continue to be advanced" (p. 32). Also, Phares (1973) states that "there is real room for improvement, and it is expected that additional

research will not only produce better scales in the future but will also highlight the particular strengths and weaknesses of the Rotter I-E scale ... the psychometric elegance of several aspects of the I-E scale may be readily questioned" (p. 9). The present research, which involves an examination of some of the psychometric properties of the I-E scale, is considered consistent with these latter observations and recommendations.

The Internal-External Control Scale

Scale development. The internal-external control scale, introduced by Rotter (1966), was the product of a substantial amount of earlier research attempting to measure individual differences in locus of control. The first attempt to assess internal-external control as a personality variable was initiated by Phares (1955) in a study examining chance and skill effects on expectancies for reinforcement. Phares (1955) developed a 26-item Likert-type scale consisting of 13 external and 13 internal attitude statements. This scale, constructed on an a priori rational-analytic basis, demonstrated that the prediction of behavior within a given task situation was possible. Specifically, Phares (1955) found that the items representing external control attitudes provided directional if not statistically significant support for the prediction that individuals endorsing such items would behave in a manner similar to subjects who were placed in a chance (versus skill) situation. Results demonstrated that such persons tended to show more unusual shifts, smaller magnitude of increments and decrements, and a lower frequency of shifts in their expectancies for future reinforcements than persons who were less likely to endorse the 13 external items. The 13-item internal control scale was found not predictive and was subsequently

discarded.

This initial attempt to measure internal versus external control expectancies was followed by the dissertation research of James (1957). Maintaining the Likert-type format, James (1957) revised and extended the Phares measure by writing 26 items plus fillers based on those statements which appeared to be most successful in Phares' (1955) research. On the basis of subsequent research, James (1957) reported low but significant correlations between scores on this scale and behavioral measures in the task situation. Specifically, in terms of their verbalized expectancies, external subjects demonstrated smaller increments following success and smaller decrements following failure, generalized less from one task to another, and recovered less following an extinction period than internals. Also, external subjects tended to produce more unusual shifts (i.e., increases after failure and decreases following success) in their expectancies than subjects who were less likely to endorse the external attitude items. James (1957) further reported a significant correlation between scores on the James-Phares scale and the Incomplete Sentences Blank (Rotter & Rafferty, 1950), a measure of personal adjustment.

In subsequent research (e.g., Holden, Simmons, cited in Rotter et al., 1962), the James-Phares scale was related to the California F scale, the Edwards Personal Preference Schedule, the Incomplete Sentences measure of dependency, and to some additional problem-solving situations. Results of these studies indicated that the internal-external control variable had considerable generality as a personality dimension prompting additional research on scale development. Specifically, Rotter, Seeman, and Liverant (1962) sought to improve the James-Phares scale by (a) including items in-

volving internal as well as external control, (b) developing subscales for different life areas (e.g., academic recognition, social recognition, affection, dominance, and general social and political attitudes), and (c) controlling for social desirability by the use of a forced-choice format. The original version of this scale consisted of one hundred forced-choice items; each item comparing an external with a corresponding internal belief statement. This version was subsequently item and factor analyzed, and 40 items were removed on the basis of an internal consistency criterion. A further item analysis of the resultant 60-item scale demonstrated that the subscales were not generating separate predictions. Moreover, the items of the achievement recognition subscale tended to correlate substantially with social desirability and some of the inter-subscale correlations were of the same approximate magnitude as the internal consistency values for the individual subscales. Therefore, the attempt to measure some of the more specific subareas of internal-external control was abandoned.

The following stage of scale refinement involved the administration of the 60-item version and the Marlowe-Crowne Social Desirability scale (Crowne & Marlowe, 1964) to a large number of undergraduate psychology subject samples. The correlations of the scale with the social desirability measure, for the different subject samples, ranged from .35 to .40. Therefore, further reduction and purification of the 60-item scale was undertaken. In addition to the social desirability and internal consistency data, validity data from two studies (Rotter, Liverant, & Crowne, 1961; Seeman & Evans, 1962) were employed at this stage of scale refinement. Specifically, Rotter, Seeman, and Liverant (1962) eliminated those items of the 60-item scale which had either (a) a high correlation with the Marlowe-Crowne Social

Desirability scale, (b) a proportional split so that one of the two alternatives was endorsed more than 85% of the time, (c) a nonsignificant correlation with other items, or (d) a correlation approaching zero with both of the validation criteria, thus reducing the scale to 23 items. Additionally, some of the items were reworded to make the scale appropriate for additional use with noncollege adults and upper-level high school students. The final version of the scale, the current I-E scale, consists of 29 forced-choice items including six buffer items intended to make the purpose of the scale somewhat ambiguous.

Scale characteristics: Psychometric data. Initial data on the psychometric characteristics of the I-E scale were reported by Rotter (1966). Biseri-serial correlations with total score, with the item removed, were calculated for samples of 200 males, 200 females, and for the combined group. The values ranged from .52 to .004 for males, from .44 to .13 for females, and from .48 to .11 for the combined group. Rotter (1966) concluded that these correlations "are moderate but consistent" (p. 10). The test-retest reliability values reported by Rotter (1966) for different subject samples and intervening time periods, from one to two months, ranged between .49 and .83. Comparable findings were reported by Hersch and Scheibe (1967) who found test-retest reliability coefficients ranging between .48 and .84 for a two-month interval. In these studies of test-retest reliability, the scale means on the second administration were typically one point lower indicating a slight retest shift toward internality. Employing psychiatric subjects, Harrow and Ferrante (1969) found, over a six-week period, a test-retest reliability of .75 which is similar to the values obtained with normal samples. Finally, internal consistency estimates of reliability reported by

Rotter (1966) ranged from .65 to .79, with most values greater than .70.

Rotter (1966) reported that correlations between the I-E scale and the Marlowe-Crowne Social Desirability scale, for different samples, ranged from -.07 to -.35, with a median value of -.22. This finding was interpreted as support for the discriminant validity of the I-E scale. Strickland (1965), Tolor (1968), and Tolor and Jalowiec (1968) similarly reported low correlations between these two measures. However, nearly every other study examining the relationship between internal-external control and social desirability has reported a substantial co-variation. Feather (1967) and Altrocchi, Palmer, Hellman, and Davis (1968) reported correlations of -.42 and -.34, respectively, between scores on the I-E and Marlowe-Crowne scales. Berzins, Ross, and Cohen (1970) reported a significant correlation of -.23 between the I-E scale and the Edwards Social Desirability scale, and Cone (1971) found significant correlations between these two scales ranging from -.29 to -.70, for five large samples. The median value was -.46. Additional research investigating social desirability as a variable in the I-E scale has provided similar results. For example, Hjelle (1971) and Joe (1972) reported that a substantial number of internal statements were rated as significantly more socially desirable than corresponding external statements. More recently, Vuchinich and Bass (1974) found that although a significant correlation was obtained between the Marlowe-Crowne and I-E scales, this relationship was not consistent throughout the entire range of I-E scale scores. Results demonstrated that internals scored significantly higher on the Marlowe-Crowne scale than did moderates or externals, while moderates did not score significantly higher than externals. The totality of such results suggests that the I-E scale is not totally free of the social de-

sirability response set, as was originally assumed by Rotter (1966).

Initial correlations between different measures of intelligence and the I-E scale were shown to be low ranging from $-.22$ to $.09$ for various subject samples (Rotter, 1966). Similar results (i.e., ranging from $-.07$ and $.17$) were reported by Hersch and Scheibe (1967), who examined the relationship between I-E scale scores and three different measures of intelligence (i.e., Otis, Concept Mastery Test, D48). However, other research has demonstrated that an internal control orientation may be associated with greater mental ability. Specifically, Powell and Centa (1972) reported a significant correlation of $-.34$ between the I-E scale and the Henman-Nelson Tests of Mental Ability, and Boor (1973) found a correlation of $-.36$ between the I-E scale and the Wechsler Adult Intelligence scale. These latter findings appear inconsistent with Rotter's (1966) contention that internal-external control and mental ability are unrelated.

Additional initial evidence for the discriminant validity of the I-E scale was indicated by the nonsignificant relationship between this measure and political affiliation. Rotter (1966) reported no significant differences in the mean I-E scores of introductory psychology students who identified themselves as Republicans, Democrats, or Independents. Similarly, Minton (1967) notes that, for male subjects, internal-external control was shown unrelated to political liberalism or conservatism, "left" versus "right" ideology, or attitudes concerning international relations. However, other research has demonstrated a possible "political bias" in the I-E scale. Thomas (1970) demonstrated that internal items are likely to be endorsed by persons holding conservative rather than liberal political views. Such findings have been supported by Gootnick (1974) who suggested that the

greater ideological tendency of Republicans for "conservatism", allegiance to the "work ethic", and maintenance of order is consistent with an internal control orientation. Also, Zuckerman (1973) reported that, prior to the 1972 Presidential election, Republican supporters were shown to be significantly more internal than Democrats on the political dimension of the I-E scale.

In summary, research data tend to question Rotter's (1966) conclusion that "discriminant validity (for the I-E scale) is indicated by the low relationships with such variables as intelligence, social desirability, and political liberalness" (p. 25). Moreover, additional research (Hines, 1972) examining the convergent and discriminant validity of this scale, employing a multitrait-multimethod analysis (Campbell & Fiske, 1956), suggests a similar limitation. On the basis of obtained data, Hines (1972) indicates that "there is some evidence for convergent validity across the control measures, but ... the discriminant validity required by basic validity criteria appears lacking. The I-E scale correlates just as highly with an aggression measure as it does with another control measure" (p. 5443). While these and other research findings (e.g., mood response bias, Lamont & Brooks, 1973) indicate certain limitations of the I-E scale, perhaps the most serious challenge has come from factor analytic research which has demonstrated that this scale is not unidimensional as was originally assumed (Rotter, 1966).

Dimensionality of the I-E scale. Rotter (1966) reported that two factor analyses of the I-E scale had been computed. The first, based on a combined sample of 200 males and 200 females, "indicated that much of the variance was included in a general factor" (Rotter, 1966, p. 16). Rotter indicated that there were several additional factors involving only a few

items, but that only a small degree of variance for each factor could be isolated. Consequently, these additional factors were not considered sufficiently reliable to suggest any clear-cut subscales within the I-E scale. The second factor analysis reported by Rotter (1966), was completed by Franklin (1963) who analyzed the factor structure of the I-E scale from the responses of 1000 high school students. Rotter (1966) indicated that essentially similar results were obtained; "all of the items loaded significantly on the general factor which accounted for 53% of the total scale variance" (p. 16). On the basis of these data, it was assumed that the I-E scale measures a single unidimensional factor, i.e., the perception of locus of control as either internal or external.

Subsequent factor analytic research has challenged this unidimensional assumption of the I-E scale structure. At least five factor analytic studies have been conducted in which neither the item content nor the scoring format of the I-E scale were altered. Employing samples of 159 college males and 157 college females, Mirels (1970) used a principal axes solution, with squared multiple correlations as communality estimates. Extracted factors were rotated to orthogonal simple structure (Thurstone, 1947) employing Kaiser's (1958) varimax rotation procedure. This analysis resulted in a two-factor structure for both males and females. For the male sample, Factor I accounted for 10.9% of the variance while Factor II accounted for 8.6%. Respective values for the female sample were 12.1% and 6.7%. Factor I (Fatalism) concerned "the respondent's inclination to assign greater or lesser importance to ability and hard work than to luck as influences which determine personally relevant outcomes" (Mirels, 1970, p. 227). In contrast, Factor II (Social Political Control) referred to "the respondent's

acceptance or rejection of the idea that a citizen can exert some control over political and world affairs" (Mirels, 1970, p. 228). Similar factors have been identified by two factor analytic investigations employing Canadian subject samples. Abrahamson, Schludermann, and Schludermann (1973) administered the I-E scale to 120 male and 113 female introductory psychology students. A principal axes analysis, with squared multiple correlations as communality estimates and rotation by the varimax criterion, indicated two factors for each of the male and female samples (Abrahamson, Note 1). For males, Factor I accounted for 16.9% of the variance and Factor II for 9.3%. For females, the variance percentages were 14.0 and 11.1, respectively. These factors were interpreted as similar to those obtained by Mirels (1970). In another study, Reid and Ware (1973, Experiment 1) obtained the I-E scale responses of 130 women enrolled at Canadian weight-reducing clubs. The resultant correlation matrix was factored by a principal axes solution, employing squared multiple correlations in the diagonals. Two factors were rotated by the Kaiser (1958) varimax method; Factor I was labelled Fatalism while Factor II was designated Social System Control. Although Reid and Ware (1973) did not report the amounts of variance accounted for by each of the two factors, presenting the results for only those items with substantial factor loadings, it is apparent that the obtained factors were similar to those reported by Mirels (1970) for his female sample.

In a more recent study, Viney (1974) examined the factor structure of the I-E scale employing Australian subject samples. The I-E scale was administered to samples of 159 males and 134 females and the item responses were factor analyzed by the principal axes solution with squared multiple correlations as the communality estimates. Extracted factors were rotated

to orthogonal simple structure by means of the Kaiser (1958) varimax procedure. For each subject sample, two factors were obtained. For the male sample, Factor I accounted for 8% of the variance while Factor II accounted for 5%. Respective values for the female sample were 12% and 7%. Viney (1974) concluded that no large, general factor was found to account for the scores on the I-E scale and that the two obtained factors were "almost identical with those extracted by Mirels (1970) from two American, as compared with Australian, samples" (p. 6, extended report). Also, Cherlin and Bourque (1974) examined the factor structure of the I-E scale employing two American subject samples. The first sample consisted of 161 sociology students (96 females and 65 males) while the subjects of the second sample were 100 randomly selected residents (53 females and 47 males) of the Sylmar area in San Fernando, California. The I-E data were collected in the aftermath of the February 9, 1971, San Fernando earthquake. Principal components solutions and varimax rotations were obtained for the two samples from the matrices of correlations of the I-E item responses. Two factors, similar to those obtained by Mirels (1970), were reported for each of the two samples. For the college sample, Factor I accounted for 17% of the variance; Factor II for 12%. Respective values for the Sylmar sample were 15% and 11%. On the basis of these data, Cherlin and Bourque (1974) conclude; "this study, and others mentioned, ... indicate quite strongly that the I-E scale does not represent a unidimensional construct" (p. 580).

At least three factor analyses of the I-E scale have been conducted employing a modified response format. Joe and Jahn (1973) administered the scale to 168 male and 120 female introductory students, requiring the subjects to indicate their agreement with the selected alternative on a 6-point

scale. Separate factor analyses were calculated for males and for females, using squared multiple correlations as communality estimates and the varimax orthogonal rotation method. Results of these analyses demonstrated two factors each for males and females. For males, Factor I accounted for 49.2% of the variance while Factor II accounted for 18%. For females, the values were 45.5% and 18.9%, respectively. Despite the expected differences in the amounts of variance accounted for by these factors, the factors identified by Joe and Jahn are similar to those obtained by previous research (e.g., Mirels, 1970). In fact, these investigators indicate that "the items that identify Factor II replicate 100% the second factor in studies by MacDonald and Tseng (1971) and Mirels (1970)" (Joe & Jahn, 1973, p. 68). In another study, Kleiber, Veldman, and Menaker (1973) administered the I-E scale statement-pairs as 46 separate items. Subjects were 219 undergraduate psychology students who responded to each item on a 6-point Likert-type format. Responses to the 46 items were factor analyzed by the principal axes method and rotated toward simple structure by means of the varimax procedure. A three-factor structure was considered most interpretable and accounted for 25% of the total variance. The first factor, Disbelief in Luck and Chance, accounted for 12.8% of the variance while Factor II, System Modifiability, accounted for 6.7% variance. The third factor, Individual Responsibility for Failure, accounted for 5.5% of the total variance. Results of this factor analysis are similar to those reported by Mirels (1970) despite any difference in the number of dimensions obtained. Specifically, System Modifiability corresponds closely to Mirel's (1970) Factor II while Factors I and III, collectively, constitute the items which define the Fatalism dimension obtained by Mirels (1970).

In a study similar to that of Kleiber et al. (1973), Collins (1974) converted the 23 forced-choice I-E scale items to 46 Likert scale items and added 42 new items to provide an "it depends on the situation" alternative. The 88-item scale was administered to 300 university undergraduate students. Subsequently, the 46 Likert format statements were subjected to a principal axes factor analysis with squared multiple correlations as the communality estimates. Four factors were retained for rotation by the varimax criterion. These four factors, defined as reflecting Belief in a Difficult World, a Just World, a Predictable World, and a Politically Responsive World, each accounted for approximately an equal amount of the four-factor variance (i.e., 25%). This four-factor structure, not obtained by other research, is considered due to the Likert response format employed by Collins (1974). In fact, when Collins (1974) simulated a forced-choice format by pairing the original internal and external alternatives for each of the I-E items, a factor analysis produced two factors which were highly similar to those obtained by Mirels (1970) and by other researchers (e.g., Reid & Ware, 1973).

Other researchers have suggested that the I-E scale may not be providing sufficient distinction within the concept of internal-external locus of control. For example, Gurin, Gurin, Lao, and Beattie (1969) argued that internal control and external control are not simple concepts and that external control may be usefully redefined in terms of individual versus system blame. Furthermore, an external orientation resulting from racial discrimination might be operative for Negroes. Consequently, these researchers constructed a measure including the 23 items of the I-E scale, three items from a personal efficacy scale, and a set of 13 items written to assess students' beliefs about the operation of personal and external forces

in the racial situation. A factor analysis (procedure was not reported) of the responses of 1695 Negro students to this 39-item scale resulted in a four-factor structure. The first factor, Control Ideology, referred to how much control a person believes that most people in society possess, while Factor II, Personal Control, referred to how much control one believes that he personally possesses. The third factor, System Modifiability, was related to the degree to which a person believes that racial discrimination, wars, and world affairs can be modified. The fourth factor, Race Ideology, referred to race-related issues.

Additional research has suggested other distinctions within the internal-external control construct. As earlier noted, Levenson (1972, 1974) differentiated external control into two separate dimensions (i.e., belief in chance control and belief in powerful others control) reasoning that persons who perceive their reinforcements to be a function of chance think and behave differently from persons who believe in powerful others control. In the latter case, a potential for personal control exists. Levenson (1974) reported a principal axes factor analysis of the responses of 329 male undergraduates to the Internal, Powerful Others, and Chance scales. Squared multiple correlations were employed as communality estimates. A varimax rotation of three factors indicated that Factor I, Powerful Others, accounted for 16.8% of the variance; Factor II, Internal, accounted for 9.7% variance; and Factor III, Chance, accounted for 6.4% variance. Subsequent research with psychiatric patients (Levenson, 1973) demonstrated that the dimensions of external control by powerful others and chance were consistent factors.

Most recently, Reid and Ware (1974) reported two studies examining ad-

ditional dimensions of the internal-external control construct. In Experiment I, a 40-item forced-choice questionnaire was developed to determine whether persons can distinguish between items referring to external determinants of their own behavior and items referring to external determinants of other's behavior. A principal axes analysis of the responses of 134 psychology students, with squared multiple correlations used as communality estimates, resulted in four factors with eigenvalues greater than 1.000. Rotation of these factors by the varimax method indicated that "the targets of control", whether oneself or others, were interchangeable in the Fatalism and Social System Control dimensions. The second experiment reported by Reid and Ware examined whether the control of impulses, desires, or emotional behavior was part of the two-factor structure obtained by previous research (e.g., Mirels, 1970; Reid & Ware, 1973), or whether it represented a separate independent internal-external control dimension. One hundred sixty-seven psychology students were administered a 45-item forced-choice questionnaire including eight items written specifically to measure self-control of behavior. A factor analysis, similar to that employed in Experiment 1, yielded three meaningful factors. Factor I consisted of the items measuring the Self-Control dimension while Factors II and III were defined as Social System Control and Fatalism, respectively. This experiment suggested that the I-E scale is not providing a direct measure of self-control which may be important in locus of control research focusing on topics related to self-control of behavior (see Prociuk & Lussier, 1975).

In summary, factor analytic research examining the structure of the I-E scale may be classified into one of three categories. The first category of research, consisting of factor analyses of the unaltered I-E scale

(e.g., Mirels, 1970; Viney, 1974), has demonstrated the presence of two independent dimensions; Fatalism and Social Political Control. The second category of investigation, consisting of research which has employed the original I-E scale items with a Likert-type response format (e.g., Collins, 1974; Joe & Jahn, 1973), has provided some data which differ from those typically obtained (e.g., amount of variance accounted). However, these results are interpretable in terms of the general two-factor structure originally obtained by Mirels (1970). The final category consists of research attempting to demonstrate additional distinctions within the locus of control construct (e.g., Reid & Ware, 1974). These studies have typically employed the I-E scale as a basic source of items but have extended the measurement of internal-external control by adding items concerned with specific dimensions (e.g., racial discrimination, Gurin et al., 1969; self-control, Reid & Ware, 1974). This latter form of research has provided important information concerning additional locus of control dimensions which might prove valuable when examining certain areas of experience. Additionally, these studies have demonstrated the pervasiveness of the Fatalism and Social Political Control dimensions. Specifically, these two dimensions have been shown to occur in each of the analyses which have identified other internal-external distinctions (see Reid, Note 5).

In conclusion, the totality of such research, irrespective of category, suggests at least one conclusion. The data indicate that the I-E scale contains at least two independent locus of control dimensions, i.e., Fatalism and Social Political Control. Consequently, this measure is not unidimensional as was originally suggested by Rotter (1966).

Some observations and conclusions. Not only has recent factor analytic

research consistently demonstrated the presence of two independent factors in the I-E scale, but the findings of a number of studies (e.g., Mirels, 1970; Viney, 1974) have indicated that Factor I (Fatalism) and Factor II (Social Political Control) account for approximately 14% and 9% of the variance, respectively. These results raised an interesting, perplexing question. How was it possible for Franklin (1963) to obtain a general factor accounting for 53% of the total scale variance, if subsequent research had neither found evidence for such a general factor nor even approximated this substantial amount of accounted for variance? Rotter (1975) has noted that there may have been an increased differentiation in locus of control attitudes over time. This possibility may account for the two-factor structure of the I-E scale reported in recent studies. However, the question concerning the substantial difference between the total scale variance reported by Franklin (i.e., 53%) and that typically accounted for by subsequent factor analyses (i.e., approximately 23% combined over factors) remained unresolved. Therefore, an attempt was made to examine these contradictory results through a re-analysis of Franklin's (1963) data.

Franklin reported calculating a principal component factor analysis with communalities established by the image-covariance technique (Guttman, 1953). The first seven factors extracted were retained for rotation to simple structure employing the Carroll (1957) biquartimin method.

As a first step, Franklin's finding that "Factor I in the unrotated analysis accounted for 53% of the total scale variance" (1963, p. 51) was examined. In order to extract the total scale variance, a principal component analysis (i.e., unities in the diagonals) was calculated (BMDP4M, Dixon, 1973) employing the matrix of correlations reported by Franklin

(1963, p. 52) as input data. This solution extracted eight factors with eigenvalues greater than 1.00, accounting for the following percentages of total scale variance: 12.8, 6.2, 5.9, 5.5, 5.3, 5.0, 4.8, and 4.6. Clearly, the first factor accounted for considerably less of the total scale variance (i.e., 12.8%) than that reported by Franklin. Interestingly, the first factor accounted for approximately the same amount of variance as reported by subsequent research (e.g., Mirels, 1970).

Subsequent analyses demonstrated that the communality estimates employed Franklin (1963), and established by the image-covariance technique, were essentially identical to squared multiple correlations. Specifically, the squared multiple correlation communality estimates for items 2, 9, and 13 were .07, .15, and .20 compared to .06, .14, and .19, respectively, reported by Franklin (1963, p. 52). All other values were identical. Therefore, a principal axes analysis (BMDP4M, Dixon, 1973) was calculated, employing squared multiple correlations as communality estimates and a .001 convergence criterion for iteration on these estimates. This analysis resulted in the extraction of only one factor, with an eigenvalue of 2.06, accounting for 8.9% of the total scale variance. A comparison of the obtained factor loadings with those reported by Franklin (1963, p. 53), indicated an identical rank order. However, the obtained factor loadings were, on the average, greater by a value of .05 than the Franklin factor loadings. This consistent difference between the factor loadings was considered due to a number of possible computational factors (e.g., differences in convergence criterion for iteration, double-precision calculation, etc.). Unfortunately, an exact replication was not possible since the specific procedures employed by Franklin were not documented in any detail. It was possible, however,

to determine the percentage of total scale variance accounted for by Franklin's general factor from the factor loadings which had been reported (1963, p. 53).

In a factor analysis, all variables are standardized and the variance of each variable is thus equal to 1.00 (Nie, Bent, & Hull, 1970). Therefore, the total variance in the data is equal to the number of variables. The sum of the squared factor loadings, divided by this value, determines the proportion of total scale variance accounted for by the factor. Results of this calculation indicated that Franklin's general factor accounted for 6.4% of the total scale variance and not 53% as reported. In comparison, this value approximates that obtained in the present re-analysis (i.e., 8.9%). Clearly, the factor does not account for 53% of the total scale variance. In fact, either 6.4% or 8.9% is consistent with the value reported by Viney (1974) (i.e., 8% for Factor I), for a sample of 159 male students. This subject sample was reported "comparable with that used by Franklin (1963)" (Viney, 1974, p. 2, extended report).

If 53% was not the percentage of total scale variance accounted for by Franklin's general factor, then what did this value represent? Further analyses were calculated. The proportion of common variance accounted for by a given factor can be determined if the sum of the squared factor loadings is divided by the sum of the communalities (Nie, Bent, & Hull, 1970). Employing the data reported by Franklin (1963, pp. 52-53), this calculation yielded a value of .5294. Therefore, the 53% value reported by Franklin represented the percentage of common variance and not total variance accounted for by the general factor. This calculation simultaneously demonstrated that approximately 88% of the total scale variance was unique (i.e.,

specific and error variance).

In summary, Franklin's (1963) conclusion of the presence of a general factor in the I-E scale was likely the result of a misinterpretation of the obtained factor analytic data. Subsequently, this reported finding was considered as support for the unidimensionality of the I-E scale by Rotter (1966). However, this assumption was also based on a factor analysis conducted by Rotter (1966), who indicated that "much of the variance was included in a general factor" (p. 16). More recently, Rotter (1975) has provided an important addendum to this conclusion, i.e., "but some factors with only a few items with significant loadings did account for a small but significant variance" (p. 65). In the absence of Rotter's (1966) factor analytic data, neither the results nor conclusions may be evaluated.

Concerning other characteristics of the I-E scale, it is suggested that this measure may not be independent of a social desirability response set (e.g., Cone, 1971), and a political or ideological bias (e.g., Silvern, 1975; Thomas, 1970). Initially, Rotter (1966) reported low, nonsignificant correlations between the I-E and Marlowe-Crowne scales and between the I-E scale and a self-report political affiliation measure, as evidence for the discriminative validity of the I-E scale. A recent paper by Fiske (1973) should provide pause from drawing conclusions on the basis of single measures of, in this case, social desirability and political affiliation. Fiske (1973) reported that scales purporting to measure the same construct differed markedly in their correlations with other measures even when the subject sample was the same. These findings suggest that a number of different measures of social desirability, intelligence, etc., be employed when examining the discriminative validity of any personality scale. Moreover, the

results illustrate the dangers inherent in naively assuming that tests given the same name must also measure equivalent constructs (e.g., jingle-jangle fallacy, Kelley, 1927). In essence, such data call for a much more intensive psychometric analysis of personality scales than has previously been the practice.

Statement of Research Objectives

The preceding discussion has been intended to provide a review, an analysis, and a summary of representative research in three areas of personality psychology. First, in an attempt to place the objectives of the present investigation within the broad context of personality research, some of the current theoretical and methodological issues in this area of psychology were considered. A review and analysis of the relevant literature suggested that personality measurement was a central issue in the controversy involving personologism, situationism, and interactionism (e.g., Sarason, Smith, & Diener, 1975). Consistent with the views of a number of personality psychologists (e.g., Fiske, 1973, 1974; Wiggins, 1973), the need for a systematic psychometric evaluation of the measures currently used in personality research was emphasized. Second, in an attempt to place the objectives of the present investigation within a more defined area of current personality research, some representative topics of internal-external control investigation were considered. A review and analysis of the literature focusing on several areas of locus of control research (e.g., academic achievement, social-political activism) suggested that the measurement of this personality construct requires refinement in order to provide finer discriminations of belief in internal-external control expectancies. Consistent with the

views of a number of locus of control researchers (e.g., Joe, 1971, Lefcourt, 1972; Phares, 1973) additional psychometric data on the I-E scale was considered necessary. Finally, in an attempt to place the objectives of the present investigation into immediate focus, the area of internal-external control research concerned with the examination of the I-E scale was considered. A review and analysis of the relevant literature suggested certain limitations of the I-E scale as a measure of generalized expectancies for reinforcement (e.g., social desirability, political response bias). While previous research has provided some important psychometric data on this personality measure, certain issues have not been examined. Therefore, the present research attempts to investigate a number of structural characteristics of the I-E scale.

Consistent with Rotter's (1966) theoretical conceptualization of the internal-external control construct, the I-E scale was developed to measure a single, unidimensional, bipolar factor, i.e., the perception of locus of control as either internal or external. Reviewed factor analytic research has challenged the unidimensionality assumption demonstrating the presence of two independent factors in the I-E scale. Generally, various researchers have assumed the generality of these factors across populations without the necessary empirical verification. In contrast, Rotter (1975) notes that "some factors are emerging, although these still vary from population to population, and between the sexes" (p. 53, italics added). Therefore, one objective of the present research is to examine the factorial invariance of the I-E scale.

A second objective of this investigation involves an evaluation of the assumption of bipolarity. Specifically, the pairing of an internal with a

corresponding external statement constitutes the theoretical assumption that the internal-external item pairs represent opposite ends of a bipolar continuum. This assumption is examined through a scaling of the internal control and external control statements on the basis of Rotter's (1966) original conceptualization of the locus of control dimension. Subsequently, the bipolarity of the I-E scale items is evaluated through a scaling of the statements on the basis of the two dimensions demonstrated by previous factor analytic research, i.e., Fatalism and Social Political Control.

A third objective of this research is to examine the homogeneity of the I-E scale. In traditional psychometric practice, the Cronbach (1951) alpha coefficient has been the most commonly employed index of internal consistency, i.e., the extent to which various items of a measure intercorrelate with one another. More recently, however, there has been an increasing interest in other indices of personality scale homogeneity. Specifically, Fiske (1963, 1966, 1971) has developed procedures for determining the proportion of total scale variance due to persons, items, and remainder (a major component of which is person X item interaction). In addition to providing homogeneity information, the specification of these variance components (e.g., Endler, 1966) for the I-E scale, appears particularly relevant in view of the current controversy in personality psychology. According to Rotter (1966, 1975), the items of the I-E scale represent different life situations in which internal-external control attitudes might be expected to affect behavior. Consequently, it is reasonable to construe items as situations and reinterpret the item effect as a situation effect; the person X item interaction as a person X situation interaction. The analysis will, therefore, demonstrate whether the person X situation interaction is as important

a source of internal-external control variance as it has been shown to be in the case of anxiety variance (e.g., Endler & Hunt, 1969) and other behavioral variance (e.g., Bowers, 1973).

Of necessity, the objectives of the present research are specific to a given personality measure, the I-E scale, and to a given area of personality investigation, internal-external locus of control. It is believed, however, that the issues considered and procedures employed have a much broader applicability to the area of personality psychology. As was suggested by the opening remarks, there exists a distinct parallelism between the current issues in the general area of personality research and the specific research area of internal-external control. These issues concern the adequacy of measurement and the lack of sufficient interaction between concepts and empirical findings. Therefore, a final objective of this research is to suggest possible methods for the clearer delineation of instruments so that ultimately, the now substantial gap between theory and measurement might be attenuated.

CHAPTER II
PSYCHOMETRIC RESEARCH
EXPERIMENT 1

When several factor analytic studies have been conducted in the same substantive area of research, the question of similarity between sets of factors arises. Some factors may replicate, others may not reappear, while still others may shift their character from one investigation to the next. Therefore, evaluating the replication of factors across different studies is particularly important since there are few significance tests for factor analytic procedures (Gorsuch, 1974).

Cattell, Balcar, Horn, and Nesselroade (1969) indicate that "no psychologist can be content ... with the outcome of factoring a single correlation matrix from a single experiment ... the scientific model requires that the factors represent some influence ... which should reappear in any other experiment independently brought by the same rules to its unique resolution" (p. 731). Similarly, Harman (1960) states that it is not likely that psychologists will take the approach of assigning a set of r variables into an $r \times r$ array of factor loadings once and for all, and then linking future measurement to this standard by carrying the set of r variables from one experiment to the next. Harman indicates that "instead, they are more likely to appeal to statistical criteria for a measure of coincidence or agreement of factors obtained in one study with those of another" (1960, p. 257).

Despite these cautions and recommendations, locus of control researchers have not examined the invariance of the factor structure of the I-E scale. Instead, they have assumed the generality of certain factors across

different samples without the necessary empirical verification. For example, in research on locus of control and academic achievement, Boor (1973) employed Mirels' (1970) factor structure obtaining Factor I and Factor II scores for his subjects on the basis of those items which Mirels (1970) had identified as having the highest factor loadings on these two factors. Similarly, Gootnick (1974) and Zuckerman (1973) have employed Mirels' (1970) Factor I and Factor II scores in research on political participation and political affiliation, respectively, assuming that the Mirels (1970) factor structure was appropriate for the subject samples in their investigations. Moreover, Mirels' (1970) findings have not been used consistently. For example, Boor (1973) calculated Factor II scores on the basis of items 3, 7, 12, 13, 17, 18, 22, 26, and 29. Zuckerman (1973) calculated such scores on the basis of five items, i.e., 3, 12, 17, 22, and 29. Consequently, it is difficult to derive any firm conclusions concerning the differential relations of factorial dimensions to behavioral criteria (Reid & Ware, 1973) if (a) the consistency of the I-E scale factor structure has not been demonstrated across different samples, and (b) the factor structure is employed differently by researchers. It has been rare, for example, to find research in which a factor analysis of the I-E scale was calculated, the obtained factor structure compared to that of previous research (e.g., Mirels, 1970), and scores on a given factor determined on the basis of the immediate factor analysis. At present, recent research on power position in task-oriented groups (Hrycenko & Minton, 1974) stands alone in this regard.

It is not suggested that the conclusions of other researchers concerning the factor structure of the I-E scale have been inappropriate. In fact, the typically obtained two-factor structure and the similarity of observed

relationships between factors and variables would suggest some degree of generality for these findings. However, as indicated by Gorsuch (1974), the use of subjective examination of factor loadings for relating factors has several problems. First, one can only be certain that the same factor appears in several separate analyses if a number of the same variables have high loadings (e.g., .90) in these analyses. In factor analytic research of the I-E scale, high factor loadings on either the Fatalism or the Social Political Control dimensions have typically been in the order of .40 to .60 (e.g., Abrahamson et al., 1973; Mirels, 1970; Reid & Ware, 1973; Viney, 1974). Second, a variable with a high reliability may load on two uncorrelated factors at a moderate level. Therefore, the identification of factors on the basis of such variables may be obscured as a function of fluctuations in the size of their factor loadings. Third, complementary factors may occur which are formed by the same variables but which utilize different components of their variance. While the occurrence of such factors is generally rare, there would appear to be some potential for their appearance in research on the I-E scale due to the broad definition of external control, i.e., belief in powerful others versus chance, luck, fate (Levenson, 1972, 1974). ~~A final major problem with relating factors by examining factor~~ loadings is the subjectivity of the procedure. Gorsuch (1974) indicates that such " 'Eyeball' analyses are prone to errors of expectation. The subjectivity can be overcome by indices (of factorial invariance)" (p. 247). Factorial invariance measures also have the advantage of providing information concerning the degree of factor consistency which, in some cases, may be subjected to tests of statistical significance.

In order to determine whether or not a factor has been replicated, ob-

jective means for relating factors from one investigation to those from another are employed. The possible procedures which might be used vary depending upon whether the factors are extracted from the same individuals and whether they are based on the same variables. Essentially, there are four possible combinations of variable and individual samples: same variables and same individuals; same variables and different individuals; different variables and same individuals; and different variables and different individuals (Cattell et al., 1969; Gorsuch, 1974). Procedures exist for relating factors for the first three of the above combinations. In the case of different variables and different individuals, "the problem belongs to Alice in Wonderland" (Cattell et al., 1969, p. 782). Of the first three combinations, the first two are applicable to the factor analytic research of the I-E scale (i.e., same variables). Therefore, the present research examines the factorial invariance of the I-E scale from research employing the same and different subject samples.

An examination of the factorial invariance of the I-E scale is an important current issue. For example, Wolk and Hardy (1975) indicate that "whether one can defend unidimensionality or multidimensionality hinges upon whether that type of dimensionality can be consistently demonstrated in various subpopulations Such a psychometric quality (of) the Internal-External Scale remains to be demonstrated" (p. 157). These investigators report initial research attempting to examine both the identifiability and consistency of the factor structure of the I-E scale. Specifically, Wolk and Hardy (1975) administered the I-E scale to three college female samples; Black nursing students, White nursing students, and White education students. The female psychology students from Mirels' (1970) investigation

constituted their fourth sample. The responses of the first three subject samples were factor analyzed by the principal axes method, employing squared multiple correlations as communality estimates. Extracted factors were rotated to orthogonal simple structure by means of the varimax method (Kaiser, 1958). Subsequently, the factor loadings for the four subject samples were compared employing the relate method developed by Kaiser (Kaiser, Hunka, & Bianchini, 1971).

Wolk and Hardy (1975) noted that there was a low to moderate degree of consistency between obtained factors, considering all possible comparisons between factor structures. Several of the comparisons indicated a substantial correspondence between the total factor structures, with the factors of one sample corresponding closely to those of another (e.g., psychology students versus education students). Wolk and Hardy state, however, that "samples which could have been expected to correspond to a high degree (e.g., White versus Black nurses) did not" (1975, p. 154). On the basis of the totality of their findings, these researchers concluded that the analyses failed to indicate a high degree of consistency in the factor structure of the I-E scale.

Although the research reported by Wolk and Hardy (1975) is considered an important first attempt at examining the factorial invariance of the I-E scale, these investigators indicate that their research is not considered an exhaustive examination of factorial consistency and that alternative techniques for relating factors between groups might be employed. Similarly, Cattell et al. (1969) recommend that "on account of the special assumptions in each of these methods (of evaluating factorial consistency) ... we would suggest that the best work in this area should simultaneously apply

two or three of the evaluations" (p. 782). Consistent with such observations, the present research employs four different measures of factorial invariance in an attempt to minimize possible methodology-specific results.

Recently, Rotter (1975) has observed that "some separate factors (in the I-E scale) are emerging, although these still vary from population to population and between the sexes" (p. 63). The present experiment attempts to focus directly on this observation. Specifically, what is the actual degree of this variation and is it possible to conclude that the structure of the I-E scale is multidimensional? As noted in previous discussion, research employing subject samples drawn from Canadian (Abrahamson, Schludermann, & Schludermann, 1973), American (Mirels, 1970), and Australian (Viney, 1974) student populations (i.e., students of three different countries) has demonstrated the presence of two independent factors in the I-E scale; Fatalism and Social Political Control. Moreover, a subjective examination of the factor loadings defining these two factors would suggest some degree of factorial consistency from one investigation to another. However, the actual degree of invariance remains to be determined. Therefore, in addition to providing further data on the factor structure of the I-E scale, the present study serves to compare the results of these previous investigations in an attempt to develop some general conclusions concerning the dimensionality of the I-E scale. On the basis of past research, the following hypotheses are formulated.

Hypotheses

Hypothesis 1. The two-factor structure of the I-E scale is invariant across populations and within sexes.

Hypothesis 2. The two-factor structure of the I-E scale is invariant

within populations and between sexes.

Hypothesis 3. The two-factor structure of the I-E scale is invariant within a population and within sexes.

Method

Subjects

Sample 1. This sample consisted of 144 male students enrolled in introductory psychology courses at the University of Manitoba. The subjects participated voluntarily in this experiment and received credit toward partial fulfillment of course requirements.

Sample 2. Subjects in this sample were 145 female students enrolled in introductory psychology courses at the University of Manitoba. The subjects, volunteers for this experiment, participated in partial fulfillment of course requirements.

Sample 3. This sample consisted of 159 male students employed by Mirels (1970). As reported in the investigation, these subjects were enrolled in an introductory psychology course at Ohio State University.

Sample 4. Subjects in this sample were 157 female students employed in the Mirels (1970) research. As in the case of the male sample, these subjects were reported enrolled in an introductory psychology course at Ohio State University.

Sample 5. One hundred twenty male students enrolled in introductory psychology courses at the University of Manitoba, during the 1971-72 academic year, comprised this sample. This subject group represents one-half of the study reported by Abrahamson et al. (1973) in which factor analytic data were reported for males and females.

Sample 6. The female subjects ($n = 113$) of the Abrahamson et al. (1973) investigation constituted this sample. These subjects were students in introductory psychology courses at the University of Manitoba during the 1971-72 academic year.

Sample 7. The subjects of this sample were 159 Australian male students, aged 14 to 19, employed in a factor analytic investigation of the I-E scale reported by Viney (1974). This subject group was considered by Viney (1974) to be comparable to that employed by Franklin (1963).

Sample 8. This sample, consisting of 134 Australian female students, constituted the second half of the Viney (1974) research. The age range of these subjects, from 18 to 20 years, was considered comparable to that of the Canadian and American female samples.

Procedure

The I-E scale (Appendix A) was administered to 144 male and 145 female introductory psychology students in group testing sessions. An average of 28 subjects participated during each session. Initially, subjects were provided with introductory experimental instructions and were informed of their right to withdraw from the experiment, without penalty, if they believed that it constituted a violation of their privacy. Subsequently, test materials were distributed and standard instructions for I-E scale administration (Rotter, 1966, Appendix A) were presented. Following a period of three weeks, the subjects participated in the second part of the experiment. At this time, the subjects were readministered the I-E scale according to the above-outlined procedure. In an attempt to standardize the administrations of the I-E scale, the instructions were presented by a Philips (Model C130) tape recorder in all testing sessions. Also, the test and re-

test sessions were conducted by the same male and female experimenters. Following their participation, subjects were provided with information concerning the purpose of the experiment.

Subjects' responses to the I-E scale items were scored according to standard procedure (i.e., in an external direction) employing the IBM optical scanner. The resultant data matrices were subjected to principal axes analyses (BMDP4M, Dixon, 1975) using squared multiple correlations as initial communality estimates and a convergence criterion of .001 for iteration on these communality estimates. The minimum eigenvalue for factor rotation was 1.00 (e.g., Kaiser, 1970). In addition, Cattell's scree test (Cattell, 1966) and factor interpretability were employed as supplementary criteria for factor rotation. Subsequently, extracted factors were rotated to orthogonal simple structure by the varimax criterion (Kaiser, 1958). The resultant factor solutions were examined for factorial consistency across administrations (i.e., same variables and same subjects), and were compared for invariance with the factor solutions obtained in previous research (i.e., same variables and different subjects). Also, the results of previous factor analyses, based on samples from Canadian (Abrahamson et al., 1973), American (Mirels, 1970), and Australian (Viney, 1974) student populations, were examined for factorial invariance.

Measures of Factorial Invariance

Correlation of factor loadings. The methodology involved in calculating Pearson product-moment correlation coefficients is widely known and obtained values may be tested for statistical significance. Consequently, this procedure has been used as a measure of factorial invariance (e.g., Gifford, 1975; see Pinneau & Newhouse, 1964). However, at times, correlat-

ing factor loadings may yield ambiguous coefficients. For example, a factor from one matrix may have loadings varying between .00 and .85, while a factor from a second matrix may have a distribution of loadings of the same shape but varying from -.85 to .85. In the process of calculating correlation coefficients, raw scores are converted to standard scores. Consequently, the factor loading of .00 on the first factor is given the equivalent standard score value as the very high negative loading of -.85 on the second factor. A variable which contains none of the common variance of the factor is thus equated with one which shares a substantial amount of the variance with the factor on which it loads. Therefore, in order to avoid equating factor loadings which may have different meanings, the means and variances of the factor loadings from the different factor matrices should be examined for their relative equivalence.

Coefficient of congruence. The Tucker coefficient of congruence (ϕ) is a frequently suggested measure of factorial invariance for fixed variables and different samples (Pinneau & Newhouse, 1964). This measure is defined as the sum of the cross products of the loadings for the two factors under consideration, divided by the square root of the product of the sums of the squared factor loadings. As Harman (1960) indicates, the coefficient of congruence is similar in form to the product-moment correlation. However, the measure is not a correlation. The raw loadings used in the formula are not deviates from their respective means and the summations are over the number of variables rather than over the number of individuals. The advantage of ease in the calculation of this measure is somewhat offset by the fact that its sampling distribution is not known. Consequently, test of significance can not be calculated for this index. Also, the values of the coefficient

can be influenced by both the size and the sign of the factor loadings. Consequently, a number of researchers (e.g., Cattell et al., 1969; Gorsuch, 1974) recommend that this measure be supplemented by additional indices of factorial invariance.

Salient variable similarity index. This measure of factorial invariance, developed by Cattell (1949; Cattell et al., 1969), is a test of significance for determining whether or not two factors match in the sense of having the same salient variables. Since several variables could load on the same factor by chance, the question arises as to whether a sufficient number of identical variables load the two factors for it to be assumed that such parallel loadings could not have occurred by chance (Gorsuch, 1974). In determining this index, factor loadings are divided, for each of the two factors to be compared, into hyperplane non-salients, positive salients, and negative salients. Two factors are maximally similar when, for the common variables of the two factors, there is a complete agreement among salients with a positive sign, among salients with a negative sign, and among hyperplanes. Due to the division of variables into salient and non-salient categories, the salient variable similarity index (s) does not take into account differences within either of these categories. As such, this measure of factorial invariance represents a non parametric technique. Gorsuch (1974) indicates that a non parametric procedure "may be more appropriate when the analysis can capitalize on chance. Since the usual factor analysis does capitalize on chance, relating factors by examining minor differences between loadings may not be worthwhile and the s index may be more valuable than it first appears" (p. 254). The possible values of s range from -1.00 to +1.00 and the sampling distribution for this index, based on different

hyperplane percentage counts, has been determined (Cattell et al., 1969). Therefore, calculated values of the s index may be examined for statistical significance.

Kaiser relate method. This procedure for determining factorial consistency across studies was developed by Kaiser (Kaiser, Hunka, & Bianchini, 1971). Its intended use is to compare factor structures which are based on different subject samples and on identical or similar variables. To calculate the consistency between two sets of factors, the study with the greater number of factors is selected and the operations occur within the space defined by these factors. In the case of an equal number of factors, the selection is arbitrary. The variables of the space-defining study are located by their respective factor loadings. Subsequently, the variables of the second study are projected into this space and rotated so the cosine between each variable's vector in the first study and the same variable's vector in the second study is maximized. The factor vectors from the second study are then projected into this space; a procedure which is possible since the relationships of factors to variables are known. When both sets of factors, from the two studies, are projected into the same space the cosines of the angles ($\cos \theta$) between the two sets of factors can be calculated. These cosines represent the relationships between the two sets of factors and may be interpreted as correlation coefficients. Although the computational procedures are extremely complex for this method of relating factors, Veldman (1967) has developed a computer program (RELATE) for comparing orthogonal factors. Tests of significance are not available for this procedure.

Correlation of factor scores. This method represents the most direct

and accurate procedure for examining factorial invariance (Gorsuch, 1974; Veldman, 1967). When the same group of individuals has been tested on two separate occasions with the same set of variables a separate factor analysis for each set of data is calculated and two sets of factor scores for each subject are obtained. An intercorrelation of these two sets of factor scores indicates the stability of the factor structure. This procedure can only be employed when the two factor structures to be compared are based on the same individuals. When they are based on different subjects, the correlation of factor scores is no longer possible and other approaches must be applied (Veldman, 1967).

Summary. Gorsuch (1974) states that the above factorial invariance procedures are employed when "a survey of the literature is being conducted or if one is evaluating whether the previously found factors are also the simple structure factors for a new study" (p. 247). Since these are the primary objectives of the present research, the outlined methods were accordingly selected. Four methods for examining factorial consistency were employed in the case of different subjects and same variables in order to minimize possible methodology-specific findings. The final method, correlation of factor scores, was used to examine the stability of the factor structure of the I-E scale over time (i.e., same subjects and same variables). The factor structures obtained in the present experiment were also compared to those of previous investigations employing each of the first four factorial invariance procedures.

Results

Descriptive Statistics

Means and standard deviations were calculated for male ($n = 144$) and

female ($n = 145$) subjects for both test and retest administrations of the I-E scale. For males in the test case, the mean I-E score was 10.96 while the standard deviation was 3.88. In the retest case, corresponding values were 10.56 and 4.46. For female subjects, the values of the mean and standard deviation in the test case were 11.23 and 4.09, respectively, while the corresponding values in the retest case were 10.78 and 4.80. The three-week test-retest reliability coefficient of the I-E scale was .78 for male subjects and .83 for females. These descriptive statistics are similar to those previously reported (e.g., Joe, 1971).

Factor Analyses of the I-E Scale

Principal axes analyses of the data from the test administration of the I-E scale yielded two-factor structures for both male and female subjects. In the case of the male sample, the extracted principal factors accounted for 14.70% of the I-E scale variance. For female subjects, the two-factor solution accounted for 18.13% of the variance.

Factor analyses of the I-E scale from the retest administration of this measure similarly resulted in two factors each for males and females. The two-factor structure accounted for 19.95% of the variance in the I-E scores of male subjects and for 23.96% of the total scale variance in the case of female subjects.

Table 1 presents the rotated factor loadings of the 23-scored items for each subject sample and for both administrations of the I-E scale. Although some variation in variance accounted for by the extracted factors is noted, an inspection of the rotated factor loadings reveals the following general patterns. Items with consistent significant factor loadings on Factor I (e.g., 2, 6, 9, 11, 13, 15, 16, 18, 25) include statements con-

Table 1

Rotated Factor Loadings of I-E Scale Items for Male and Female Introductory Psychology Students on Test and Retest Administrations

Item	Test				Retest			
	Males		Females		Males		Females	
	I	II	I	II	I	II	I	II
2	.43*	-.07	.05	.01	.39*	.08	.40*	-.10
3	-.14	.36*	-.04	.43*	.05	.31*	.04	.44*
4	-.12	.24	.35*	.08	.05	.26	.32*	.09
5	.20	.26	.15	-.04	.35*	.15	.27	.24
6	.36*	-.15	.21	.20	.40*	-.04	.30*	.24
7	.07	.01	.14	.12	.10	.35*	.31*	.06
9	.35*	.13	.33*	.12	.40*	-.03	.49*	.05
10	.11	.19	.27	.14	.15	.26	.42*	.19
11	.39*	.26	.59*	.26	.37*	.42*	.58*	.34*
12	.15	.30*	.17	.45*	-.07	.58*	.13	.61*
13	.48*	.28	.24	.22	.43*	.36*	.45*	.22
15	.49*	.12	.43*	.15	.52*	.33*	.57*	.08
16	.36*	.11	.54*	.23	.47*	.14	.51*	.25
17	.02	.39*	.03	.72*	.14	.38*	.20	.60*
18	.41*	.11	.41*	.11	.57*	.05	.50*	.32*
20	.10	.27	.18	.06	.15	.34*	.33*	.04
21	.38*	-.01	.15	.02	.39*	-.01	.24	-.02
22	-.03	.41*	.09	.63*	.08	.50*	.00	.73*
23	.17	.31*	.33*	.01	.12	.32*	.22	.15
25	.54*	.24	.52*	.22	.63*	.21	.62*	.20
26	.15	.17	.36*	-.11	-.10	.20	.22	.00
28	.19	.26	.51*	.07	.24	.25	.47*	.08
29	.07	.35*	.10	.42*	.01	.50*	.00	.51*
Eigenvalue:	2.01	1.37	2.33	1.84	2.43	2.16	3.23	2.28
Percentage of variance:	8.74	5.96	10.13	8.00	10.56	9.39	14.05	9.91

*factor loadings $\geq .30$, $p < .01$ (Burt-Banks formula, Child, 1970).

trasting the affirmation of personal control over one's destiny with the assignment of such control to luck, chance, or fate. In previous research (e.g., Reid & Ware, 1973), these items have been employed to define the Fatalism dimension. In contrast, most of the items with significant loadings on Factor II (e.g., 3, 12, 17, 22, 29) compare personal versus external control over political and world affairs. On the basis of these items, Factor II has commonly been referred to as the Social Political Control dimension (e.g., Abramowitz, 1973). Therefore, the results of the present analyses are consistent with those reported in previous factor analytic research of the I-E scale. The two factors of this measure, obtained for both male and female subjects and for test and retest administrations, may be compared to similar two-factor structures reported by Abrahamson et al. (1973), Mirels (1970), and Viney (1974). The rotated factor loadings of the I-E scale items, reported in these investigations, are presented in Table 2. These data are employed in examining the factorial consistency of the I-E scale.

Invariance of I-E Scale Factor Structure

An inspection of only patterns of significant loadings on factors does not permit a judgment concerning the consistency of factor structures since selected loadings do not represent a factor (i.e., a linear combination of variables). Therefore, four measures of factorial invariance were employed in the present experiment; correlation of factor loadings (r), coefficient of congruence (ϕ), salient variable similarity index (s), and Kaiser's relate procedure ($\cos \theta$). In the case of same variables and same individuals, correlation of factor scores (r_{fs}) was also employed since this method provides the most direct evaluation of factorial consistency.

Table 2

Rotated Factor Loadings of I-E Scale Items for Male and
Female Canadian (Abrahamson et al., 1973), American
(Mirels, 1970), and Australian (Viney, 1974) Students

Item	Canadian				American				Australian			
	Males		Females		Males		Females		Males		Females	
	I	II	I	II	I	II	I	II	I	II	I	II
2	.51*	-.29	.44*	-.13	.09	-.02	.20	-.09	.20	.18	.29	.01
3	-.06	.60*	-.04	.47*	-.11	.11	.04	.28	-.06	.36*	-.06	.33*
4	.20	.06	.21	.48*	.35*	.04	.04	.02	.21	.12	.19	-.25
5	.38*	.12	.30*	.28	.38*	.17	.37*	.05	.38*	.04	.13	-.27
6	.39*	-.03	.11	.11	.27	.09	.41*	.23	.20	.41*	.13	-.24
7	.30*	.01	.19	.37*	.17	-.08	.13	.25	.03	.17	.18	.04
9	.37*	.21	.40*	-.23	.28	.09	.30*	.14	.03	.12	.36*	.01
10	.56*	-.07	.31*	.29	.33*	.22	.36*	.07	.27	-.09	.21	.08
11	.66*	.10	.55*	.14	.57*	.16	.60*	.13	.41*	.10	.43*	-.21
12	.30*	.50*	-.03	.63*	.12	.68*	.01	.49*	-.01	.42*	.38*	.48*
13	.42*	.29	.51*	.17	.28	.29	.37*	.23	-.09	.45*	.49*	.09
15	.64*	-.12	.73*	.01	.60*	.13	.47*	.18	.24	.16	.55*	-.13
16	.44*	-.01	.26	.10	.40*	.19	.59*	-.03	.52*	.05	.42*	-.36*
17	.30*	.64*	-.01	.53*	.04	.70*	.23	.45*	.09	.47*	.20	.58*
18	.60*	.10	.56*	-.25	.48*	.27	.43*	.10	.41*	.10	.46*	-.11
20	-.11	.14	.36*	.21	.18	.02	.29	.11	.18	-.01	.31*	.21
21	.04	-.01	.41*	-.12	.03	.21	.03	.01	.26	.19	.29	-.08
22	-.01	.73*	.10	.64*	.10	.64*	.07	.60*	.06	.36*	.27	.55*
23	.45*	.07	.54*	.29	.40*	.10	.53*	-.04	.30*	-.02	.26	.14
25	.68*	.06	.54*	.02	.61*	.10	.58*	.03	.51*	.19	.72*	-.03
26	.28	.09	-.01	.25	.11	.08	-.04	.47*	.18	.32*	.20	.02
28	.49*	.18	.47*	.21	.37*	.03	.43*	-.11	.31*	.16	.52*	-.04
29	.06	.48*	.06	.53*	.18	.44*	.01	.36*	.27	-.09	.15	.39*
Eigenvalue:	3.90	2.13	3.23	2.57	2.50	1.98	2.77	1.52	1.68	1.38	2.84	1.62
Percentage of variance:	16.95	9.26	14.04	11.17	10.86	8.60	12.04	6.60	7.30	6.00	12.34	7.04

*factor loadings $\geq .30$, $p < .01$ (Burt-Banks formula, Child, 1970).

Comparisons across populations and within sexes. Table 3 provides a summary of the comparisons of the two-factor structure for male and female samples from three student populations; Canadian (Abrahamson et al., 1973), American (Mirels, 1970), and Australian (Viney, 1974). The factor analytic results of the present research, for male and female subjects and for test and retest administrations, were also compared to those of Mirels (1970) and Viney (1974) (i.e., studies based on students from different countries). The findings obtained in this experiment are designated Canadian (Test) and Canadian (Retest). The results of Abrahamson et al. (1973) are designated Canadian.

Obtained results indicated a high degree of consistency in the factor loadings of Factor I. Across population comparisons for males indicated correlation coefficients and salient variable similarity indices which were statistically significant. Coefficients of congruence and Kaiser cosine θ values ranged from .76 to .93 and from .82 to .99, respectively. For females, similar comparisons of Factor I yielded values which were of slightly greater magnitude than those for male subjects. All values of \underline{r} and \underline{s} were significant ($\underline{p} < .01$) and the values of ϕ and $\cos \theta$ ranged from .87 to .97 and from .90 to .99, respectively.

In the case of Factor II, obtained results suggested a possible variation for male versus female subject samples. For females, the data indicated a substantial degree of factorial consistency. Specifically, all values of \underline{r} and \underline{s} were statistically significant (i.e., at an alpha level of at least .05) and coefficients of congruence ranged from .60 to .83. Correspondingly, $\cos \theta$ values ranged from .90 to .99. For male subjects, three comparisons yielded nonsignificant correlation coefficients. However,

Table 3

Factorial Invariance Comparisons Across
Populations and Within Sexes

Comparison	Factor I				Factor II			
	<u>r</u>	ϕ	<u>s</u>	cos θ	<u>r</u>	ϕ	<u>s</u>	cos θ
Males								
Canadian (Test) vs. American	.57**	.83	.70**	.98	.52*	.78	.55**	.98
Canadian (Test) vs. Australian	.41*	.76	.67**	.82	.01	.60	.48**	.82
Canadian (Retest) vs. American	.61**	.85	.80**	.97	.53**	.77	.55**	.97
Canadian (Retest) vs. Australian	.50*	.80	.77**	.99	.11	.66	.48**	.99
Canadian vs. American	.77**	.93	.76**	.98	.74**	.83	.67**	.98
Canadian vs. Australian	.50*	.83	.71**	.94	.46**	.67	.71**	.94
American vs. Australian	.68**	.89	.82**	.99	.39	.70	.53**	.99
Females								
Canadian (Test) vs. American	.68**	.89	.79**	.99	.66**	.81	.70**	.99
Canadian (Test) vs. Australian	.71**	.92	.67**	.92	.70**	.64	.47**	.92
Canadian (Retest) vs. American	.76**	.92	.85**	.99	.68**	.83	.70**	.99
Canadian (Retest) vs. Australian	.74**	.94	.75**	.93	.63**	.67	.35*	.93
Canadian vs. American	.70**	.90	.90**	.99	.60**	.77	.70**	.99
Canadian vs. Australian	.70**	.91	.86**	.90	.62**	.60	.33*	.90
American vs. Australian	.59**	.87	.76**	.92	.69**	.64	.59**	.92

Note. Correlations of factor loadings (r) evaluated at $df = 21$. S indices evaluated at hyperplane counts of 60% and 70%, as applicable. The same values apply for all subsequent comparisons.

** $p < .01$

* $p < .05$

all values of s were significant and the ranges of both ϕ (i.e., from .60 to .83) and $\cos \theta$ (i.e., from .82 to .99) values were similar to those obtained for female subjects. As previously noted, correlations of factor loadings are affected by the variability of the loadings. Therefore, at times, this method may provide ambiguous results. Since all comparisons yielding non-significant values of r involved the Australian male sample, the variance in the factor loadings of Factor II was examined for this subject sample. The value of this variance (i.e., .028) was comparatively lower than corresponding values for the other male subject samples (e.g., .047 for the male subjects in the Mirels investigation). Consequently, the limited range in the loadings on Factor II for the Australian male subjects may have accounted for the nonsignificant correlation coefficients which were obtained.

Comparisons within populations and across sexes. Factorial invariance comparisons were calculated to examine the degree to which the two-factor structure of the I-E scale was consistent for male versus female subjects. These comparisons were necessarily restricted within populations (i.e., to students within a given country) to avoid confounding two parameters (i.e., country of residence and sex of subject). The results of these analyses are summarized in Table 4.

The comparisons of Factor I indicated that the factor loadings corresponded substantially between male and female samples. The values of r and s were significant for all comparisons while coefficients of congruence ranged from .81 to .94. Similarly, the values of $\cos \theta$ ranged from .81 with the majority of values exceeding .96.

Results for Factor II indicated a similar pattern with the exception of one comparison (i.e., male versus female Australian samples). The correla-

Table 4

Factorial Invariance Comparisons Within
Populations and Across Sexes

Comparison (Males vs. Female)	Factor I				Factor II			
	<u>r</u>	ϕ	<u>s</u>	cos θ	<u>r</u>	ϕ	<u>s</u>	cos θ
Canadian (Test)	.51*	.81	.70**	.97	.52*	.78	.69**	.97
Canadian (Retest)	.77**	.92	.80**	.96	.61**	.84	.56**	.96
Canadian	.62**	.87	.77**	.97	.68**	.79	.53**	.97
American	.81**	.94	.86**	.99	.68**	.83	.59**	.99
Australian	.41*	.81	.64**	.81	.35	.38	.53**	.81
Canadian (Test: Males) vs. Canadian (Females)	.71**	.89	.75**	.98	.65**	.82	.67**	.98
Canadian (Retest: Males) vs. Canadian (Females)	.74**	.91	.85**	.97	.79**	.87	.72**	.97
Canadian (Test: Females) vs. Canadian (Males)	.67**	.90	.76**	.99	.81**	.88	.75**	.99
Canadian (Retest: Females) vs. Canadian (Males)	.79**	.94	.85**	.99	.84**	.89	.67**	.99

**p < .01

*p < .05

tion coefficient for this comparison was not significant and the value of ϕ was .38. However, since both statistical procedures are influenced by the sign as well as the size of the factor loadings the obtained values of \underline{r} and ϕ might have been attenuated given that corresponding values of \underline{s} (i.e., .53, $p < .01$) and $\cos \theta$ (i.e., .81) demonstrated at least moderate factorial consistency. The values of \underline{r} and \underline{s} were statistically significant for all other comparisons (i.e., $p < .01$) while corresponding values of ϕ and $\cos \theta$ ranged from .78 to .89 and from .96 to .99, respectively.

Of specific note in the present analyses were the comparisons involving the male and female samples of the Abrahamson et al. (1973) investigation and those of this experiment. The results demonstrated a high degree of factorial invariance within a given student population (i.e., Canadian). Additionally, these findings provided evidence for the temporal stability of the two-factor structure of the I-E scale across sexes.

Comparisons within a population and within sexes. Table 5 presents the results of within-sex comparisons of Canadian student samples. The values of factorial consistency obtained for comparisons involving the subjects of the present experiment were relevant to the case of same subjects and same variables. Therefore, for this case, correlations of factor scores (\underline{r}_{fs}) were calculated in addition to the other four measures of factorial invariance. All values of \underline{r} and \underline{s} were significant ($p < .01$) for both Factor I and Factor II and for comparisons involving male subjects and female subjects. For Factor I, obtained values of ϕ and $\cos \theta$ were .94 and .99, respectively, for both samples. The values of ϕ for Factor II were .93 and .95 for males and females, respectively, while $\cos \theta$ was .99 for both subject samples. Correlations of factor scores similarly indicated a high de-

Table 5

Factorial Invariance Comparisons Within a
Population (Canadian) and Within Sexes

Comparison	Factor I					Factor II				
	<u>r</u>	ϕ	<u>s</u>	cos θ	<u>r_{fs}</u>	<u>r</u>	ϕ	<u>s</u>	cos θ	<u>r_{fs}</u>
Same Subjects and Same Variables										
Males (Test vs. Retest)	.85**	.94	.91**	.99	.68**	.72**	.93	.86**	.99	.64**
Females (Test vs. Retest)	.77**	.94	.84**	.99	.74**	.89**	.95	.80**	.99	.69**
Different Subjects and Same Variables										
Males (Test vs. Abrahamson et al., 1973)	.68**	.88	.67**	.95		.73**	.81	.57**	.95	
Males (Retest vs. Abrahamson et al., 1973)	.61**	.86	.76**	.93		.58**	.75	.57**	.93	
Females (Test vs. Abrahamson et al., 1973)	.59**	.87	.74**	.99		.58**	.77	.53**	.99	
Females (Retest vs. Abrahamson et al., 1973)	.78**	.93	.88**	.99		.64**	.82	.57**	.99	

Note. Correlations of factor scores (r_{fs}) evaluated at df = 142 for males and df = 143 for females.

**p < .01

*p < .05

gree of consistency in the factor loadings of both Factor I and Factor II. All values of r_{fs} , ranging from .64 to .74, were significant ($p < .01$). Supplementary correlations of the Factor I and Factor II scores of males, $r_{fs} = .06$, and females, $r_{fs} = .09$, from the test administration of the I-E scale demonstrated the orthogonality of the two-factor structure. From the retest administration, the correlations of the factor scores were .09 for both male and female subjects.

In the case of different subjects and same variables, the factor analytic results obtained by Abrahamson et al. (1973) were compared to those of the present research. These within-sex comparisons of Canadian student samples demonstrated the consistency of the two-factor structure of the I-E scale over a 30-month period. For Factor I, all values of r and s were significant ($p < .01$) while coefficients of congruence and Kaiser $\cos \theta$ values ranged from .86 to .93 and from .93 to .99, respectively. Similarly, all values of r and s were significant ($p < .01$) for the comparisons of the loadings of Factor II. For this factor, ϕ and $\cos \theta$ values ranged from .75 to .82 and from .93 to .99, respectively.

Discussion

Factor Structure of the I-E Scale

The factor analytic results of the present experiment demonstrated a two-factor structure of the I-E scale for both male and female subject samples. On the basis of the items with substantial loadings on Factor I, this factor was identified as a Fatalism dimension, i.e., the belief that reinforcements are either under personal control or are contingent upon luck, chance, or fate. An examination of the significant loadings on Factor II

indicated that this factor was defined by items referring to social and political events. These items contrast the belief that an individual has the ability and capacity to influence social and political events with the belief that such events are controlled by powerful others and by social and political institutions (e.g., politicians, governments, etc.). Therefore, this factor was interpreted as a Social Political Control dimension of the I-E scale.

These findings were consistent with those of other factor analytic research of the I-E scale (e.g., Abrahamson et al., 1973; Mirels, 1970; Viney, 1974) in terms of three criteria. First, the number of factors identified was the same across all studies. Second, the items which defined each of the two factors were those with consistent high loadings on their respective factors in each of the four investigations. Finally, in all studies, the results were clearly interpretable as indicating two independent dimensions in the I-E scale (i.e., Fatalism and Social Political Control).

An inspection of the significant factor loadings on the Fatalism and Social Political Control dimensions of the I-E scale suggested a substantial correspondence between the factor structures obtained in the four studies. However, it should be noted that factorial consistency is often as much a function of total item vector alignment as it is of similarity of significant factor loadings (e.g., Kaiser, Hunka, & Bianchini, 1971). While this may at first seem somewhat paradoxical since significant loadings are often used to "name" a factor, it should be reemphasized that such a strategy of identification of factors cannot be employed to determine consistency of factors. Selected loadings on a given factor do not represent that factor (i.e., a linear combination of variables). Instead, factorial invariance is

examined through the application of methods developed specifically for this purpose (e.g., coefficient of congruence, salient variable similarity index, Kaiser relate method).

Factorial Invariance of the I-E Scale

The totality of results from the comparisons of the two-factor structures of the I-E scale obtained in the present as well as in previous investigations (i.e., Abrahamson et al, 1973; Mirels, 1970; Viney, 1974) suggest a high degree of consistency for both Fatalism and Social Political Control dimensions. For example, on the basis of all four measures of factorial invariance employed in this experiment (i.e., correlation of factor loadings, coefficient of congruence, salient variable similarity index, and Kaiser's relate method), the findings indicated that the two-factor structure of the I-E scale was invariant within a population (i.e., Canadian students) and within sexes. In the case of same subjects and same variables, this conclusion was further supported by the results obtained from the correlation of factor scores. Similarly, the findings demonstrated a high degree of consistency in the I-E scale factor structure when within population across sex and when across population within sex comparisons were calculated. Therefore, to the extent that the majority of comparisons yielded significant (i.e., $r, s, p < .05$) or high values (i.e., $\phi \geq .60$, $\cos \theta \geq .80$) on the measures of factorial invariance which were employed, the hypotheses of the present experiment were supported. There would, however, appear to be one possible exception to this general conclusion.

In several comparisons involving the Australian male sample, the results failed to demonstrate the same degree of factorial consistency as obtained with other subject samples. These findings were specific to compari-

sons of the loadings of Factor II (i.e., Social Political Control) and also to a given method (i.e., correlation of factor loadings). As previously noted, this method of evaluating factorial invariance is particularly subject to fluctuations in the sign and size of the factor loadings and is markedly attenuated by low values in the variance of the factor loadings. For these reasons, several researchers have stated that this method may be unsuitable as a measure of factorial invariance (e.g., Cattell et al., 1969) or have recommended that correlation of factor loadings be employed only as a supplementary index of factor-structure consistency (e.g., Pinneau & Newhouse, 1964). However, the particular sensitivity of this method to variations in factor loading variability may be a source of important information. Specifically, it would appear necessary to consider why the variance in the factor loadings of a given factor (i.e., Social Political Control) for a particular subject sample (i.e., Australian male subjects) is substantially lower than corresponding values for other subject samples.

Viney (1974) described this subject sample as consisting of 159 Australian male students aged 14 to 19 years, a group comparable to that used by Franklin (1963). In essence, this sample consisted of senior high school students in contrast to the male and female college samples employed in the present as well as previous studies (i.e., Abrahamson et al, 1973; Mirels, 1970). The female sample employed in the Viney (1974) investigation also consisted of college students. Therefore, the lower variance in the factor loadings of the Social Political Control factor for the Australian male sample, compared to the other samples, may have been partly due to subject differences. Although the I-E scale was developed for use with college students, Rotter (1966) noted that its range of applicability was extended to

include senior high school students by a rewording of several items. However, the content of the items was not altered. It is thus suggested that the social and political issues depicted by several of the I-E scale items (e.g., wars, political actions) may constitute a less salient concern for senior high school students than for college students. High school students are less likely to be of voting age, to participate in the political process, or to be directly exposed to social-political activist issues (i.e., war protest, strikes, boycotts, anti-government bureaucracy action, etc.) compared to college students. Therefore, such subject samples may be more homogeneous in their attitudes concerning social and political affairs than college student samples and their reinforcement beliefs related to social political control may be less clearly distinguished from fatalism expectancies. In fact, the pre-activist period during which Franklin (1963) conducted his research may have partly accounted for his finding of a general factor in the I-E scale with a lack of any differentiation between fatalism and social political control expectancies.

Consistent with the views of Nowicki and Duke (1974), it is suggested that investigators employing high school students in locus of control research consider alternative measures of reinforcement control beliefs which are designed specifically for use with such subject samples. Correspondingly, it is suggested that the findings of the present research, demonstrating the factorial consistency of the I-E scale, be conservatively generalized only to college male and female student samples. Moreover, the results should only be generalized to such samples drawn from Canadian, American, and Australian populations, and only to female subjects in the last case. Further research is considered necessary if interest is expressed in ex-

tending the generality of these findings to include high school student samples drawn from different populations (e.g., Canadian, American, etc.).

To the extent that the results of the present experiment, based on college student samples, demonstrated a substantial degree of consistency in the factor structure of the I-E scale, such findings differ from those reported by Wolk and Hardy (1975). These researchers factor analyzed the I-E scale responses of three college female samples (i.e., Black nursing students, White nursing students, and White education students), retaining for rotation three, three, and four factors, respectively. Subsequently, these factor structures as well as the two-factor structure reported by Mirels (1970) for his female psychology sample were compared for consistency employing Kaiser's relate procedure (Kaiser, Hunka, & Bianchini, 1971). On the bases of their findings, Wolk and Hardy concluded that the obtained factors "failed to evidence consistency between groups" (1975, p. 149).

It is evident from their analyses, that the number of factors retained for rotation was overdetermined resulting in the disintegration of the common factors. When this occurs, noninterpretable factors consisting of both common and specific variance components tend to emerge (Gorsuch, 1974). In fact, Wolk and Hardy (1975) indicated that the majority of factors were noninterpretable; "there is a substantial mix of items ... factors are not interpretable from the items that load on them" (p. 152). Given that noninterpretable "mixed" factors were retained in the factor solution, it is understandable that the comparisons of such factors failed to yield evidence for factorial consistency.

Factor interpretability is an important criterion for determining the number of factors to be retained for rotation as is indicated by Cherlin and

Bourque (1974) in recent factor analytic research on the I-E scale. These researchers state "in determining how many factors to rotate ... the final criterion was the meaning of the factors rather than a hard-and-fast mathematical rule. We must recognize that factor analysis is not an automatic technique for the production of useful constructs; rather, its use requires interpretation on the part of the analyst" (p. 568). If uninterpretable factors consisting of both common and specific variance are included in the final solution, the problem is magnified when such factors are examined for invariance. In the case of factor overdetermination, Kaiser, Humka, and Bianchini (1971) emphasize that the common variance of a given variable from such a study will differ substantially from its counterpart in another study because of the opportunity for converting its specific variance into common variance. Therefore, Kaiser et al. (1971) recommend that particular attention be focused on the meaningfulness of the factor solution itself, since the relate procedure for examining factorial invariance employed by Wolk and Hardy (1975) "is particularly susceptible to being applied indiscriminantly to yield a substantial amount of nonsense by thoughtless investigators" (p. 421).

Summary

The results of the present experiment demonstrated a two-factor structure of the I-E scale for both male and female subjects. On the basis of items with significant loadings, the two factors were identified as Fatalism and Social Political Control. Similar factor solutions were reported in previous research employing Canadian (Abrahamson et al., 1973), American (Mirels, 1970), and Australian (Viney, 1974) subject samples. However, the factorial consistency of the Fatalism and Social Political Control factors

had not been demonstrated. Therefore, four measures of factorial invariance (i.e., correlation of factor loadings, coefficient of congruence, salient variable similarity index, and Kaiser's relate method) were employed to compare the factor structures obtained in the present as well as in previous studies across populations within sexes, within populations across sexes, and within a population within sexes. In the latter case, correlation of factor scores was also employed. The totality of the findings suggested a high degree of consistency for the two-factor structure of the I-E scale. One possible exception to this general conclusion was noted. Specifically, comparisons involving the Australian male sample tended to yield lower consistency values than those obtained with other subject samples. Since this sample consisted of senior high school students, it was suggested that the present results be conservatively generalized to only college male and female student samples from Canadian, American, and Australian populations.

EXPERIMENT 2

Each of the 23 forced-choice items of the I-E scale consists of a statement attributing reinforcement causality to external factors (i.e., chance, luck, fate, or powerful others) paired with a statement reflecting attribution of reinforcement causality to personal factors (i.e., skill, ability, or effort). Therefore, based on statement choice, persons are assumed to vary along a unidimensional, bipolar continuum of locus of control with the poles defined as internal control and external control (e.g., Hjelle, 1971; Kleiber, Veldman, & Menaker, 1973). As previously noted, the dimensionality of the I-E scale has received substantial research attention in recent years. In contrast, the assumption of the bipolarity of this measure has been relatively unexamined. Therefore, the present experiment represents an attempt to investigate whether internal versus external control expectancies, as measured by the I-E scale, constitute the opposite ends of a bipolar continuum.

During the early development of the I-E scale (e.g., James, 1957; Phares, 1955), a Likert-type response format was employed. Also, the measure did not include any items referring to internal control expectancies. Rather, the assumption was made that agreement with external control items indicated a potential disagreement with internal control items. In subsequent scale development, Rotter, Seeman, and Liverant (1962) suggested that the James-Phares scale may lack construct validity because of the failure to include items sampling the internal pole of the continuum. Furthermore, these researchers indicated that the assumption of inferring an internal orientation from the disagreement with external control statements may be invalid for many persons (see also Levenson, 1972, 1974). Therefore,

Rotter et al. (1962) sought to construct a forced-choice scale by pairing statements expressing internal control with statements reflecting external control. It was also believed that this scale format would minimize social desirability response bias and represent "real life" decisions; "behavior in complex social situations is not a matter of making absolute judgements (I agree or disagree), but a relative matter of deciding I prefer this alternative to that one. Consequently, forcing a discrimination on the part of the subject may be more representative of 'real life' situations" (Rotter et al., 1962, p. 505). Given this rationale, a 100-item forced-choice scale was developed, refined, and reduced to its present length. Each of the 23 items of the current I-E scale are considered indicants of internal-external control expectancies in a wide variety of different situations (Rotter, 1966, 1975), with the paired statements of any given item representing a common situation (e.g., item 23 represents an academic situation, item 29 describes a social political situation, etc.).

While the adopted format of the I-E scale could have the "salutory effect of providing higher validity coefficients" (Rotter et al., 1962, p.505), the logic of the forced-choice scale construction would require that all statements appearing in the measure be scaled on the basis of the degree of internal or external control they represent, and then paired according to their scale values. Such a procedure would appear to be a minimum requirement to ensure that the internal-external statement pairs constitute opposite ends of a bipolar continuum, particularly since bipolarity is a theoretical assumption of the internal-external control dimension (Rotter, 1966, 1975). Moreover, the statements of each item should have approximately the same scale values since it is conceivable that differences in the degree of

internal versus external control represented by the paired statements might adversely affect the item's discriminative power.

In order for a forced-choice item to provide maximal discriminative information, each of the two alternatives should have an approximately equal probability of being selected by the respondent (e.g., Anastasi, 1968; Nunnally, 1967). For a large number of individuals, where the proportional split between the alternatives is 50/50, the item provides $50 \times 50 = 2500$ units of differential information (i.e., the maximum possible value). A proportional split of 90/10, for example, provides only 900 units of discriminative information. Therefore, it would appear desirable that the internal and corresponding external statement of each I-E scale item have probabilities of being endorsed which do not differ substantially from .50. Of course, whether the internal or the external statement is endorsed by a respondent will depend upon that respondent's generalized expectancy for reinforcement.

It is not suggested that an ideal measure of internal-external control should consist entirely of items which have a probability of endorsement of .50, but that the probabilities of endorsement constitute a distribution about this value. Current psychometric theory (e.g., Fiske, 1971; Magnusson, 1966; Nunnally, 1967) suggests that other criteria be employed for evaluating item effectiveness (e.g., item intercorrelation, factor loadings) in addition to probability of endorsement. However, a probability of endorsement value which differs substantially from .50 is commonly used as a criterion for identifying possible nondiscriminating items (e.g., Nunnally, 1967). In fact, an 85/15 proportional split between alternatives was used by Rotter et al. (1962) to eliminate nonfunctional items.

As related to item bipolarity, it would appear conceivable that the probability of endorsement of a given statement, e.g., the internal control alternative, might be influenced by the degree of internal control represented by that statement relative to the degree of external control represented by the corresponding external control statement. For example, when a statement expressing a high degree of internal control (e.g., There is no such thing as luck) is paired with a statement expressing a low degree of external control (e.g., Luck plays a minor part in people's lives), an internally-oriented person might endorse the external alternative not because he agrees with it entirely but because he disagrees with the high degree of internal control expressed by the corresponding internal alternative. Assuming that only a small number of persons endorse the internal alternative, the proportional split for this item becomes approximately 90/10. As a consequence, this item's correlation with the other items is attenuated (e.g., Magnusson, 1966). Such a finding is not entirely uncommon considering that the average correlation among I-E scale items is in the range of from .08 to .14. However, if a statement representing a high degree of external control (e.g., The outcomes of important life events are determined by luck) is paired with the alternative expressing a high degree of internal control (e.g., There is no such thing as luck), then it is more likely that externally-oriented persons will endorse the former alternative since it is most consistent with their locus of control orientation, with the opposite true for internally-oriented individuals. In summary, it is suggested that if the internal and corresponding external statements have approximately the same scale values, then this equality might reduce the possibility that the choice between the statements will be influenced by a difference in the

degree of internal versus external control represented by the statements. Consequently, the endorsement of either the internal or external alternative would be more directly dependent upon the respondent's generalized expectancy for reinforcement which is the desired outcome of locus of control measurement.

The issue of internal-external item bipolarity and probability of statement endorsement should, however, be examined within the context of the possible effects of social desirability. Specifically, it is possible that the probability of endorsement of given statements may be influenced not only by the lack of item bipolarity but also by social desirability with the internal control statements endorsed to a greater extent because of higher associated social desirability (e.g., Joe, 1972). Recent research on the probability of endorsement of I-E statements and social desirability (Hjelle, 1971) would appear to have some direct implications for this experiment. In this research, one group of subjects was administered the I-E scale under standard instructions while a second group was instructed to select the statement in each item which was considered more socially desirable. Although it was predicted that in the socially desirable condition the probability of internal alternative endorsement would be increased, results demonstrated that the correlation between the levels of endorsement of such statements by the two groups was .87 ($df = 21$, $p < .001$). Therefore, while the majority of I-E statements did not have an equal probability of endorsement, social desirability did not have an effect on altering that probability of endorsement. Hjelle (1971) thus concluded that "overall, the data strongly indicate that major revision of I-E scale items is required in order to maximize the psychometric attributes demanded of a forced-choice

inventory" (p. 811).

Hjelle (1971) has provided some important data on the relationship between social desirability and probability of I-E statement endorsement. However, further research on this issue would appear necessary. In Hjelle's study, two conditions were employed, i.e., a standard administration of the I-E scale and an administration under socially desirable instructions. It may be the case that the probabilities of endorsement were highly similar under the two conditions because, in the standard administration condition, the subjects were already responding in a socially desirable manner. Consequently, little effect was obtained by introducing socially desirable instructions. Therefore, it would appear necessary to additionally examine the possible effects of socially undesirable instructions on the probabilities of I-E statement endorsement.

Based on the foregoing considerations, the present experiment was designed to investigate the following questions. What is the degree of internal and external control represented by each of the internal and external control statements of the I-E scale, respectively? When the scale values of internal control statements are compared to those of corresponding external control statements, are the degrees of internal and external control represented equivalent? What is the relationship between the equivalence or non-equivalence of scale values of paired internal and external control statements and the probability of equal endorsement of the two statements? Is the probability of I-E statement endorsement independent of social desirability? Since the literature is essentially void of information concerning the bipolarity of the I-E scale, specific hypotheses could not be advanced. However, on the basis of the theoretical formulation of the internal-exter-

nal control construct, and consistent with previous discussion, the following hypotheses were formulated in the logical form of the general implication (Reichenbach, 1947).

Hypotheses

Hypothesis 1. If the I-E scale is bipolar, then the scale values of the internal control statements, indicating the degree of internal control represented, should be statistically equivalent to the scale values of the corresponding external control statements, indicating the degree of external control represented.

Hypothesis 2. If the internal-external item pairs of the I-E scale are bipolar, i.e., constitute opposite ends of a continuum, then the paired statements should have statistically equal probabilities of endorsement.

Hypothesis 3. If the probabilities of I-E statement endorsement are independent of social desirability, then the probabilities should be similar under socially desirable, socially undesirable, and standard I-E scale administration conditions.

Method

Subjects

Sample 1. The subjects of this sample were 15 male and 25 female students enrolled in a third-year psychology course at the University of Manitoba during the 1973-74 academic year. These subjects were selected from a larger sample of 27 male and 48 female students who participated voluntarily, on the basis of a criterion discussed elsewhere. All subjects had completed the I-E scale in an earlier experimental session.

Sample 2. This subject sample consisted of 82 introductory psychology

students (39 males and 43 females) enrolled at the University of Manitoba. These subjects were administered the I-E scale under standard instructions (Rotter, 1966). All subjects, volunteers for this experiment, received course credit for their participation.

Sample 3. This sample consisted of 34 male and 46 female introductory psychology students enrolled at the University of Manitoba. These subjects were administered the I-E scale under standard testing conditions but were provided with socially desirable instructions. Subjects were volunteers for this experiment earning course credit for their participation.

Sample 4. The subjects in this sample were 84 introductory psychology students (36 males and 48 females) enrolled at the University of Manitoba. Like the other samples, this sample was administered the I-E scale in a standard manner but was provided with socially undesirable instructions. All subjects, volunteers for this experiment, were given course credit for their participation.

Instruments

To determine the scale values of the internal and external control statements of the I-E scale, several specific instruments were developed (Appendix B). First, the six buffer items (numbers 1, 8, 14, 19, 24, and 27) of the 29 item I-E scale were removed leaving the 23 scored items, each consisting of an internal and a corresponding external control statement. The 46 statements were then randomized and a questionnaire (Form A) was constructed. To counterbalance for order of presentation, practice or fatigue effects, etc., a second questionnaire form was developed (Form B) by reversing the statement order, i.e., the first statement of Form A became the last statement of Form B, etc. The statements were presented without any iden-

tification as to whether they expressed internal or external control.

A common rating form was developed to accompany the two questionnaires. On this rating form, each statement number was preceded by a space where the subject was to identify the statement as expressing either internal or external control and was followed by a 7-point (1 - 7) rating scale. In the completion instructions, the extreme as well as the middle rating points were anchored by providing descriptions corresponding to the degree of internal or external control implicit at these points.

Method of Successive Intervals

Edwards' (1952, 1957, 1970) method of successive intervals was employed to determine the scale values of the internal and external control statements of the I-E scale. This scaling method has been used extensively with personality scales and inventories, particularly for determining the social desirability scale values of personality items (see Edwards, 1970). The method of successive intervals (Edwards, 1952, 1957) is similar to Torger-son's (1958) law of categorical judgement with both scaling methodologies based on Thurstone's (1927) general judgement model. The basic notions underlying Thurstone's scaling model are briefly summarized.

Given a series of stimuli to which the subject can respond differentially with respect to some given attribute, the researcher's task is to locate the stimuli on a psychological continuum in such a way as to account for the obtained responses. The psychological continuum may be considered a continuum of subjective or psychological magnitudes, with each psychological magnitude mediated by a discriminial process. Therefore, each discriminial process, defined as the process by which the subject identifies, distinguishes, or reacts to stimuli, has a value on the psychological continuum.

Each stimulus, when presented to a subject, gives rise to a discriminial process. Owing to various factors, e.g., individual differences, upon repeated presentation to different subjects, the stimulus is not always associated with a particular value but may be associated with one higher or lower on the continuum. It is thus postulated that the values associated with any given stimulus project a normal distribution on the continuum. The discriminial process most often associated with a given stimulus is defined as the modal discriminial process. The scale value of the stimulus on the psychological continuum is taken as the value of the mean discriminial process associated with it. The standard deviation of the distribution associated with a given stimulus is called the discriminial dispersion of the stimulus.

According to the method of successive intervals, like the law of categorical judgement, it is further postulated that the psychological continuum can be divided into a number of ordered categories, steps, or rating points. A given rating point is not necessarily always located at a particular point on the continuum, but projects a normal distribution of positions on the continuum. Therefore, a subject judges a given stimulus to be below a rating point whenever the value of the stimulus on the continuum is less than that of the rating point. In sum, rating points behave in a manner similar to stimuli, hence a solution for scale values involves a determination of the location of the rating points on the psychological continuum.

Edwards (1952,1957) indicates that the method of successive intervals can be applied to relatively large numbers of stimuli since only n judgements for n stimuli are required from each subject. In contrast, the method of paired comparisons requires $n(n-1)/2$ judgements for the n stimuli. Thus, it is obvious that the latter method is experimentally impractical when the

number of stimuli to be scaled is large. In the present experiment, for example, 1035 comparative judgements would be required from each subject. Despite this difference, Edwards (1952) reports that the method of successive intervals yields scale values which are linearly related to those obtained by the method of paired comparisons.

Procedure

Scaling of internal and external control statements. Subjects of Sample 1, all completing a third year course in Personality, received three lectures on Rotter's social learning theory of personality with specific emphasis on the internal-external control dimension. At the conclusion of this instruction, the subjects were asked to participate in a study concerned with the I-E scale. Of the 75 subjects volunteering for this experiment, 37 received questionnaire Form A while 38 subjects received Form B. The subjects were presented with the experimental instructions, were required to study each statement and then identify it as representing either internal or external control. Consistent with scaling methodology (Torgerson, 1958), all statements were presented prior to any rating allowing familiarity with the overall range of stimuli. Subsequently, subjects proceeded to study each statement again and rate it on a 7-point scale reflecting the extent to which it was judged as expressing either internal or external control. Since it was conceptually and methodologically inconsistent to include the ratings of statements which had been misidentified, the correct identification of the 46 statements (i.e., internal or external control) was necessary for the judgement protocol to be included in the computation of the scale values. Although some form of "exclusion" criterion is commonly employed in scaling methodology to help identify any carelessness, lack of attention, etc., on

the part of the subject (Edwards, 1957), the present criterion, of necessity, was a stringent one. However, it was believed that if the subject was able to correctly identify all of the statements, then greater confidence might be placed in his judgements of the degree of internal or external control represented by the statements. Moreover, any identification errors were considered to be of interest in their own right. Specifically, if subjects who had received instruction on the internal-external control construct were unable to correctly identify the statements, such a finding would have obvious implications for the standard administration of the I-E scale. In this regard, Tyre (1972) has commented on the "obviousness of the I-E scale items" (p. 34). The present error of identification data were thus considered important for evaluating this observation.

Endorsement of I-E statements. The endorsement of the internal and external control statements of the I-E scale by the subjects of Sample 1, followed the presentation of standard administration instructions. The instructions were presented verbally and the experimental session was conducted by a male and female experimenter. The subjects were administered the I-E scale approximately two months prior to their participation in the scaling of the internal and external control statements.

A second subject-sample was employed to provide comparative information concerning the probabilities of endorsement of the internal and external control statements obtained from Sample 1. Therefore, the subjects of Sample 2 were administered the I-E scale employing identical standard administration instructions. In contrast, two subject-samples were used to determine whether social desirability influences the probabilities of internal and external control statement endorsement. Consequently, the subjects of

Sample 3 were provided with socially desirable instructions while those of Sample 4 were administered the I-E scale under socially undesirable instructions.

In the socially desirable condition, the I-E scale administration instructions read as follows:

This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered a and b. Please select the one statement of each pair (and only one) which you believe is more socially desirable, that is, the statement which you believe would make another person look better or be regarded more positively if he or she were to express agreement with it. This is a measure of personal belief; obviously there are no right or wrong answers. Also, try to respond to each item independently when making your choice; do not be influenced by your previous choices.

In the socially undesirable condition, the above instructions were altered by substituting "undesirable" for "desirable", "worse" for "better", and "negatively" for "positively". In all other respects, the instructions and administration procedure were consistent. The instructions were presented by a Philips (Model CL30) tape recorder and the experimental sessions were conducted by a male and female experimenter.

Following their completion of the I-E scale, the subjects of Samples 2, 3, and 4 rated their responses to the I-E items on a 7-point (-3 to +3) scale (Appendix C). Specifically, subjects were asked to indicate how favorably or unfavorably another person would be described if that person's description was contingent on their responses to the I-E scale. On a separate

7-point (1 - 7) rating scale, the subjects indicated how confident they were of their judgement about the possible description of another person. At the conclusion of each experimental session, the subjects were provided with information concerning the purpose of this research.

Results

Scale Values of Internal and External Control Statements

The 23 internal and 23 external control statements of the I-E scale were subjected to successive internal scaling analyses (Edwards, 1957, 1970). The frequency with which a statement was rated at each of the 7 rating points was determined, the cumulative proportions for each statement calculated, and estimates of the widths of the intervals making up the psychological continuum, i.e., internal control and external control, computed. With knowledge of the psychological continuum, the scale values of the statements were computed relative to the corresponding cumulative proportion distributions of this continuum. Also, standard deviations were determined as measures of the variation, i.e., discriminial dispersion, in the distribution of judgements for the statements. Table 6 presents the ordered scale values and corresponding discriminial dispersions of the internal and external control statements.

Since it is a basic assumption of the method of successive intervals that the scale values of the statements be independent of the attitudes of the subjects completing the ratings, this assumption was examined. Pearson product-moment correlations between individuals' ratings of the statements and their I-E scores supported this assumption. For the internal statements, the median correlation coefficient was .039 while the corresponding

Table 6

Ordered Scale Values and Corresponding Discriminal Dispersions
of Internal and External Control Statements

Internal Statements			External Statements		
Statement Number	Scale Value	Discriminal Dispersion	Statement Number	Scale Value	Discriminal Dispersion
2(b)	5.34	1.58	2(a)	3.77	1.56
3(a)	3.24	1.68	3(b)	4.71	1.48
4(a)	4.42	1.36	4(b)	4.91	1.81
5(a)	4.19	1.76	5(b)	5.49	1.19
6(b)	4.42	1.58	6(a)	5.23	1.20
7(b)	4.35	1.27	7(a)	3.81	1.78
9(b)	4.77	1.61	9(a)	6.30	1.36
10(a)	5.33	1.48	10(b)	5.15	1.74
11(a)	6.41	1.23	11(b)	4.47	1.52
12(a)	3.91	1.53	12(b)	6.29	1.13
13(a)	5.44	1.24	13(b)	5.09	1.36
15(a)	5.68	1.41	15(b)	6.54	1.32
16(b)	5.49	1.24	16(a)	5.46	1.16
17(b)	5.46	1.63	17(a)	6.16	1.62
18(b)	6.89	1.66	18(a)	5.61	1.37
20(b)	3.79	1.50	20(a)	3.24	1.24
21(b)	6.08	1.08	21(a)	3.85	1.48
22(a)	5.10	1.57	22(b)	4.51	1.44
23(b)	6.57	1.60	23(a)	3.48	1.39
25(b)	6.42	1.55	25(a)	5.50	1.40
26(a)	3.83	1.41	26(b)	4.16	1.72
28(a)	7.02	1.08	28(b)	5.01	1.63
29(b)	4.56	1.35	29(a)	2.54	1.26

Note. A scale value of 7.02 was obtained for statement 28(a) despite the employed 1-7 rating scale. The scaling procedure allows for an extrapolation beyond the upper limit when greater than 50% of the ratings occur at the extreme rating point, the case for this statement.

value for the external statements was .099. For all I-E scale statements combined, the median correlation coefficient was .083. Only two of the 46 correlation coefficients were statistically significant which is a ratio expected by chance alone (i.e., $p = .043$). Also, an analysis of the I-E scores of the 40 subjects who completed the ratings indicated that this group was representative of other subject-samples. For example, the mean (i.e., 11.40) and standard deviation (i.e., 4.37) for this sample correspond closely to values of 10.99 and 4.35, respectively, obtained in other research employing a larger subject sample (e.g., Prociuk & Breen, 1973).

Analysis of Identification Errors

Table 7 presents a summary of the errors in the identification of the internal and external control statements, i.e., internal control statements misidentified as expressing external control and vice versa. The frequency values indicate that there were 106 and 128 errors in the identification of the internal and the external control statements, respectively, while the total-item error frequency was 234. An average number of 6.69 identification errors were made by each of the 35 subjects whose judgement protocols were excluded by this criterion. Corresponding error proportion values were calculated for each of the statements and total-items to serve as a basis for error comparison. These values, calculated relative to the maximum number of possible errors for each statement (i.e., 35) and for each total-item (i.e., 70), represent conservative estimates since approximately 50% of all statements can be correctly identified by guessing alone. The data indicate that only one statement was correctly identified by all subjects (i.e., internal statement of item 23) while several of the statements were misidentified by 40% or more of the subjects (i.e., external statements of items 7,

Table 7

Frequencies and Proportions of Identification Errors
for Internal and External Control Statements
and for Total Items

Item	Internal Statement		External Statement		Total Item	
	Frequency	Proportion	Frequency	Proportion	Frequency	Proportion
2	7	.20	1	.03	8	.11
3	8	.23	4	.11	12	.17
4	8	.23	7	.20	15	.21
5	9	.26	2	.06	11	.16
6	7	.20	3	.09	10	.14
7	4	.11	15	.43	19	.27
9	3	.09	3	.09	6	.09
10	3	.09	4	.11	7	.10
11	4	.11	8	.23	12	.17
12	3	.09	1	.03	4	.06
13	1	.03	3	.09	4	.06
15	3	.09	2	.06	5	.07
16	2	.06	1	.03	3	.04
17	4	.11	1	.03	5	.07
18	12	.34	3	.09	15	.21
20	9	.26	14	.40	23	.33
21	4	.11	15	.43	19	.27
22	3	.09	1	.03	4	.06
23	0	.00	7	.20	7	.10
25	6	.17	2	.06	8	.11
26	2	.06	11	.31	13	.19
28	1	.03	8	.23	9	.13
29	3	.09	12	.34	15	.21

Note. Proportions calculated relative to the maximum number of errors for a statement (i.e., 35) and for an item (i.e., 70).

20, 21). It will be noted that these statement identifications were completed by a senior psychology student sample following three hours of instruction on the internal-external locus of control dimension.

Examination of Bipolarity of the I-E Scale

As an initial test of the assumption that the internal and corresponding external control statements of the I-E scale constitute opposite ends of a bipolar continuum, the scale values of these statements were correlated. The product-moment correlation between the two sets of scale values was .15, $df = 21$, $p > .05$. This finding suggests the general lack of empirical bipolarity in the statement pairs of the I-E scale.

In order to examine the bipolarity of individual item pairs, orthogonal t-tests were calculated comparing the scale values of internal and corresponding external control statements. Due to the possibility that the ratings of internal control statements might be negatively correlated with those of corresponding external control statements, orthogonal t-tests for differences in correlated scale values were determined. These analyses demonstrated that the correlations between ratings were nonsignificant and virtually zero in most cases. The median correlation coefficient was -0.01. Therefore, while the t-values were essentially unaltered, these values were evaluated conservatively because of the lower associated degrees of freedom. Results of these comparisons are summarized in Table 8.

Obtained t-values indicated that the scale values of internal control statements were significantly greater than those of corresponding external control statements for items 1, 11, 18, 21, 23, 25, 28, and 29. Conversely, the scale values of external control statements were greater for items 3, 5, 6, 9, 12, and 15. For the remaining 9 items, the differences between the

Table 8

Comparisons of Scale Values of Internal Versus
Corresponding External Control Statements

Item	SCALE VALUES		<u>t</u>
	Internal Statement	External Statement	
2	5.34	3.77	+4.33**
3	3.24	4.72	-4.78**
4	4.42	4.91	-1.31
5	4.19	5.49	-3.98**
6	4.42	5.23	-2.46*
7	4.35	3.81	+1.47
9	4.77	6.30	-4.55**
10	5.33	5.15	+0.52
11	6.41	4.47	+6.32**
12	3.91	6.29	-8.59**
13	5.44	5.09	+1.24
15	5.68	6.54	-2.89**
16	5.49	5.46	+0.11
17	5.46	6.16	-1.88
18	6.89	5.61	+3.57**
20	3.79	3.24	+1.77
21	6.08	3.85	+6.78**
22	5.10	4.51	+1.97
23	6.57	3.48	+9.14**
25	6.42	5.50	+2.66*
26	3.83	4.16	-1.01
28	7.02	5.01	+6.66**
29	4.56	2.54	+6.89**

Note. All comparisons evaluated at 39 degrees of freedom.

**p < .01

*p < .05

scale values of the internal and corresponding external control statements were not significant. An overall t -test, comparing the scale values of all internal control statements with those of the external control statements, was not significant, $t(21) = 1.11$, $p > .05$. In sum, these results suggest that only 9 of the 23 items of the I-E scale consist of internal and corresponding external control statements which constitute opposite ends of a bipolar continuum.

Probability of Endorsement and Social Desirability

To determine whether social desirability affects the endorsement of I-E scale statements, the scale was administered under standard, socially desirable, and socially undesirable instructions. The means and standard deviations of the I-E scores for the two subject samples who completed the I-E scale under standard administration instructions were calculated. For Sample 1 ($n = 75$) the values of the mean and standard deviation were 10.32 and 4.36, respectively, while corresponding values, for Sample 2 ($n = 82$) were 11.01 and 4.28. The subjects of Sample 3 completed the I-E scale under socially desirable instructions. The mean and standard deviation of the I-E scores for this subject sample ($n = 80$) were 10.94 and 4.41, respectively. All possible comparisons of the mean I-E scores of these three subject samples indicated that they did not differ significantly (i.e., $t < 1.0$). In contrast, the mean and standard deviation of the I-E scores for the subjects of Sample 4 ($n = 84$), who responded under socially undesirable instructions, were 12.63 and 3.35, respectively. The mean I-E score of this subject sample was significantly different from that of Sample 1, $t(157) = 3.79$, $p < .01$; Sample 2, $t(164) = 2.72$, $p < .01$; and Sample 3, $t(162) = 2.69$, $p < .01$.

These results are consistent with the subjects' ratings of the judged

favorability of their I-E scale responses. Specifically, the subjects of Sample 2 (standard instructions), Sample 3 (socially desirable instructions), and Sample 4 (socially undesirable instructions) were asked to rate, on a 7-point scale (-3 to +3), how favorably another person would be described if that person's description was contingent upon their responses to the I-E scale. Under standard administration instructions, the mean rating was 0.79 (SD = 1.18) while under socially desirable instructions the mean rating was 1.11 (SD = 0.99). The difference between these ratings was not significant, $t(160) = 1.87$, $p > .05$. However, the mean rating obtained under the socially undesirable instructions (i.e., -1.11, SD = 1.25) differed significantly from that obtained under the standard, $t(164) = 10.11$, $p < .001$, and socially desirable, $t(162) = 12.69$, $p < .001$, instructions. The mean confidence ratings under all three sets of instructions (i.e., the degree of confidence the subjects expressed in their judgements of the possible description of another person on the basis of their own I-E scale responses) were similar and did not differ significantly. Under standard, socially desirable, and socially undesirable instructions the mean confidence ratings (i.e., based on a 0 to 7 scale) were 4.57, 4.38, and 4.26, respectively.

The present results indicate that the mean I-E score was similar under standard and socially desirable administration instructions but was significantly higher (i.e., a shift toward greater externality) under the socially undesirable instructions. These findings were also shown consistent with the subjects' own direct ratings of the favorability of their I-E scale responses under these three administration conditions.

Item analyses were calculated to examine the individual item responses based on standard, socially desirable, and socially undesirable administra-

tion instructions. For each of the subject samples, the proportion of subjects who chose the external (i.e., scored) alternative for each of the 23-keyed items of the I-E scale was determined. Subsequently, for each scorable item, a one sample proportion test (McNemar, 1962) was calculated to examine the departure from equal statement endorsement (i.e., .50). Table 9 summarizes the results of these analyses.

The correlation of the probabilities of external statement endorsement under standard administration instructions (i.e., based on Sample 1 and Sample 2) was .94, $p < .001$. Further results demonstrated that the probability of endorsement values under socially desirable instructions were similar to those under the standard administration instructions. Correlation coefficients between the probability values based on Sample 3 (i.e., socially desirable instructions) and those based on Sample 1 and Sample 2 (i.e., standard instructions) were .87, $p < .001$, and .84, $p < .001$, respectively. In contrast, the probabilities of external statement endorsement under the socially undesirable instructions were negatively related to those under the other instructional sets. Correlation coefficients of $-.77$ ($p < .001$), $-.72$ ($p < .001$), and $-.89$ ($p < .001$) were obtained between the probability values under socially undesirable instructions (i.e., Sample 4) and those under standard (i.e., Sample 1 and Sample 2) and under socially desirable instructions (i.e., Sample 3), respectively. These results further suggest that subjects were able to alter their I-E scale responses under socially undesirable but not under socially desirable instructions.

Item Bipolarity and Probability of Endorsement

In order to examine the relationship between item bipolarity and probability of statement endorsement, the 23 items of the I-E scale were classi-

Table 9

Probabilities of Endorsement of External Control
Statements Under Standard, Socially Desirable,
and Socially Undesirable Instructions

External Control Statements	I-E Administration Instructions							
	Standard (Sample 1)		Standard (Sample 2)		Socially Desirable		Socially Undesirable	
	P	\bar{z}	P	\bar{z}	P	\bar{z}	P	\bar{z}
2(a)	.35	-2.60**	.33	-3.08**	.58	1.43	.44	-1.10
3(b)	.71	3.64**	.84	6.16**	.64	2.50*	.45	-0.92
4(b)	.68	3.12**	.70	3.62**	.56	1.07	.48	-0.37
5(b)	.55	.87	.65	2.71**	.53	.54	.51	0.18
6(a)	.29	-3.64**	.35	-2.71**	.35	-2.68**	.68	3.30**
7(a)	.59	1.56	.51	.18	.59	1.61	.48	-0.37
9(a)	.23	-4.68**	.24	-4.71**	.35	-2.68**	.73	4.21**
10(b)	.40	-1.73	.33	-3.08**	.31	-3.40**	.69	3.48**
11(b)	.36	-2.43*	.42	-1.50	.34	-2.86**	.63	2.38*
12(b)	.52	.35	.62	2.17*	.56	1.07	.51	.18
13(b)	.41	-1.56	.46	-0.72	.48	-0.36	.63	2.38*
15(b)	.30	-3.46**	.28	-3.99**	.35	-2.68**	.64	2.56**
16(a)	.20	-5.20**	.24	-4.71**	.28	-3.94**	.83	6.04**
17(a)	.53	.52	.60	1.81	.60	1.79	.57	1.28
18(a)	.68	3.12**	.68	3.26**	.66	2.86**	.36	-2.56**
20(a)	.52	.35	.57	1.27	.54	.72	.46	-0.73
21(a)	.67	2.94**	.67	3.08**	.75	4.47**	.18	-5.86**
22(b)	.54	.69	.59	1.63	.54	.72	.54	.73
23(a)	.22	-4.85**	.22	-5.07**	.24	-4.65**	.77	4.95**
25(a)	.43	-1.21	.42	-1.45	.49	-0.18	.43	-1.28
26(b)	.45	-0.87	.49	-0.18	.45	-0.89	.50	.00
28(b)	.35	-2.60**	.36	-2.57**	.35	-2.68**	.63	2.38*
29(a)	.29	-3.64**	.44	-1.09	.43	-1.25	.49	-0.18

**p < .01

*p < .05

fied into 2x2 contingency tables dichotomized as bipolar versus nonbipolar and as equal versus nonequal probability of endorsement items. Four separate contingency tables were computed with each based on the probability of statement endorsement values obtained under the different I-E scale administration instructions (i.e., standard, socially desirable, and socially undesirable). Subsequently, chi square tests of independence (McNemar, 1962; Siegel, 1956) were calculated using corrections for continuity (Yates, 1934).

Employing the probability of statement endorsement values obtained from the initial standard administration of the I-E scale (i.e., Sample 1), the chi square analysis indicated a significant association between item bipolarity and equal probability of statement endorsement, $\chi^2(1) = 4.98$, $p < .05$. To extend the generality of this finding, the probability of statement endorsement values from a second standard administration of the I-E scale (i.e., Sample 2) were used. Results of this chi square test, $\chi^2(1) = 3.01$, $p < .07$, also provided support, albeit weak, for an association between item bipolarity and equal probability of statement endorsement. However, when the probability of statement endorsement values obtained from the socially desirable (i.e., Sample 3) and socially undesirable (i.e., Sample 4) administrations of the I-E scale were employed, the results of the chi square tests were not significant. Respective values for these analyses were $\chi^2(1) = 2.37$, $p < .20$, and $\chi^2(1) = 0.47$.

As McNemar (1962) indicates, chi square per se is not a measure of association, "if we have evidence for correlation or a lack of independence from the χ^2 technique, we can proceed to calculate an appropriate coefficient for measuring the degree of correlation or the strength of association" (p. 219). Therefore, contingency coefficients were calculated to determine

the degree of association between item bipolarity and equal probability of statement endorsement. On the basis of the probability of statement endorsement values obtained from the two standard administrations (i.e., Sample 1 and Sample 2), the socially desirable administration (i.e., Sample 3), and the socially undesirable administration (i.e., Sample 4) of the I-E scale, the computed values of the contingency coefficient were .42 ($p < .05$), .34 ($p < .07$), .31 ($p < .20$), and .14 ($p > .20$), respectively. In the present analyses, the upper limit of the contingency coefficient was .71.

Discussion

Bipolarity of the I-E Scale

A primary objective of the present experiment was to examine the empirical bipolarity of the I-E scale. The internal and external control statements of this measure were scaled in terms of the degree of internal control and external control they represent, respectively, and the scale values were statistically compared. The obtained results suggest that the assumption of bipolarity in the theoretical formulation of the locus of control dimension (Rotter, 1966) is not reflected in the I-E scale, developed to measure this construct. Specifically, for the majority of the I-E items, the scale values of the internal and corresponding external control statements were significantly different suggesting that the degree of internal versus external control indicated by these paired statements is not equivalent. Correspondingly, such items do not appear to represent opposite ends of a bipolar continuum. On the other hand, only 9 of the 23 items of the I-E scale (i.e., 4, 7, 10, 13, 16, 17, 20, 22, and 26) consist of internal and corresponding external control statements judged as expressing equivalent de-

grees of internal control and external control, respectively. These findings thus suggest a lack of congruence between the theory and measurement of the locus of control dimension.

The results of two recent studies (Kleiber, Veldman, & Menaker, 1973; Klockars & Varnum, 1975) are consistent with those of the present experiment. In each of these investigations, the 23-paired statements of the I-E scale were administered in a Likert-type format as 46 separate items. Subsequently, correlations were calculated between the subjects' responses to statements which were originally paired in the I-E scale. If the statements of each item represented opposite ends of a bipolar continuum, then the results should have yielded high negative correlations. Instead, the data of both investigations demonstrated low, nonsignificant negative correlations for a substantial number of the items (e.g., 2, 3, 5, 6, 7, 9, 11, 13, 21, 23, 29). The majority of these same items were shown to be nonbipolar in the present experiment (e.g., 2, 3, 5, 6, 9, 11, 21, 23, 29). On the basis of such findings, Klockars and Varnum (1975) concluded that "the results ... do not support the assumption that the item pairs are bipolar. The correlations between the statements within each pair are surprisingly low considering that they are supposed to be logical opposites. Subjects do not respond as if there were two ends of a single dimension but rather as if they were responding to two separate and only slightly related statements" (p. 403).

In sum, the results of the present experiment and those of other research, employing a different methodology, indicate that the majority of the items of the I-E scale are not bipolar. Such data suggest that only approximately nine of the items consist of statements which reflect opposite ends of the locus of control dimension. The remaining 14 items appear to consist

of statements which are either inappropriately paired or are only slightly related in terms of the different reinforcement beliefs which they express (Klockars & Varnum, 1975).

Item Bipolarity and Probability of Endorsement

As a possible implication of the lack of bipolarity of the majority of I-E scale items, the probability of statement endorsement values of such items were compared to those of items which were shown to be bipolar. However, cognizant of the fact that probabilities of endorsement might be susceptible to social desirability influence (Edwards, 1970) (i.e., internal control statements might be endorsed to a greater extent because of higher associated social desirability), the relationship between these two variables was first examined. The results of these analyses suggest several interesting and important implications for the future use of the I-E scale.

Consistent with the data reported by Hjelle (1971), the probability of statement endorsement values were similar under standard and socially desirable instructions. The correlations between these two sets of probability of endorsement values (i.e., .87, .84), for two comparisons, were essentially identical to the value obtained by Hjelle (1971) (i.e., $r = .87$). In advance of the data collection, it was recognized that such a finding would lend itself to two possible interpretations. First, it could be suggested that probabilities of endorsement are not influenced by social desirability. Alternatively, it was possible that subjects completing the scale under standard administration instructions were already responding in a socially desirable manner. Therefore, socially undesirable instructions were also employed. The probabilities of endorsement obtained under such instructions were shown to differ from those obtained under both the standard and social-

ly desirable instructions. Also, the mean I-E score obtained under socially undesirable instructions (i.e., 12.63) was significantly higher than the means obtained under regular (i.e., 11.02) and socially desirable (10.94) instructions. Such results indicate that the I-E scale is subject to social desirability response bias and suggest that in the standard administration of this measure, persons may be responding in a socially desirable manner. This conclusion is consistent with that of other researchers (e.g., Cone, 1971; Hjelle, 1971) who have questioned Rotter's (1966) contention that the I-E scale is relatively free of social desirability response bias.

Although the probability of endorsement values changed as a function of socially undesirable instructions, an examination of the direction of change for individual items revealed an interesting finding. Under socially undesirable instructions it was expected that a greater number of external control alternatives would be selected. Since probability of endorsement values were calculated on the basis of the external control alternatives, such values were expected to increase beyond the values obtained under regular or socially desirable instructions. For some of the items, this was shown to be the case (e.g., 6, 9, 10, 11, 13, 16, 23, 28). However, for several of the items (e.g., 3, 4, 7, 12, 20, 21), the probability of endorsement values indicated a marked decrease as a function of greater endorsement of the internal control alternatives.

An inspection of the errors in the identification of the internal and external control statements revealed the following general pattern. Items consisting of statements which had been correctly identified by the majority of respondents (i.e., low proportion of error values) had associated probability of endorsement values indicating greater external control. In other

words, the probability of endorsement values had shifted in the expected direction given the socially undesirable instructions. Conversely, items consisting of statements which had been misidentified by many of the subjects (i.e., high proportion of error values) had probability of endorsement values reflecting greater internal control in spite of the external control inducing instructions. Supplementary analyses demonstrated that these patterns were reliable. Specifically, a correlation of the probability of endorsement values obtained under socially undesirable instructions with the proportion of error values indicated a negative relationship, $r(21) = -.62$, $p < .01$. Employing the probability of endorsement values obtained under standard and socially desirable instructions, the correlation coefficients were $r(21) = .44$, $p < .05$, and $r(21) = .45$, $p < .05$, respectively. The totality of these findings suggest that statement ambiguity may be a determinant of subjects' endorsement of either the internal or external control alternative for several of the items of the I-E scale. If the meaning intent of a given statement is misperceived, then for a given item the choice is essentially one between two internal or two external statements. Although most subjects are likely to perceive some qualitative difference between the two statements, clearly the statements do not represent logical opposites for all respondents.

Since social desirability was found to influence the probabilities of endorsement, the suggested relationship between item bipolarity and equal probability of statement endorsement was not supported with clarity. When the probability of endorsement values obtained under standard instructions were analyzed, results indicated some support for the prediction that bipolar items would consist of internal and external statements endorsed at an

approximately equal level of probability (i.e., .50). However, when the probability of endorsement values obtained under socially desirable and socially undesirable instructions were employed, this relationship was not supported.

Perhaps the most reasonable conclusion given the results of the present experiment is that probability of endorsement values are susceptible to variation as a function of several different factors. For example, whether the internal or external control statement is selected by the respondent is somewhat determined by social desirability response bias. As the data of this experiment indicate, the choice is also a function of the ambiguity in the meaning intent of the statements. Several of the I-E statements have been shown to be misperceived by respondents as expressing a reinforcement belief opposite to that intended. Furthermore, it is possible that probability of endorsement values vary as a function of changes in attitudes. When such values for the social-political control items (i.e., 3, 12, 17, 22, 29) are compared for the two standard administrations of the I-E scale (i.e., the first in 1973 and the second in 1975), a consistent increase of approximately 10% is apparent. It is possible that the post-Watergate confirmation that some politicians are corrupt and that governments control important social-political affairs (e.g., price and wage control) have resulted in an increased endorsement of statements which reflect such attitudes. Therefore, although it would appear reasonable that probability of endorsement values should be related to item bipolarity, the variety and complexity of other factors which influence probability of endorsement values preclude firm support for this relationship. Instead, the data appear to suggest additional possible sources of weakness in the I-E scale (e.g., statement ambiguity)

which will require further extensive examination in their own right.

Summary

The results of the present experiment demonstrated that the majority of the items of the I-E scale were not bipolar. Only 9 of the 23 scored items were shown to consist of statements which represent opposite ends of a bipolar continuum. Similar data have been reported in other research employing a different methodology (Kleiber, et al., 1973; Klockars & Varnum, 1975). In an attempt to examine a possible implication of the general lack of bipolarity of the I-E scale, the probability of statement endorsement values of bipolar and nonbipolar items were analyzed. Obtained results did not support the suggested relationship between item bipolarity and equal probability of statement endorsement with any degree of clarity. Instead, several possible factors influencing the probability of endorsement values of specific items were identified (e.g., statement ambiguity) which will require further extensive research.

EXPERIMENT 3

Consistent with Rotter's (1966) theoretical conceptualization of the locus of control construct, the majority of researchers have employed the I-E scale with the assumption that it measures a single unidimensional, bipolar factor, i.e., the perception of locus of control as either internal or external. Therefore, in Experiment 2, the bipolarity of this scale was evaluated in a manner congruent with this formulation. Specifically, the internal-external statement pairs were examined for empirical bipolarity on the basis of Rotter's (1966) formulation of locus of control with internal control defined as the belief that reinforcements are contingent upon ability and effort and external control defined as the belief that reinforcements are a function of luck, chance, fate, or powerful others.

To the extent that the data of Experiment 2 indicate the general lack of bipolarity of the I-E scale, and the specific lack of bipolarity of the majority of the items, it might be concluded that a basic assumption of this personality scale is untenable and that "the validity of the I-E scale ... is in serious question" (Hjelle, 1971, p. 816). However, it would appear that any conclusion concerning the bipolarity of the scale should, simultaneously, take into account the dimensionality of this measure. In so far as one accepts Rotter's (1966) view that the I-E scale is unidimensional (e.g., Wolk & Hardy, 1975), then it is possible given the evidence to suggest that the I-E scale lacks empirical bipolarity. However, if one recognizes the possibility that the I-E scale may be a multidimensional measure, then any conclusion concerning its bipolarity must be tentative pending further investigation.

Previous factor analytic research (e.g., Cherlin & Bourque, 1974;

Mirels, 1970; Viney, 1974) has consistently demonstrated the presence of two independent factors in the I-E scale. The first factor has commonly been referred to as Fatalism and defined as the belief that one's reinforcements are determined by external factors (e.g., fate, luck) as opposed to one's own ability or effort (e.g., Mirels, 1970). The second factor, commonly referred to as Social Political Control, has been defined as the belief that political and world affairs are controlled by social political powers (e.g., politicians, governments) as opposed to the belief that the ordinary individual has the ability or capacity to understand and influence such powers (e.g., Mirels, 1970; Reid & Ware, 1973). Results of Experiment 1 indicate that this two-factor structure has been demonstrated when different subject samples have been employed (e.g., Canadian, Australian, American). Also, the two dimensions have been shown to be invariant when compared by several different factorial consistency methods. Such data would appear to have implications concerning the bipolarity of the I-E scale items.

As indicated by Klockars and Varnum (1975), each of the two dimensions of the I-E scale represents a potential bipolar continuum. Specifically, on each of the two dimensions, an individual may express the belief that reinforcements are a function of external factors, e.g., luck, fate, in the case of the Fatalism dimension, and social political institutions such as governments in the case of the Social Political Control dimension. Conversely, on each of the two dimensions, an individual may express belief that reinforcements are contingent upon internal factors, e.g., ability and effort in the case of the Fatalism dimension, and ability and capacity to influence social political forces in the case of the Social Political Control dimension.

Therefore, two scores may be obtained for each respondent by scoring appro-

priate items, i.e., one on the Fatalism dimension and a second on the Social Political Control dimension. This procedure has been employed in several investigations (e.g., Abramowitz, 1973; Berzins & Ross, 1973; Boor, 1973; Camargo & Reznikoff, 1975; Gootnick, 1974) using the I-E scale as a multi-dimensional personality measure.

Given the evidence for the two-factor structure of the I-E scale, it would appear necessary to re-examine the bipolarity of the internal-external control statement pairs in terms of two, rather than one, underlying locus of control dimensions. It may be the case, for example, that the items referring to social political control may show empirical bipolarity, but only if they are scaled on the Social Political Control dimension. Determining the degree of bipolarity of all I-E scale items in terms of a single unidimensional continuum, while consistent with the theoretical formulation of the internal-external control dimension, may have been somewhat imprecise since the Fatalism and Social Political Control item-sets appear to refer to separate domains of internal-external control expectancies. Moreover, certain data suggest that the items referring to social political control expectancies tend to share factor loadings on a common factor which is a necessary precondition for item bipolarity. Therefore, such items may be more empirically bipolar than has previously been indicated.

As earlier discussed, Collins (1974) factor analyzed subjects' responses to the internal and external control statements of the I-E scale. In this research, the forced-choice I-E scale items were converted into a Likert-type measure including the 23 internal and the 23 external control alternatives. If Rotter's (1966) position concerning the unidimensionality and bipolarity of the I-E scale was correct, then the use of this format

should have resulted in a single bipolar factor with the originally paired statements loading at opposite ends of the factor. However, results demonstrated the presence of four separate factors in the I-E scale. The first factor, Difficult-Easy World, consisted of 11 external alternatives; the second factor, Just-Unjust World, consisted of 10 internal and one external alternatives; and the third factor, Predictable-Unpredictable World, consisted of six internal and one external alternatives. Of particular interest to the present experiment, is the fourth factor reported by Collins (1974). This factor, labelled Politically Responsive-Unresponsive World, consisted of nine statements; five internal and four external control alternatives. These statements form four of the five items (i.e., 3, 12, 17, 22) typically defining the Social Political Control dimension. On this factor, the internal control alternatives had positive loadings while the corresponding external control alternatives had negative loadings. Essentially similar data are apparent from the results reported by Kleiber, Veldman, and Menaker (1973), who also factor analyzed the I-E scale as a 46-item Likert measure. Although these researchers retained three factors for rotation compared to four by Collins (1974), the second factor labelled Social Modifiability consisted of the internal and external control statements of the Social Political Control item-set, with positive and negative factor loadings, respectively. In contrast, the Fatalism external control statements defined the first factor, Disbelief in Luck and Chance, while the Fatalism internal control statements defined Factor III, labelled Individual Responsibility for Failure. In sum, these findings indicate that the internal and corresponding external control statements defining the Social Political Control dimension tend to share factor loadings on a common fac-

tor. Therefore, these particular internal-external statement pairs may be more empirically bipolar when compared to the Fatalism statement pairs which have been found to decompose into different factorial dimensions.

Although the primary objectives of the present experiment concern a scaling of the internal and external control statements on the Fatalism and Social Political Control dimensions and a subsequent examination of item bipolarity in terms of related dimensions, Edwards (Note 2) has indicated that this methodology further permits a re-examination of the dimensionality of the I-E scale from a scaling perspective. The multidimensional application of the method of successive intervals, employed in the present experiment, yields two scale values for each I-E scale statement (i.e., one on the Fatalism dimension and one on the Social Political Control dimension). Statements referring to social political control expectancies should have scale values of greater magnitude when scaled on the Social Political Control dimension than when scaled on the Fatalism dimension, with the converse true for statements referring to fatalism expectancies. Also, the vector defining the Social Political Control scale values should be orthogonal to the vector defining the Fatalism scale values. It will be noted that these expected results would be consistent with those of previous factor analytic research of the I-E scale indicating two independent dimensions. This similarity in the results might be expected because of the common theoretical basis underlying both multidimensional scaling and factor analysis (MacCallum, 1974).

Hypotheses

Hypothesis 1. When scaled on the Fatalism dimension, the scale values of internal and external control statements referring to fatalism expect-

ancies should be greater than the scale values of these statements when scaled on the Social Political Control dimension.

Hypothesis 2. When scaled on the Social Political Control dimension, the scale values of internal and external control statements referring to social political control expectancies should be greater than the scale values of these statements when scaled on the Fatalism dimension.

Hypothesis 3. When the scale values of internal and external control statements are compared in terms of the Fatalism and Social Political Control dimensions, the relationship between the scale value pairs should be orthogonal.

Hypothesis 4. When internal-external control item pairs are examined for empirical bipolarity with respect to their defining dimensions, the items referring to social political control expectancies should indicate a higher degree of bipolarity than items referring to fatalism expectancies.

Method

Subjects

The subjects of this experiment were 54 male and 66 female students enrolled in introductory psychology courses at the University of Manitoba. These subjects were selected from a larger sample of 254 students (110 males and 144 females) participating in the experiment, on the basis of the same error of identification criterion employed in Experiment 2. All subjects, volunteers for this study, received course credit for their participation.

Instruments

The instruments employed in the present experiment (Appendix D) were similar to those used in the previous study. However, several specific

changes were made to obtain scale values on two dimensions (i.e., Fatalism and Social Political Control). As was the case in Experiment 2, two questionnaire forms were employed in order to counterbalance for order of statement presentation, practice effects, etc. The first questionnaire (Form A) was constructed by removing the six buffer items of the I-E scale (i.e., 1, 8, 14, 19, 24, and 27) and by randomizing the 46 internal and external control statements. The second questionnaire (Form B) was developed by reversing the statement order of the first questionnaire (i.e., Form A). In both questionnaires the statements were presented without any identification as to whether they expressed internal or external control expectancies.

An identification form and two rating forms (i.e., Fatalism and Social Political Control) were developed to accompany either of the two questionnaires. The I-E statement identification form consisted of 46 statement numbers each followed by a space where the subject was to identify the statement as expressing an internal or external control expectancy (i.e., the subject circled either capital letter I or E corresponding to internal or external control, respectively). One of the rating forms was developed for scaling the statements on the Fatalism dimension, while the second rating form was developed for scaling the statements on the Social Political Control dimension. Each of the two rating forms included completion instructions and the definition of the particular dimension on the basis of which the statements were to be scaled. The definitions of the Fatalism and Social Political Control dimensions employed in this study were based on those provided by Mirels (1970). The rating form proper consisted of the statement numbers each followed by an 8-point (0 - 7) rating scale. As was the case in Experiment 2, rating points 1, 4, and 7 were anchored by provid-

ing descriptions corresponding to the degree of internal or external control expectancy implicit at these points. The addition of a zero-value rating point, in the present study, allowed subjects to make judgements between those statements referring to fatalism and those referring to social political control expectancies when rating the statements on a specific dimension. For example, when rating statements referring to social political control on the Fatalism dimension, subjects could judge those statements as not applicable to the Fatalism dimension (i.e., 0) if such was considered the case.

Procedure

The data for this study were collected by conducting sixteen 2-hour experimental sessions with groups of approximately 16 subjects participating in each session. The experimental sessions were conducted by a male and female experimenter, and all standard instructions were presented by a Philips (Model C130) tape recorder. At the outset of each session the subjects were provided with human research instructions including their right to withdraw, without penalty, from the experiment if they believed it to constitute a violation of their privacy. Following this introduction, the subjects completed the I-E scale under standard administration instructions (Rotter, 1966). When these data were collected, a brief tape-recorded instruction on the locus of control dimension and the I-E scale was provided. Specifically, the terms internal control and external control were defined and the subjects were requested to identify several example statements as expressing either internal or external control expectancies. These sample statements (e.g., I think that life is mostly a gamble) were adopted from Phares (1973) and Rotter, Seeman, and Liverant (1962). Following this instruction, half of the subjects participating in each experimental session

received one questionnaire form with the second half receiving the alternate form. The subjects were instructed to study each statement carefully and to identify it as expressing either internal control or external control.

In the second half of the experimental session, the subjects were presented with some further instruction on the I-E scale. They were informed that previous research has indicated that the statements of the I-E scale can be described in terms of two general headings, Fatalism and Social Political Control. The terms Fatalism and Social Political Control were defined in a manner consistent with the description of the two dimensions provided by Mirels (1970). As was the case in the first part of the experiment, subjects were then requested to identify several example statements, adopted from Phares (1973) and Rotter et al. (1962), as expressing either internal or external control referring to Fatalism or to Social Political Control. At the conclusion of this instruction, the subjects were provided with either the Fatalism or the Social Political Control rating form and were asked to rate each statement on the 8-point rating scale as to the degree of either internal or external control that the statement was judged as expressing in relation to the defined dimension (e.g., Fatalism). In the final part of the experiment, the subjects rated each of the statements in terms of the second dimension (e.g., Social Political Control). The order by which the ratings were completed was counterbalanced across experimental sessions, with half of the subjects completing the Fatalism ratings first and the other half of the subjects rating the statements on the Social Political dimension first. Following the completion of the two sets of ratings, the subjects were provided with information concerning the purpose of the experiment.

Results

Scale Values of Internal and External Control Statements on Fatalism and Social Political Dimensions

The initial data analyses were similar to those of Experiment 2 establishing continuity between the two studies. Specifically, the previously employed statement identification criterion was used to select the judgement protocols on the basis of which the scale values were to be determined. The use of this criterion also allowed the error of identification data obtained in the present study to be compared directly to those of Experiment 2. Of the 254 subjects who participated in the experiment, 120 completed the identifications of the internal and external control statements correctly. The percentage of judgement protocols employed in this experiment (i.e., 47.2%) was thus comparable to the percentage used in Experiment 2 (i.e., 53.3%).

The 23 internal and 23 external control statements were subjected to successive interval scaling analyses (Edwards, 1957, 1970) in terms of each of the two dimensions on which they were rated, i.e., Fatalism and Social Political Control. Following the calculation of interval widths, Scott's (1968) recommendation for computing scale values relative to individual cumulative frequency distributions was applied since the interval widths were shown to vary as a function of the dimension on which the statements were scaled. Subsequently, standard deviations were determined as measures of the variation, i.e., discriminial dispersion, in the distribution of judgement ratings for the statements. Table 10 provides a summary of the scale values and corresponding discriminial dispersions of the internal and external control statements scaled on the Fatalism and Social Political Control

Table 10
Scale Values and Corresponding Discriminal Dispersions of
Internal and External Control Statements Scaled on
Fatalism and Social Political Control Dimensions

Item Number	Fatalism				Social Political Control			
	Internal Statement		External Statement		Internal Statement		External Statement	
	Scale Value	Discriminal Dispersion	Scale Value	Discriminal Dispersion	Scale Value	Discriminal Dispersion	Scale Value	Discriminal Dispersion
2	5.51	1.95	3.79	1.11	0.47	1.43	0.48	1.22
3	0.61	1.37	2.10	2.90	5.19	1.23	5.27	2.36
4	4.54	1.87	4.45	1.54	1.25	1.92	0.97	1.91
5	5.04	2.43	4.72	1.18	0.95	2.09	0.37	1.09
6	4.18	2.55	4.72	2.27	2.91	2.39	3.12	2.61
7	4.15	2.33	4.73	2.06	1.43	2.19	1.15	2.10
9	5.15	1.89	4.93	1.30	0.39	1.21	0.30	1.04
10	5.26	1.73	5.08	1.36	0.64	1.71	0.33	1.00
11	5.30	1.74	4.54	1.62	0.80	1.80	0.85	1.74
12	0.82	1.71	1.08	1.96	5.00	1.28	5.25	1.57
13	5.15	1.62	4.91	1.41	0.43	1.26	0.40	0.01
15	4.88	1.82	5.00	1.39	0.23	1.03	0.28	1.09
16	5.07	1.83	4.74	1.55	0.88	1.73	1.13	1.69
17	0.67	1.51	1.08	2.04	6.17	1.91	4.90	1.74
18	5.58	2.15	5.03	1.13	0.37	1.28	0.38	1.05
20	4.54	2.25	3.78	1.82	1.34	2.26	1.03	1.89
21	5.08	1.57	4.58	1.42	0.40	1.23	0.53	1.16
22	0.86	1.78	0.58	1.31	5.90	1.15	4.53	1.60
23	5.82	1.89	3.49	1.44	0.47	1.53	0.68	1.49
25	5.83	2.09	4.53	1.52	0.38	1.30	0.48	1.11
26	4.45	2.35	4.47	1.93	1.09	2.70	1.24	2.07
28	6.08	1.90	3.59	1.29	0.35	1.25	0.52	1.24
29	1.18	1.44	0.60	1.88	5.60	1.19	4.27	1.48

dimensions.

The assumption that subjects' ratings are independent of their locus of control orientations was examined for both the internal and external control statements and for the two dimensions on the basis of which the statements were rated. The median correlation coefficients between subjects' I-E scores and their ratings of the internal statements on the Fatalism dimension and on the Social Political Control dimension were $-.037$ and $.003$, respectively. Subjects' ratings of the external statements on the Fatalism and Social Political Control dimensions were similarly found to be unrelated to their I-E scores. In this case, the median correlation coefficients were $.005$ and $-.005$, respectively. Of the 96 correlation coefficients which were calculated only one was statistically significant, a ratio expected by chance ($p = .0104$). These results supported the assumption that the obtained ratings of the I-E scale statements were independent of the internal-external control attitudes of the subjects completing the ratings. Further analyses demonstrated that the I-E score mean (i.e., 12.09) and standard deviation (i.e., 4.22) for the subjects of this study were similar to corresponding values of 11.40 and 4.37 obtained for the subjects participating in the scaling of the I-E statements in Experiment 2.

Analysis of Identification Errors

The errors in the identification of the internal and external control statements, made by the 134 subjects whose judgement protocols were excluded by this criterion, were analyzed in a manner consistent with that employed in Experiment 2. Specifically, the frequency with which each statement was misidentified (i.e., internal control statement identified as expressing external control and vice versa) was determined and corresponding proportion

values computed. As was the case in the previous study, the proportion values were calculated relative to the maximum number of errors for a statement (i.e., 134) and for an item (i.e., 268). The obtained frequencies and proportions of identification errors are presented in Table 11.

Frequency data indicate that a total of 488 errors were made in identifying the internal control statements while the corresponding value for external control statements was 502. The total error frequency for both internal and external control statements (i.e., total item) was 990. An average number of 7.39 errors were made by the 134 subjects of this study compared to a value of 6.69 for the 35 subjects of Experiment 2.

Correlation coefficients were calculated between the proportion of identification error values obtained in this experiment and those calculated in the previous study. Obtained values for the internal statements, external statements, and total items were .77 ($p < .01$), .69 ($p < .01$), and .70 ($p < .01$), respectively. These data suggest similar patterns in the errors of identification of the I-E statements made by the third-year psychology students who participated in Experiment 2 and by the introductory psychology students who served as the subjects of the present study.

Scale Value Comparisons Across Dimensions

Each of the internal and external control statements of the I-E scale were scaled in terms of both the Fatalism and Social Political Control dimensions. Therefore, two scale values were obtained for each statement (i.e., one on the Fatalism dimension and one on the Social Political Control dimension). To evaluate differences in the judged degree of internal or external control expressed by individual statements across dimensions, orthogonal t-tests were calculated comparing the Fatalism and Social Political

Table 11

Frequencies and Proportions of Identification Errors
for Internal and External Control Statements
and for Total Items

Item	Internal Statement		External Statement		Total Items	
	Frequency	Proportion	Frequency	Proportion	Frequency	Proportion
2	18	.13	7	.05	25	.09
3	35	.26	28	.21	63	.24
4	46	.34	42	.31	88	.33
5	43	.32	13	.10	56	.21
6	36	.27	14	.10	50	.19
7	26	.19	43	.32	69	.26
9	28	.21	18	.13	46	.17
10	13	.10	19	.14	32	.12
11	4	.03	11	.08	15	.06
12	18	.13	15	.11	33	.12
13	4	.03	5	.04	9	.03
15	11	.08	4	.03	15	.06
16	8	.06	11	.08	19	.07
17	20	.15	10	.07	30	.11
18	32	.24	4	.03	36	.13
20	27	.20	47	.35	74	.28
21	23	.17	27	.20	50	.19
22	11	.08	31	.23	41	.15
23	4	.03	34	.25	38	.14
25	28	.21	11	.08	39	.15
26	17	.13	18	.13	35	.13
28	8	.06	27	.20	35	.13
29	28	.21	63	.47	91	.34

Note. Proportions calculated relative to the maximum number of errors for a statement (i.e., 134) and for an item (i.e., 268).

Control scale values of each of the internal and external control statements. The results of these comparisons are summarized in Table 12.

The data indicate that both the internal and external control statements of items 3, 12, 17, 22, and 29 had significantly higher scale values on the Social Political Control dimension than on the Fatalism dimension. Conversely, the Fatalism scale values of the remaining internal and external control statements were significantly greater than corresponding Social Political Control scale values. Such results are consistent with prediction and are also congruent with the findings of previous factor analytic research (e.g., Experiment 1).

As suggested by Edwards (Note 2), the relationship between the Fatalism and Social Political Control scale values was examined for both the internal control and external control statements. Figure 1 presents the plot of the two sets of scale values for the internal control statements while the corresponding plot for the external control statements is indicated in Figure 2. As is evident from these geometric representations, the scale values of the statements (i.e., both internal and external) referring to fatalism expectancies are orthogonal to those referring to social political control expectancies. Moreover, these patterns of scale values are similar to the plots of rotated factor loadings obtained in factor analytic research.

In order to obtain an estimate of the relationship between the Fatalism and Social Political Control scale values of the internal control statements, an oblique rotation of the Fatalism and the Social Political Control reference vectors was performed and the cosine of the angle subtended by the reference vectors determined (e.g., Gorsuch, 1974). The alpha coefficients reported by Reid and Ware (1973) for the Fatalism and Social Political

Table 12

Comparisons of Fatalism vs. Social Political
Control (SPC) Scale Values of Internal and
External Control Statements

Item Number	Internal Statements			External Statements		
	Fatalism Scale Values	SPC Scale Values	<u>t</u>	Fatalism Scale Values	SPC Scale Values	<u>t</u>
2	5.51	0.47	19.41**	3.79	0.48	21.78**
3	0.61	5.19	-26.12**	2.10	5.27	- 7.67**
4	4.54	1.25	12.07**	4.45	0.97	15.84**
5	5.04	0.95	12.28**	4.72	0.37	25.92**
6	4.18	2.91	3.42*	4.72	3.21	4.58*
7	4.15	1.43	7.78**	4.73	1.15	11.41**
9	5.15	0.39	21.52**	4.93	0.30	30.32**
10	5.26	0.64	18.38**	5.08	0.33	30.18**
11	5.30	0.80	17.54**	4.54	0.85	15.27**
12	0.82	5.00	-21.32**	1.08	5.25	-17.57**
13	5.15	0.43	22.15**	4.91	0.41	27.45**
15	4.88	0.23	22.98**	5.00	0.28	30.44**
16	5.07	0.88	16.32**	4.74	1.13	15.33**
17	0.67	6.17	-23.40**	1.08	4.90	-15.13**
18	5.58	0.37	22.04**	5.03	0.38	31.69**
20	4.54	1.34	9.21**	3.78	1.03	9.75**
21	5.08	0.40	22.91**	4.58	0.53	23.46**
22	0.86	5.90	-25.41**	0.58	4.53	-20.59**
23	5.82	0.47	20.59**	3.49	0.68	13.60**
25	5.83	0.38	22.04**	4.53	0.48	24.40**
26	4.45	1.09	10.01**	4.47	1.24	11.16**
28	6.08	0.35	23.48**	3.59	0.52	18.77**
29	1.18	5.60	-24.93**	0.60	4.27	-17.32**

Note. All comparisons evaluated at 119 degrees of freedom.

** $p < .001$

* $p < .005$

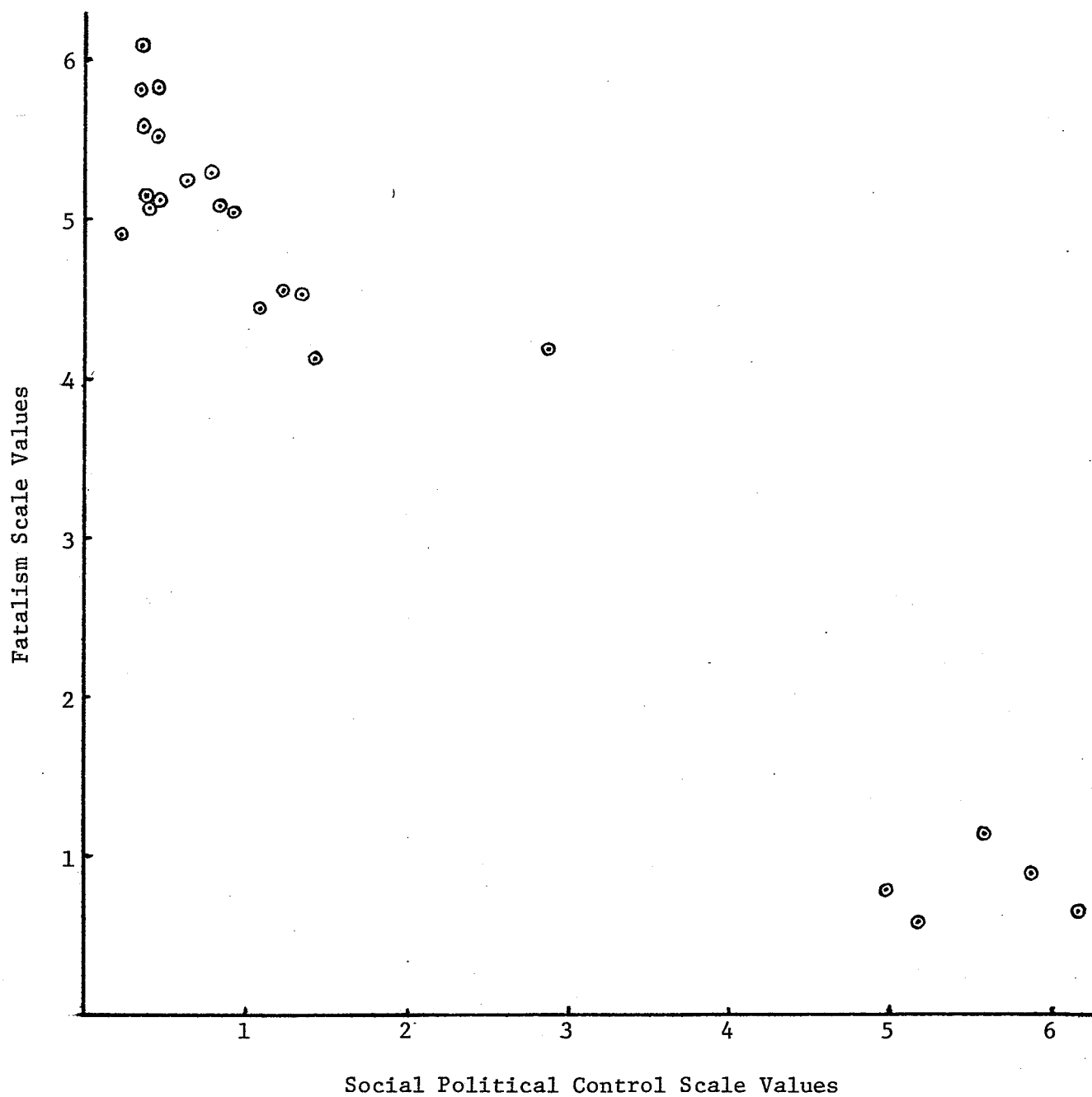


Figure 1. Relationship between Fatalism and Social Political Control Scale Values of Internal Control Statements

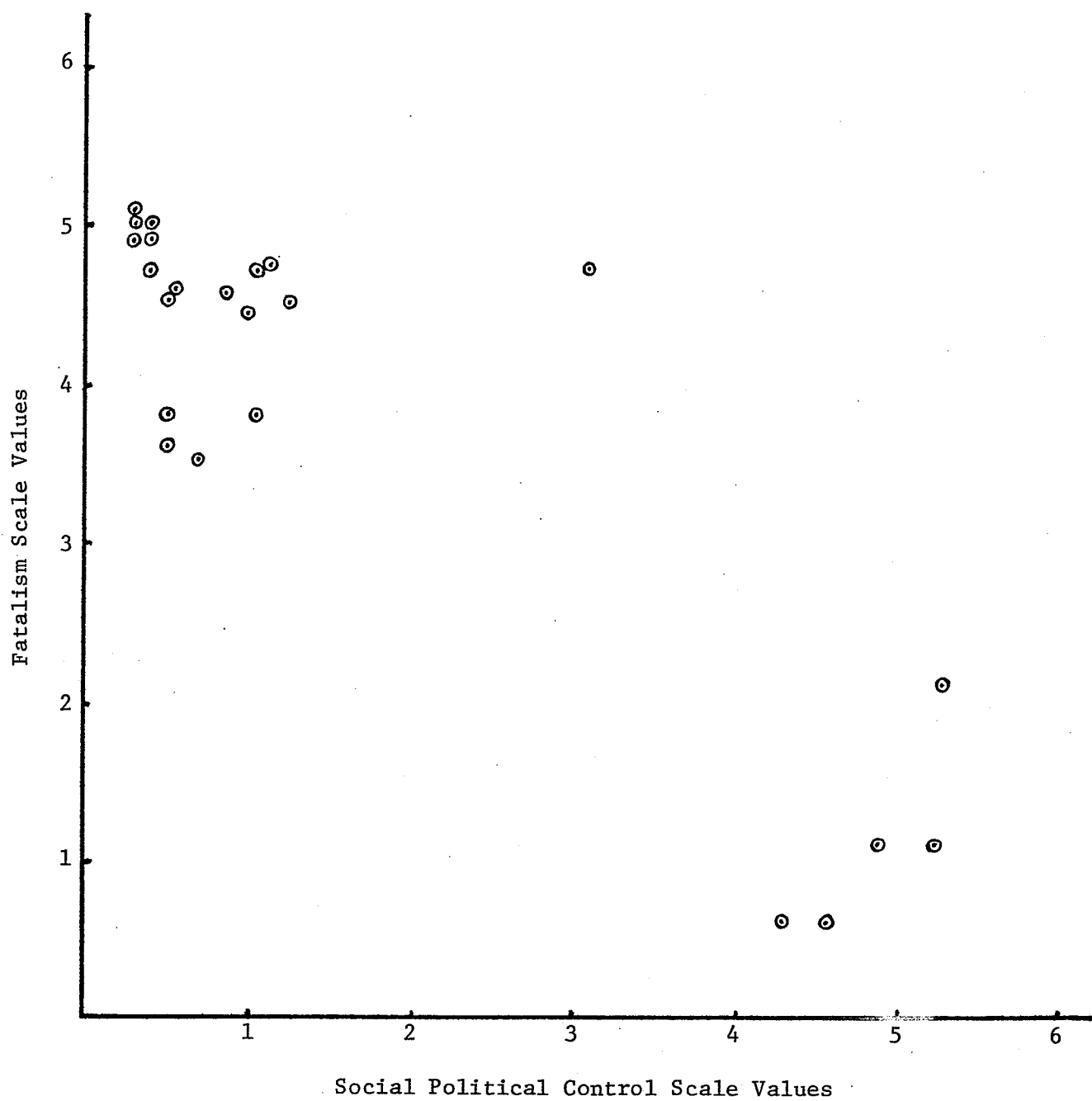


Figure 2. Relationship between Fatalism and Social Political Control Scale Values of External Control Statements

cal Control subscales (i.e., .74 and .88, respectively) were employed as indices of the lengths of the respective vectors. This analysis yielded a correlation of .19 between the Fatalism and Social Political Control scale values of the internal control statements. A similar analysis indicated that the correlation between the Fatalism and Social Political Control scale values of the external control statements was .25. These estimated values are comparable to correlations of .18 and .17 between the Fatalism and Social Political Control factors obtained from two factor analyses of the I-E scale completed by Reid and Ware (1973).

Dimension-Specific Evaluation of Item Bipolarity

Consistent with the primary objectives of this experiment, the internal and corresponding external control statements were examined for empirical bipolarity with respect to their defining dimensions. In other words, the Fatalism scale values were compared for statements referring to fatalism expectancies while Social Political Control scale values were compared for the statements which refer to social political control expectancies. Preliminary analyses demonstrated that subjects' ratings of the internal and corresponding external control statements were essentially unrelated with a median correlation coefficient of .094. Therefore, the calculated orthogonal t-tests for differences in correlated scale values were evaluated more conservatively because of lower associated degrees of freedom. The results of these comparisons are summarized in Table 13.

Obtained t-values indicated that the Fatalism scale values of the internal and corresponding external control statements differed significantly for items 2, 6, 7, 11, 18, 20, 21, 23, 25, and 28. For the remaining items referring to fatalism expectancies (i.e., 4, 5, 9, 10, 13, 15, 16, and 26),

Table 13

Dimension-Specific Comparisons of the Scale Values
of Internal and Corresponding External
Control Statements

Item	Scale Values		<u>t</u>
	Internal Statement	External Statement	
Fatalism Dimension			
2	5.51	3.79	7.91**
4	4.54	4.46	0.46
5	5.04	4.72	1.32
6	4.18	4.72	-2.31*
7	4.15	4.73	-2.64**
9	5.15	4.93	1.10
10	5.26	5.08	0.92
11	5.30	4.54	3.39**
13	5.15	4.91	1.16
15	4.88	5.00	-0.58
16	5.07	4.74	1.58
18	5.58	5.03	2.40*
20	4.54	3.78	3.86**
21	5.08	4.58	2.73**
23	5.82	3.49	10.84**
25	5.83	4.53	5.15**
26	4.45	4.52	-0.09
28	6.08	3.59	10.42**
Social Political Control Dimension			
3	5.19	5.27	-0.35
12	5.00	5.25	-1.46
17	6.17	4.90	5.88**
22	5.90	4.52	8.43**
29	5.60	4.27	8.42**

Note. All comparisons evaluated at 119 degrees of freedom.

** $p < .01$

* $p < .05$

the scale values did not differ significantly. The latter finding suggests that the internal and corresponding external control statements comprising these items express a relatively equivalent degree of internal and external control, respectively. With regard to the items referring to social political control expectancies, the data indicated that only two items (i.e., 3, 12) consist of statements judged as representing opposite ends of a bipolar continuum. The Social Political Control scale values of the paired statements of the other three items (i.e., 17, 22, 29) were shown to differ significantly suggesting a lack of item bipolarity. Given that only two of the five items referring to social political control expectancies were shown to be empirically bipolar, these data did not support the prediction that greater bipolarity of such items might be demonstrated employing Social Political Control scale values.

Considering all items, irrespective of dimensional classification, the obtained results indicated 10 items to be empirically bipolar with the remaining 13 items consisting of statements judged to represent significantly different degrees of internal and corresponding external control. These findings are similar to those obtained in Experiment 2 where 9 items were found to be empirically bipolar and 14 items shown as nonbipolar. The following common items were found to be bipolar in both studies: 4, 10, 13, 16, and 26. Conversely, items 2, 6, 11, 18, 21, 23, 25, 28, and 29 were shown to be nonbipolar in Experiment 2 as well as in the present experiment. The correlation between the scale values of the internal statements obtained in this study and those obtained in Experiment 2 was .62, $p < .01$. A similar correlation of the scale values of the external statements obtained in the two experiments was .64, $p < .01$. The totality of these findings sug-

gest a correspondence between the results of the present study and those of Experiment 2.

Discussion

The present experiment was conducted for two primary reasons. First, an attempt was made to determine whether the patterns of scale values obtained from scaling the internal and external control statements on two dimensions (i.e., Fatalism and Social Political Control) would indicate a correspondence to the results of previous factor analytic research on the I-E scale (e.g., Mirels, 1970). Second, the bipolarity of the I-E scale was re-examined employing dimension-specific scale values (i.e., Fatalism scale values were employed to evaluate the bipolarity of items concerned with fatalism expectancies while Social Political Control scale values were used in the case of items referring to social political control expectancies).

Dimension-Specific Scale Values

The comparisons of the Fatalism and Social Political Control scale values of both the internal and the external control statements indicated significant differences. Consistent with prediction, the Social Political Control scale values of statements referring to social political control expectancies (i.e., 3, 12, 17, 22, 29) were greater than the corresponding Fatalism scale values of these statements. These obtained results are consistent with those obtained from factor analytic research on this personality scale. Specifically, several studies (e.g., Mirels, 1970; Reid & Ware, 1973) have demonstrated items 3, 12, 17, 22, and 29 to have consistent high factor loadings on the Social Political Control factor with corresponding low factor loadings on the Fatalism factor. Moreover, in several investi-

gations (e.g., Abramowitz, 1973; Levenson, 1975; Zuckerman, 1973), these items have been scored separately to obtain a Social Political Control subscale score. The data of the present experiment indicate a similar pattern in terms of high Social Political Control scale values and low Fatalism scale values for the statements which comprise these items.

With respect to internal and external control statements referring to fatalism expectancies (e.g., There is really no such thing as luck), the Fatalism scale values were shown to be significantly greater than corresponding Social Political Control scale values. These findings are also consistent with prediction and indicate a correspondence to the pattern of factor loadings obtained in previous research. For example, a substantial number of I-E scale items have been shown (e.g., Mirels, 1970; Reid & Ware, 1973; Viney, 1974) to have high factor loadings on the Fatalism factor and corresponding low factor loadings on the Social Political Control factor (e.g., 2, 6, 9, 11, 13, 15, 16, 18, 23, 25, 28). Results obtained in this study indicate that these same items consist of internal and external control statements with Fatalism scale values which are significantly greater than corresponding scale values on the Social Political Control dimension.

In a subsequent analysis, the dimensionality of the I-E scale was examined employing the obtained Fatalism and Social Political Control scale values. As indicated by Edwards (Note 2), "you will have two scale values for each statement, one for SPC (Social Political Control) and one for F (Fatalism), and, if in fact there are two dimensions involved, a plot of the scale values for one rating against the scale values of the other rating should show whether this is a valid assumption or not. On the other hand, if there is a strong linear relationship between the two sets of scale val-

ues, this would seem to indicate that a single dimension is involved." The plots of Fatalism versus Social Political Control scale values for both internal and external control statements demonstrated the presence of two separate clusters of scale values. Moreover, these clusters were found to be independent (i.e., correlations of the scale values of the internal and external control statements were .19 and .25, respectively) supporting the prediction that the relationship between the two sets of scale values would be orthogonal. Similar results have been obtained in factor analytic research which indicate that the I-E scale consists of essentially two sets of statements measuring independent locus of control dimensions (e.g., Reid & Ware, 1973; Klockars & Varnum, 1975).

Bipolarity of I-E Scale Items

The evaluation of the bipolarity of I-E scale items, employing dimension-specific scale values, did not support the prediction that items referring to social political control expectancies would show greater bipolarity than those referring to fatalism expectancies. Instead, the results indicated a correspondence to those obtained in Experiment 2. For example, 10 items were shown to be bipolar in the present study compared to 9 items found to be bipolar in Experiment 2. Correspondingly, the number of items shown to be nonbipolar in this and in the previous experiment was 13 and 14, respectively. Also, the correlation between the scale values of the internal control statements obtained in the two studies indicated a significant relationship (i.e., .62). The correlation between the scale values of the external control statements (i.e., .64) similarly demonstrated a correspondence across the two studies.

These results, which indicate some degree of stability in the scale

values of the I-E statements, are particularly interesting given several methodological differences between this study and Experiment 2. First, the subjects of this experiment were 120 introductory psychology students participating for course credit while those of the previous study were 40 upper-year psychology students enrolled in a third-year course on personality. Second, the subjects of Experiment 2 received instruction on the locus of control construct and on the I-E scale in three one-hour course lectures. In contrast, the participants in this study were provided with a brief 45-minute instruction on internal-external control with primary emphasis on the definition of this construct. Several examples of statements expressing internal and external control were also presented. Finally, in Experiment 2 the I-E scale statements were scaled in terms of Rotter's (1966) unidimensional locus of control construct while the scaling of the statements in the present experiment was completed in terms of two dimensions (i.e., Fatalism and Social Political Control). Despite these differences in method, the results of both studies suggest similar conclusions concerning the lack of item bipolarity in the I-E scale.

As the data of the present experiment indicate, dimensional differences between statements referring to fatalism expectancies and those referring to social political control expectancies were perceived. Specifically, the Fatalism scale values of statements referring to fatalism expectancies (e.g., It is impossible for me to believe that chance or luck plays an important role in my life) were significantly greater than the corresponding Social Political Control scale values of such statements. The converse was shown to be true for statements referring to social political control expectancies (e.g., With enough effort we can wipe out political corruption).

However, it is equally apparent that the judgements of the degree of internal or external control expressed by given statements were independent of the dimensional membership of those statements.

One possible factor which may account for the judged degree of internal or external control expressed by the statements and simultaneously provide an explanation for the lack of item bipolarity in the I-E scale is the syntactical composition of the statements which comprise this measure. In many of the I-E statements, the reinforcement expectancy is qualified by a frequency adverb (e.g., sometimes, often, in the long run). Previous research (e.g., Hake1, 1968; Schriesheim & Kerr, 1974; Simpson, 1944) provides empirical evidence indicating that the frequencies implied by these adverbs differ substantially. Consequently, if different frequency adverbs are employed in paired I-E statements, such statements are likely to be judged as representing different degrees of reinforcement control and the item shown to be nonbipolar.

The presence of different frequency adverbs in the I-E statements would appear to account for at least some of the findings of the present experiment. For example, internal control statement 28(a) reads, "What happens to me is my own doing." The implied frequency adverb in this statement is "always" or "often". In contrast, the corresponding external control statement (i.e., 28(b)) states, "Sometimes I feel that I don't have enough control over the direction my life is taking." In this statement, the employed frequency adverb is "sometimes". Clearly, the degree of internal control expressed by the former statement is not similar to the degree of external control represented by the latter statement. Respective scale values of 6.08 and 3.59, for the two statements, reflect this difference and indicate

that this item is not bipolar.

Although it would appear reasonable that frequency adverbs account, at least in part, for the judged degree of reinforcement control expressed by the I-E statements, further research on this issue is considered necessary. The few studies on I-E scale bipolarity which have been conducted, including two experiments in the present research, have focused primarily on identifying bipolar and nonbipolar items. Such research is considered an important and necessary first step to indicate whether the assumption of I-E scale bipolarity is a viable one. However, real progress in this area of investigation will be made only when the determinants of item bipolarity or nonbipolarity are identified. Subsequently, such information would allow for a more appropriate pairing of the I-E scale statements and could serve as a guideline in the future development of items measuring reinforcement expectancies in other areas of experience (e.g., self control).

Summary

In the present experiment, the internal and external control statements of the I-E scale were scaled in terms of two dimensions (i.e., Fatalism and Social Political Control). Obtained dimension-specific scale values indicated a pattern similar to factor loadings reported in previous factor analytic research on the I-E scale. Specifically, the Fatalism scale values of statements referring to fatalism expectancies were shown to differ significantly from the corresponding Social Political Control scale values with the converse true for statements referring to social political control expectancies. Also, the Fatalism and Social Political Control scale values were shown to be orthogonal for both the internal and external control statements supporting the previously indicated two-factor structure of this personality

measure. A re-examination of item bipolarity, employing dimension-specific scale values, did not support the prediction of greater bipolarity of social political control compared to fatalism items. Instead, only 10 of the 23 items were shown to consist of statements which represent opposite ends of a bipolar continuum, i.e., results similar to those obtained in Experiment 2. Also, the similarity in the scale values of both the internal and external control statements, across the two studies, suggested that judgements of the degree of reinforcement control expectancies represented by the statements were independent of the dimensional membership of the statements. It was suggested that the use of frequency adverbs, qualifying the reinforcement control expectancies, may be a determinant of the degree of judged control expressed by the statements and that this possibility warrants further examination.

EXPERIMENT 4

Consistent with traditional psychometric theory and practice, the reliability of personality scales has been most often evaluated by test-retest, Spearman-Brown, or Kuder-Richardson internal consistency methods. Correspondingly, Rotter (1966) employed the test-retest and KR-20 methods for determining the reliability of the I-E scale. The Spearman-Brown split half method was not generally employed since "the test is an additive one and the items are not comparable" (Rotter, 1966, p. 10). Reliability coefficients based on a number of different subject samples including male and female introductory psychology students and male prisoners were considered adequate (Rotter, 1966). For intervening time intervals of from one to two months, the test-retest reliability values ranged from .48 to .84. Internal consistency estimates of I-E scale reliability ranged from .65 to .79, with the majority of values greater than .70. Recently, Rotter (1975) has indicated that because the I-E scale was developed to sample widely from a variety of different situations, it could not be expected to have as high an internal consistency as a scale sampling different strengths of response in a narrower area of experience.

Traditional indices of reliability provide important sources of information concerning the psychometric quality of a given personality scale. However, such sources of information have several limitations. For example, apart from its practical limitation, theoretically, test-retest is not ordinarily a preferred method for estimating reliability because a number of factors may function as systematic sources of variance. Differences in administration (e.g., different persons administering the scale on the two occasions) may constitute one source of response variability. Also, as

Rotter (1966) has noted, "the somewhat lower (test-retest) reliabilities for the 2-month period may be partly a function of the fact that the first test (I-E scale) was given under group conditions and the second test was individually administered" (p. 10). Similarly, internal consistency estimates of reliability provide important but limited information. For example, Cherlin and Bourque (1974) obtained an alpha reliability coefficient of .80 for the I-E scale. However, these authors further indicated that the "responses of the college sample support two distinct subscales with adequate reliability" (1974, p. 578). The calculated alpha values for the Fatalism and Social Political Control subscales were .78 and .70, respectively. Correspondingly, Reid and Ware (1973) reported corrected alpha coefficients (i.e., for 20-item length) of .88 and .74 for the Social Political Control and Fatalism subscales, respectively. In either study, the subscale reliability values are comparable to the internal consistency coefficients for the total I-E scale reported by Rotter (1966). Therefore, while internal consistency reliability coefficients have often been employed as indices of scale homogeneity, these data indicate that a satisfactory overall reliability coefficient does not imply that the scale is unidimensional (e.g., Nunnally, 1967) as is apparent in the case of the I-E scale.

With reference to the Cronbach alpha internal consistency coefficient (Cronbach, 1951), the variance of the person scores is usually of prime interest. Specifically, it is desirable that the personality scale "spread out" the subjects so that they are differentiated as much as possible. The obtained reliability coefficient is a function of this variance. For a given scale and subject population, a sample of persons with a high variance of total scores may be expected to yield a much larger reliability coeffi-

cient than one with a small variance. More recently, however, there has been an increasing interest in other indices for evaluating how well a scale is measuring the same personality construct in different individuals. Specifically, Fiske (1963, 1966, 1971) and others (Cronbach, Rajaratnam, & Gleser, 1963; Cronbach, Gleser, Nanda, & Rajaratnam, 1972) have developed procedures for determining the various components of total scale variance (i.e., person, item, and remainder variance components). Such methodology has been endorsed in the Standards for Educational and Psychological Tests (American Psychological Association, 1974) as indicated: "the estimation of clearly labelled components of score variance is the most informative outcome of a reliability study, both for the test developer wishing to improve the reliability of his instrument and for the user desiring to interpret test scores with maximum understanding" (p. 49).

The approach developed by Fiske (1963, 1966, 1971) involves a partitioning of the total observed variance in a set of test responses into the relative contribution of the means for persons, the means for items, and the remainder variance from other sources including the interaction between persons and items. These three components of variance are stated as proportions of the total variance. The relative variance of persons indicates the extent to which individuals are differentiated by the particular scale while the relative variance of items indicates the extent to which the items measure differing degrees of the underlying construct. According to Fiske (1966), the most important single index is the proportion of remainder variance, a substantial component of which is person X item interaction. This source reflects the extent to which persons give responses to items which are different from those expected on the basis of the corresponding person

and item means. Conceptually, such person X item interaction has two parts. One part may be attributed to the variability of responses over time (i.e., instability). However, analyses of data from repeated trials reveal that the proportional contribution from instability is relatively minor (Fiske, 1966). The second and, conceptually, the more important part of the person X item interaction is idiosyncrasy or the tendency of an individual's response to be different from that which might be predicted. This source of variance represents heterogeneity, the complement of what is sought in maximizing the homogeneity of persons and items. Such idiosyncrasy may be explained, for example, as stemming from individuals' own unique interpretations of a given scale item.

As indicated by Fiske (1966, 1971), the difference between this approach for evaluating personality scales and that developed by Cronbach (e.g., Cronbach, Rajaratnam, & Gleser, 1963) is that the latter approach employs variance estimates rather than obtained variances. In other words, according to Fiske's (1966, 1971) method, the variance indices are stated in terms of the actual variance in the sample rather than as estimates of variance in the population. Fiske notes that while the testing of a theoretical proposition requires inference from the sample measured to some loosely described population, it would be dangerous, for example, to assume that any single personality scale adequately represents the total domain of a personality construct. In locus of control research, such an observation has been substantiated on several occasions. For example, Reid and Ware (1974) have identified a specific and important domain of internal-external control, i.e., self control, which is not assessed by the I-E scale. Moreover, there are certain limitations to generalizing from a given subject

sample to the population. As Fiske (1971) notes, "anyone who has tried to replicate psychometric findings, even with carefully randomized subjects, sampling from an identified population, has encountered both the usual variation from sample to sample and the occasional salient finding peculiar to the particular sample" (p. 154). Therefore, Fiske (1971) recommends that a measuring operation should be re-evaluated in each application with a new sample (e.g., Breen & Prociuk, 1976).

Although a primary objective of the present experiment is to examine the variance of the I-E scale due to person, item, and remainder components (Fiske, 1971), this particular analysis is considered important for other reasons. In the development of the I-E scale (Rotter, Seeman, & Liverant, 1962), the specific items were constructed to serve as indicants of internal versus external control expectancies in a variety of different life situations. For example, the items refer to internal versus external control expectancies in such situations as academic achievement, social political involvement, interpersonal relations, etc. Given that I-E scale items represent an individual's locus of control orientation in 23 potentially different situations, it would appear possible to redefine items as situations. Therefore, an analysis of the total variance of the I-E scale may be partitioned into person, situation, and residual components. Moreover, employing two observations for each person would allow an estimate of the person X situation interaction component (Endler, 1966). Consistent with the interactionist approach to personality (e.g., Bowers, 1973; Endler, 1973, 1975, 1976), it might be expected that the proportion of variance due to the person X situation interaction would be greater than that due to either the person or situation effect.

Fiske (1971) states that the items of many personality measures do not appear to have the same meaning for different subjects as evidenced by various estimates of person X item interaction. Such an observation is entirely consistent with the interactionist approach to personality. Specifically, a given individual may be internally-oriented in certain situations (e.g., academic achievement) but externally-oriented in other situations (e.g., interpersonal relations) with the opposite true for a second individual. Thus, while the two individuals may have identical total I-E scores, these scores may be based on entirely different items depicting different life situations. Therefore, any attempt to predict behavior from a global evaluation of internal-external control expectancies will only be marginally successful, as has been shown the case in some of the previous locus of control research (e.g., Joe, 1971).

Since most personality constructs are broad and heterogeneous, Fiske (1966) recommends that any one test should be designed and used to evaluate only a specific portion of a given construct. According to Fiske, a personality variable "must be analyzed conceptually to determine the various forms and various situations or contexts in which the behavioral tendencies appear. Then scales must be constructed for each form, explicitly covering the relevant contexts. Once the homogeneity of such scales has been established, the experimenter is free to utilize one or more of these scales in basic research on that variable" (1966, p. 83). With respect to locus of control, two subscales of the I-E scale (i.e., Fatalism and Social Political Control) have been employed in a number of investigations (e.g., Abramowitz, 1973; Boor, 1973). Given Fiske's (1966) observations, these subscales and particularly the Social Political Control subscale, would appear to represent spe-

cific domains of the locus of control construct. Consequently, it may be the case that these two subscales, each representing a number of common situations, may be more homogeneous than the total I-E scale as reflected by a lower percentage of variance due to person X situation interaction. The present experiment examines this possibility.

In summary, the purpose of the present experiment is to examine the homogeneity of the I-E scale by calculating the person, item, and remainder variance components of the total scale variance (Fiske, 1963, 1966, 1971). Additionally, redefining items as situations and employing two observations for each respondent, the total scale variance is reanalyzed in terms of the relative variance due to persons, situations, and person X situation interaction (e.g., Endler, 1966). The latter analysis is calculated for the total I-E scale, the Fatalism subscale, and the Social Political Control subscale. On the basis of previous discussion and past relevant research, the following hypotheses are formulated.

Hypotheses

Hypothesis 1. In an analysis of the homogeneity of the I-E scale, the remainder variance should constitute a greater percentage of the total scale variance than either the person or item effects.

Hypothesis 2. In an analysis of the variance components of the I-E scale, the person X situation interaction should constitute a greater percentage of the total scale variance than either the person or situation effects.

Hypothesis 3. In an analysis of the variance components of the Fatalism and the Social Political Control subscales of the I-E scale, the percentage of variance due to the person X situation interaction should be less,

in either case, than the percentage of variance due to the person X situation interaction for the total I-E scale.

Method

Subjects

The subjects of this experiment were 98 male and 100 female students enrolled in introductory psychology courses at the University of Manitoba. The subjects, volunteers for this experiment, received course credit for their participation.

Procedure

The data for this experiment were collected by conducting experimental sessions with groups of approximately 25 subjects participating in each session. Initially, subjects were presented with standard human research instructions including their right to withdraw, without penalty, from the experiment. Following these introductory instructions, the subjects completed the I-E scale under standard administration instructions (Rotter, 1966, Appendix A). All instructions were presented by a Philips (Model C130) tape recorder to ensure maximum standardization among the groups. All experimental sessions were conducted by a male and a female experimenter.

During the same time-periods, one week later, the subjects participated in the second phase of this experiment. The experimental sessions were conducted in a sequence identical to the initial sessions, that is, both the order and content of instructions presented were the same. During these 1-hour experimental sessions, the subjects were re-administered the I-E scale under standard administration instructions. The same male and female experimenters conducted these as well as the original testing sessions. Fol-

lowing their participation in this experiment, the subjects were provided with information concerning the purpose of the study.

Data Analyses

Homogeneity of the I-E scale. The homogeneity of the I-E scale was examined employing the procedures developed and outlined by Fiske (1966, 1971). This analysis consists of developing a data matrix in which the rows represent persons, the columns represent items, and each entry represents the response of a person to an item. The total sum of squares and the sums of squares for rows, for columns, and for remainder, are calculated in the standard manner for a two-way analysis of variance with one observation per cell. Dividing each of the latter partial sums of squares by their respective degrees of freedom yields the usual variance components. The three components of variance, stated as proportions or percentages of the total variance, are obtained by dividing each of the obtained variances by the total variance.

In addition to providing a method for determining person, item, and remainder variance components, the procedure developed by Fiske (1966, 1971) allows for the calculation of four homogeneity coefficients. One coefficient, designated r_{tt} , is the Cronbach (1951) index of the internal consistency of the total test. Since this coefficient varies as a function of the number of items in the test, Fiske (1971) states that a better index of the quality of the items comprising a measure is r_{ii} , the average intercorrelation between the items. Employing item rather than person variance, the dual coefficient of r_{tt} may be obtained. This index, r_{gg} , provides an estimate of the correlation of the items' probability values for a given group of subjects and the values for the same items for a similarly obtained

second group of subjects. However, just as r_{tt} increases with additional items, this coefficient increases as a function of subject sample size. Therefore, the average correlation between pairs of persons, r_{pp} , is calculated to indicate the extent to which the subjects are being measured on the same variable by the various items.

Fiske (1971) notes that the computation of variance components and homogeneity coefficients provide complementary sources of information concerning the characteristics of a given personality measure. For example, the proportion of remainder variance is a useful general index and should be low in a fully adequate instrument. However, this index does not directly identify the possible sources of weakness in the measure. Such complementary information may be obtained from the values of person variance and r_{ii} , which indicate the extent to which subjects are differentiated, and from the values of item variance and r_{pp} , which indicate the dispersion of the items.

Estimates of variance components of I-E scale. To determine the percentage of total I-E scale variance due to persons, situations (i.e., individual items), and person X situation interaction, an analysis developed by Endler (1966) was employed (see also Breen & Gaito, 1970). Specifically, a mixed effects analysis of variance model was assumed with the persons, randomly selected, representing a random effect and the situations representing a fixed effect. However, employing one observation per cell does not allow for an estimate of the variance due to person X situation interaction since this source of variance cannot be separated from the error component (Vaughan & Corballis, 1969). While Endler (1966) suggests that either the interaction (i.e., triple interaction in the case of the S-R Inventory of

Anxiousness) or the error term may be assumed to equal zero, such a procedure could not be applied in the present case. Since the person X situation interaction component was of primary interest in this investigation, it could not be assumed to equal zero. Similarly, it did not appear tenable to assume error variance as equal to zero, given the results of previous psychometric research on the I-E scale (e.g., Mirels, 1970). Endler (1966) indicates that an "ostensibly workable solution for the mixed effects model is to have more than one observation per cell" (p. 567). Essentially, this solution means a readministration of the I-E scale to the same subjects, the procedure employed in the present study. Endler (1966) suggests that under ordinary circumstances, this procedure is not feasible since the subject's boredom, resistance, etc., could increase the error of measurement. However, increasing the error variance, by some small amount, was considered as having the salutary effect of yielding more conservative estimates of the variance components. Endler (1966) further indicates that repeated measurements of the same individuals could also lead to carryover effects with unequal covariances. Although unequal covariances bias the F ratio for testing main effects, they do not alter the variance component estimates (see Vaughan & Corballis, 1969). As in the case of the analysis of the S-R Inventory of Anxiousness (Endler, 1966), the procedures employed in the present study assumed intercorrelations between treatments to be zero. Endler indicates that "with a small number of tests or treatments separated by short time intervals if covariances are nonzero, it is reasonable to expect that they would not be too different" (1966, p. 569). Given the foregoing assumptions and considerations, the present analysis cannot be considered exact, but is suggested to be a reasonably good approximation to an exact

solution. As Endler (1966) notes, "it may be useful for the empirical worker to have a tool, which is a first approximation rather than no solution at all" (p. 569).

Results

Descriptive Statistics

Means and standard deviations of the I-E score were calculated for both male and female subject samples. For the male sample ($n = 98$), the test administration of the scale yielded values of 10.38 and 3.83 for the mean and standard deviation, respectively. Corresponding values for the female sample ($n = 100$) were 11.46 and 4.08. Obtained values of the mean and standard deviation from the retest administration of the I-E scale were 9.68 and 4.59, respectively, for the male subjects. For the female sample, the retest administration of the scale yielded a mean and standard deviation of 10.97 and 4.48, respectively. One-week test-retest reliability coefficients were .85 and .87 for males and females, respectively. The means and standard deviations obtained in the present study correspond to those reported in previous research (e.g., Joe, 1971). Given a one-week test-retest interval, the obtained reliability coefficients were slightly higher than the values obtained for a three-week interval in Experiment 1 (i.e., .78 and .83 for male and female subjects, respectively).

Indices of I-E Scale Homogeneity

Employing Fiske's (1966, 1971) procedure for assessing the homogeneity of personality scales, the percentages of I-E scale variance due to person, item, and remainder components were calculated. In addition, four homogeneity coefficients (i.e., r_{tt} , r_{ii} , r_{gg} , and r_{pp}) were computed. These

analyses were completed for the data of both male and female subject samples obtained from the test and retest administrations of the I-E scale.

Table 14 provides a summary of the results.

As is indicated in the table, the values of the total I-E scale variance ranged from .244 to .250. Such values were consistent with those typically obtained for most dichotomously scored measures where the group mean does not depart substantially from the middle of the possible range of means (i.e., a mean score of 11 for the I-E scale) (Fiske, 1966). A partitioning of the total variance into person, item, and remainder components demonstrated that the remainder component accounted for the majority of the I-E scale variance. For male and female subjects across test and retest administrations, the percentage of remainder variance ranged from 70.90% to 77.82% suggesting substantial person X item interaction or idiosyncratic responding. In contrast, the percentage of variance associated with persons, indicating the extent to which individuals are differentiated by the scale, varied from 10.89% to 17.72%. Similarly, the percentage of variance due to the item component, demonstrating the extent to which the items measure different degrees of the underlying construct, varied from 9.42% to 13.12%. In each of the analyses (e.g., males-test, etc.), the sum of the percentages of variance due to persons and items was less than one-half the percentage of variance due to the remainder component.

Examining homogeneity coefficients, the obtained values for the internal consistency of the I-E scale (i.e., r_{tt}) ranged from .68 to .81. Such values are similar to those reported in previous research (e.g., MacDonald, 1973; Rotter, 1966). However, because internal consistency coefficients vary as a function of the total number of items in a measure, r_{ii} coeffi-

Table 14

Homogeneity Indices of I-E Scale for
Males and Females on Test and
Retest Administrations

I-E Scale Administration	Total Variance	Percentage of Total Variance			Homogeneity Coefficients			
		Persons	Items	Remainder	r_{tt}	r_{ii}	r_{gg}	r_{pp}
Males								
Test	.248	10.89	11.29	77.82	.68	.08	.93	.12
Retest	.244	15.98	13.12	70.90	.79	.14	.94	.14
Females								
Test	.250	12.60	12.20	75.20	.73	.10	.94	.13
Retest	.250	17.72	9.42	72.87	.81	.16	.92	.11

cients were calculated. Results demonstrated that the values for r_{ii} , indicating the average correlation between pairs of I-E scale items, ranged from .08 to .16.

Calculated values of the r_{gg} coefficient, providing estimates of the correlation between the items' probability values for two similar groups of subjects, varied from .92 to .94. The obtained values of this coefficient correspond closely to a correlation of .94 based on two independent subject samples completing the I-E scale under standard administration instructions in Experiment 2. Given that the r_{gg} coefficient varies with the number of subjects contributing to the data matrix, the Spearman-Brown formula was applied to obtain the intraclass correlation for persons (Fiske, 1966). The calculated values of the r_{pp} coefficient, indicating the average intercorrelation between the response patterns for pairs of persons, ranged from .11 to .14.

Magnitude Estimation Analyses

Although previous analyses demonstrated that the remainder component accounted for the major portion of the total I-E scale variance, a separate index of the contribution due to the person X item interaction could not be obtained since this source was confounded with the error component. Therefore, analyses of variance were calculated employing two observations per cell (i.e., subjects' item scores from the test and retest administrations). Consistent with Endler (1966), a mixed effects model was employed with persons representing a random effect and items, redefined as different locus of control situations, representing a fixed effect. Variance components were estimated from specification equations which were developed according to methodology described by several researchers (e.g., Endler, 1966; Rogan,

Note 6; Vaughan & Corballis, 1969). Subsequently, the variance components were summed and the percentage of the total contributed by each of the components (e.g., persons) determined. The above analyses were calculated for male and female subjects on the I-E scale, the Fatalism subscale, and the Social Political Control subscale data. Separate analyses were computed for the two I-E subscales in order to examine the percentages of variance due to person X situation interaction in each case. Table 15 provides a summary of the obtained results.

In general, the findings were comparable for male and female subjects in terms of the percentages of variance accounted for by the separate components in each of the three analyses. The analyses of the I-E scale variance, for the two subject samples, indicated that person, situation, and person X situation interaction components contributed approximately 9%, 8%, and 33%, respectively, to the total variation. The values from the separate analyses of the Fatalism subscale variance were similar indicating that, on the average, 11%, 6%, and 31% of the total variance was due to person, situation, and person X situation interaction components, respectively. From the analyses of the I-E scale and Fatalism subscale variances, the sum of the percentages of variance contributed by persons and situations was approximately one-half that contributed by the person X situation interaction.

The calculation of the percentages of variance components for the Social Political Control subscale, for both subject samples, demonstrated that person and situation sources accounted for approximately 15% and 13% of the total subscale variance, respectively. Persons in interaction with situations contributed about 32% to the total subscale variance. The analyses of the Social Political Control subscale variance indicated that the sum of the

Table 15

Estimated Variance Components and Percentages of Variance
Components Derived from an Analysis of Variance of
the I-E Scale, Fatalism and Social Political
Control Subscales for Males and Females

Source	I-E Scale		Fatalism Subscale		Social Political Control Subscale	
	Variance Component	Percentage	Variance Component	Percentage	Variance Component	Percentage
Males						
Persons (P)	.0280	8.84	.0305	9.42	.0497	16.03
Situations (S)	.0268	8.46	.0196	6.05	.0449	14.48
P X S	.0968	30.55	.0941	29.06	.0939	30.29
Residual	.1653	52.16	.1796	55.47	.1215	39.20
Total	.3169	100.00	.3238	100.00	.3100	100.00
Females						
Persons (P)	.0324	10.20	.0393	12.27	.0444	14.30
Situations (S)	.0237	7.46	.0188	5.87	.0393	12.65
P X S	.1118	35.22	.1089	33.99	.1059	34.09
Residual	.1496	47.12	.1534	47.88	.1210	38.96
Total	.3175	100.00	.3204	100.00	.3106	100.00

Note: The percentages of variance components represent conservative estimates due to a slight overestimation of the total variance component (see Vaughan & Corballis, 1969).

variances due to persons and situations was approximately equal to that due to person X situation interaction.

Discussion

Homogeneity of the I-E Scale

The obtained results supported the prediction that the remainder component would constitute a greater percentage of the total I-E scale variance than either the person or the item components. For male and female subject samples, the analyses of both the test and retest data demonstrated that this component accounted for an average of 74% of the total scale variance. In comparison, the average percentages of variance contributed by the person and item components were 14% and 12%, respectively. An inspection of the variance percentages across I-E scale administrations indicated slight variations of approximately 4% in the majority of cases. Similarly, an examination of the variance percentages across subject samples suggested an average variation of about 2%. Such data indicate a stability in the variance composition of the I-E scale across male versus female subject samples and across test versus retest administrations of this personality measure.

According to Fiske (1966, 1971), the proportion of total variance associated with the remainder component is considered to be the best single index of the quality of measurement. When the value of this index is relatively low, most of the variance is associated with persons, items, or with both components. For a scale designed to measure individual differences, differentiation among subjects is desirable (i.e., substantial variance associated with the person component) and a minimal amount of remainder vari-

ance is necessary. Considering the relative contributions of person and remainder components to the total I-E scale variance, it is apparent that this personality scale does not provide fine differentiation among persons on the locus of control dimension.

The obtained values for the homogeneity coefficients provided additional information concerning the consistencies among I-E scale items and the homogeneousness of subjects' responses to the items. Estimates of the internal consistency of this scale (i.e., r_{tt}) were similar to those reported in previous research (e.g., Reid & Ware, 1973; Rotter, 1966). However, employing an index of the quality of the items comprising the measure which is not affected by the number of items (r_{ii}) yielded relatively low values (i.e., below .16). Such a finding suggests that the I-E items lack substantive homogeneity and do not measure a unitary locus of control construct. To some extent, the noncomparability of the items can be understood in terms of the life experiences which they are intended to sample. That is, the items represent locus of control expectancies across a range of different situations including academics, interpersonal relationships, politics, etc.

Although estimates of the correlation between the I-E items' probability values for two similar groups of subjects (i.e., r_{gg}) were relatively high (i.e., above .92), Fiske (1971) notes that this coefficient has limited value because it varies with sample size. Consequently, a more useful coefficient of the degree of correspondence among the answer patterns of different subjects is the average correlation between pairs of persons (i.e., r_{pp}). The obtained values of this coefficient for the I-E scale were low (i.e., below .14) compared to a maximum possible value of approximately .50. Substantitively, such results indicate that the I-E scale items do not have

the same meaning for different subjects. Given the results of Experiment 2, it is possible that some subjects may be responding in terms of the social desirability of the item, others on the basis of item complexity or ambiguity, while still others on the basis of how they believe the average person might answer the items. Also, because of the heterogeneity of item content, it would appear unlikely that subjects would uniformly endorse specific items in a consistent manner due to their individual past reinforcement experiences.

While the obtained data suggest that the I-E scale does not differentiate subjects with sufficient precision (e.g., low values of person variance and low value of r_{ii}) and does not measure different degrees of a single unitary construct (e.g., low values of item variance and low r_{pp} values), such findings are not uncommon for other personality measures.

Fiske's (1966) analysis of the homogeneity of a large number of personality scales including the Manifest Anxiety Scale (Taylor, 1956) and the California Psychological Inventory (Gough, 1957) indicated that the proportion of remainder variance ranged from .60 to .85 for the majority of measures.

Values for person variance proportions ranged from .04 to .29 while corresponding item variance proportions were in the order of from .09 to .35.

Similarly, the values of r_{ii} and r_{pp} were generally low ranging from .01 to .29 and from .05 to .34, respectively. On the basis of such findings,

Fiske (1971) states that much of personality measurement may be deficient for two reasons, "the items of the typical test are not measuring the same thing and the items do not have the same meaning for different subjects"

(p. 154). A similar conclusion would appear to apply in the case of the I-E scale.

Person X Situation Interaction

Since the I-E scale was developed to measure individuals' reinforcement expectancies across a variety of different life situations (e.g., college academics, interpersonal interactions, political activities, etc.), the items of this measure were redefined as representing situations and the person X item interaction redefined as a person X situation interaction. However, as noted by Fiske (1963), "we cannot separate idiosyncrasy (i.e., person X item interaction) from instability (i.e., error) in the data from a single trial" (p. 650). Consequently, two sets of observations were employed for each person (i.e., test and retest data) in order to obtain a separate estimate of the percentage of I-E scale variance due to the person X situation interaction. Consistent with prediction, obtained results for both male and female subjects demonstrated that the person X situation interaction accounted for a greater percentage of the total I-E scale variance than either persons or situations.

The data of the present experiment correspond to the results of previous research investigating the consistency versus specificity and person X situation interaction issues in personality psychology. For example, in a summary of the findings of 11 studies Bowers (1973) indicated that the person X situation interaction accounted for more variance than either the person or the situation in 14 out of 18 possible comparisons, and in eight out of the 18 comparisons the interaction accounted for more variances than the sum of the main effects. Moreover, the average variances due to persons, situations, and person X situation interactions (i.e., 12.71, 10.17, and 20.77, respectively) reported by Bowers (1973) were of the same relative magnitude as those obtained in this study. Results of variance components

analyses discussed by Endler (1973, 1975, 1976) were also similar to those of the present experiment. Specifically, Endler reported that person X situation interactions accounted for more anxiety variance than either persons or situations when the self-report data from the S-R Inventory of Anxiousness were analyzed for different subject samples.

Given the present data, it is apparent that internal versus external control expectancies are not uniform and invariant across all situations. Although locus of control may be regarded as affecting a wide range of human behaviors, it is clear that different individuals will manifest differing patterns of effects. As indicated by Phares (1976), persons may show a series of specific or circumscribed beliefs about locus of control, each of which applies more to some situations than to others. Taken together, these locus of control beliefs may "average out" to indicate a high level of internal control. However, it cannot be inferred that individuals who show a high mean level of internal control express internal control expectancies in every situation. In certain specific situations, their locus of control beliefs may be quite external. Such differential perceptions of reinforcement control across varying situations would appear to be reflected in the obtained person X situation interactions.

With respect to the variance components analyses of the Fatalism and Social Political Control subscales, the results were consistent with those obtained for the total I-E scale. Specifically, the percentage of variance associated with the person X situation interaction for either subscale and for male and female subjects ranged from 29.09% to 34.09%. Values of 30.55% and 35.22% for males and females, respectively, were obtained for the person X situation interaction component in the analyses of the I-E scale variance.

The prediction that the person X situation interaction would account for less variance in the analyses of the two subscales than in the analyses of the total I-E scale was based on the assumption that these subscales refer to more specific locus of control expectancies. Although previous factor analytic research has demonstrated that the I-E scale items may be meaningfully classified into Fatalism and Social Political Control categories, it is apparent that the situations depicted by the classified items nevertheless evoke different locus of control expectancies in different individuals. Considering the items of the Social Political control subscale, the situations which are described refer to reinforcement expectancies in terms of participation in social and political affairs, influence over political corruption, prevention of wars, etc. Similarly, the items of the Fatalism subscale refer to several different situations in which individuals may vary with respect to their reinforcement expectancies (e.g., obtaining a good job, establishing friendships, earning academic grades, etc.). Thus, while the overall range of different I-E situations may be somewhat reduced by classifying items into Fatalism and Social Political Control subscales, the subscale item-sets cannot be considered as referring to unitary areas of locus of control experience. As a consequence, individuals expressing differing patterns of internal-external expectancies in the different situations broadly classified under Fatalism and Social Political Control categories might have accounted for the obtained percentages of variance associated with person X situation interaction.

Although the present data indicate substantial person X situation interaction with respect to internal-external control expectancies, some possible limitations concerning the present analyses should be noted. First,

a one-week test-retest procedure was employed to obtain two observations for each person thus permitting an estimate of the person X situation interaction component separate from the error component. In commenting on the present methodology, Fiske (Note 3) indicated "Your use of the stability coefficient to estimate person X item (i.e., person X situation) variance is ingenious. I am greatly troubled, however, by the problem of what interval of time to use between testings". Specifically, the estimate of the person X situation variance (i.e., reliable variance) is not independent of the retest interval. A one-week period was employed to reduce memory carry-over effects and simultaneously minimize the possibility that intervening experiences might alter situation-specific locus of control expectancies. However, a shorter retest period might have resulted in a higher percentage of person X situation interaction with the converse true for a somewhat longer retest interval (i.e., six weeks). Also, the variance components analysis which was employed provides a demonstration of the existence of person X situation interactions but does not provide an explanation as to the nature of these interactions (Endler, 1976). Moreover, the data do not provide information concerning the relative consistency and the stable rank order of individuals across different situations (e.g., Epstein, 1976; Golding, 1975). However, the findings do indicate that the variance due to both persons and situations is substantially less than that due to person X situation interaction and provide evidence for a lack of absolute consistency among persons across different I-E situations. Given the foregoing considerations, the findings of the present experiment can only be interpreted as demonstrating the existence of person X situation interaction in locus of control expectancies. Real progress will be made when a priori predictions

concerning how persons and situations interact, based on the theoretical conceptualization of the locus of control construct, are subjected to empirical examination. Although several recent studies have examined differences in the performance of internals and externals across different situations (e.g., Baron, Cowan, Ganz, & MacDonald, 1974; Gilmor & Minton, 1974; Srull & Karabenick, 1975), further research of this nature is necessary.

Summary

In the present experiment, Fiske's (1963, 1966, 1971) procedure for partitioning total scale variance into person, item, and remainder components was employed to examine the homogeneity of the I-E scale. Obtained results demonstrated that the remainder component accounted for approximately 74% of the total I-E scale variance with persons and items each accounting for about 13% of the variance. Such data suggest that the I-E scale items lack substantive homogeneity and do not have the same meaning for different subjects. In subsequent variance components analyses (e.g., Endler, 1966), two observations were employed for each subject (i.e., test and retest data) to obtain estimates of the I-E scale variance due to persons, situations (i.e., as defined by individual I-E scale items), and person X situation interaction. Consistent with other research (e.g., Bowers, 1973; Endler, 1976), results indicated that the person X situation interaction accounted for substantially more of the variance than either persons or situations. These findings suggest that internal versus external control expectancies are not uniform and invariant across different situations.

CHAPTER III

GENERAL CONCLUSIONS

Since the publication of the I-E scale (Rotter, 1966), a substantial amount of locus of control research has been conducted employing this scale as the measure of internal versus external control expectancies. Consequently, the history and development of the locus of control research area, in a sense, also represents the history of the I-E scale. In recent years, there have been a number of attempts to develop alternative measures of this personality construct (e.g., Levenson, 1974; Nowicki & Duke, 1974). However, a recent analysis of the internal-external control research published during the two-year period 1973-1974 (Prociuk & Lussier, 1975) indicated that the I-E scale continues to be the most widely used measure of generalized expectancies for reinforcement. Specifically, results demonstrated that this scale was employed in 69% of the I-E studies focusing on a diversity of topics including, for example, attribution of causality, information acquisition and use, alcoholism and drug abuse, academic achievement, job competence and satisfaction.

Although the I-E scale continues to be employed in the majority of locus of control studies, it is important to note that research on this scale has evolved into a separate topic of intensive investigation (Prociuk & Lussier, 1975). In particular, the question of the dimensionality of the I-E scale has been extensively examined (e.g., Joe & Jahn, 1973; Reid & Ware, 1973) and additional research on such issues as social desirability and reliability has been conducted (e.g., Cherlin & Bourque, 1974; Vuchinich & Bass, 1974). Such research attention is consistent with sever-

al recent evaluations of the I-E scale. For example, Phares (1973) has indicated "real room for improvement" in the measurement of locus of control and has suggested that additional research might not only produce better scales in the future but also highlight the specific strengths and weaknesses of the I-E scale. Correspondingly, the present research was conducted in an attempt to provide psychometric data on several fundamental characteristics of this personality measure.

Factorial Invariance of I-E Scale

While past research had provided substantial evidence indicating that the I-E scale is not a unidimensional measure, there appeared to be little consensus regarding the multidimensional nature of this scale. As indicated by Wolk and Hardy (1975) "The attempt to offer locus of control ... as a multidimensional variable, through the various reported factor analyses in the literature, has been confusing at best" (p. 149). Depending upon the purpose of the research and the specific procedures employed, the I-E scale had been dichotomized, trichotomized, etc., into such dimensions as Fatalism and Social Political Control (Mirels, 1970); Personal Control, Control Ideology, and System Modifiability (Gurin, Gurin, Lao, & Beattie, 1969); Belief in a Difficult World, Just World, Predictable World, and Political Responsive World (Collins, 1974).

In an attempt to summarize and place into perspective the research on the multidimensionality of the I-E scale, the reported studies were discussed in terms of three categories of investigation; (1) factor analyses of the unaltered I-E scale (e.g., Mirels, 1970), (2) studies examining the I-E scale factor structure through the use of a Likert-type response format (e.g., Collins, 1974), and (3) factor analyses attempting to demonstrate

additional distinctions within the locus of control construct (e.g., Reid & Ware, 1974). The results of studies in the first two categories either demonstrated a two-factor structure of the I-E scale (i.e., Fatalism and Social Political Control) or the data were interpretable in terms of these two dimensions. In the final category of research, special scales were constructed to measure internal-external control expectancies. Consequently, evidence for additional dimensions (e.g., self-control) had been reported. Interestingly, however, the results of such studies also demonstrated the presence of the Fatalism and Social Political Control dimensions although modified I-E scales had been factor analyzed.

From the foregoing analyses of the research literature, the evidence suggested the presence of two independent dimensions in the I-E scale, when this measure was employed in its standard form. However, the extent to which this factor-structure was invariant between the sexes and across different populations had not been examined (e.g., Rotter, 1975). Consequently, the first experiment in this research was conducted in an attempt to assess the factorial consistency of the Fatalism and Social Political Control dimensions of the I-E scale.

The results of Experiment 1 suggest several general conclusions concerning the dimensionality of the I-E scale. First, the factor analytic findings demonstrated a two-factor solution for both male and female subject samples. Similar data have been reported in several other studies in which the I-E scale items were analyzed for males and females separately (e.g., Mirels, 1970) or for sexes combined (e.g., Cherlin & Bourque, 1974). The totality of such findings question Rotter's (1966) assumption that variations in expectancy for internal or external control form a single dimen-

sion, and indicate that sex differences do not differentially effect the perception of reinforcement control as due to fatalism and social political sources when this personality construct is measured by the I-E scale. It should be noted, however, that the similarity in the I-E scale factor-structure for males and females does not imply that sex differences do not moderate the relationship between locus of control expectancies and other variables. Several studies (e.g., Platt, Pomeranz, Eisenman, & DeLisser, 1970; Prociuk & Breen, 1975, 1976) reported differences in adjustment, personality, and behavioral dimensions for internals and externals particularly when data for females were analyzed separately from those of males. Platt et al. (1970) suggest that some of the moderating effects of sex may be due to the greater socialization undergone by females as contrasted to the greater responsiveness of males to situational considerations.

Subsequent comparisons of the obtained factor-structures as well as those reported in previous research employing Canadian (Abrahamson, Schludermann, & Schludermann, 1973), American (Mirels, 1970), and Australian (Viney, 1974) subject samples indicated a substantial level of consistency in the Fatalism and Social Political Control dimensions across populations within sexes, within populations across sexes, and within a population within sexes. Although these data provide evidence for the invariance of the Fatalism and Social Political Control dimensions across several populations, it is important to clearly delineate the limits of generalizability for the obtained findings. For example, factorial invariance comparisons involving a high school student sample (i.e., Australian males) did not indicate the same degree of consistency as was obtained for the college student samples. As noted by Phares (1976), college students may make dis-

tinctions among various control beliefs (e.g., Fatalism and Social Political Control) because they are sensitized to issues of politics, governments, discrimination, etc. Younger or less sophisticated groups might not be sensitized to the same extent and thus might be less likely to show evidence for the same degree of distinction between fatalism and social political control expectancies. Similarly, several cautions might be noted if the I-E scale is employed in a large-scale survey or in experimental research involving older non-college subjects. In this case, the items referring to reinforcement expectancies in academics (e.g., course grades, examinations) would appear inappropriate and might affect the overall factor structure of the scale. Also, as indicated by Cherlin and Bourque (1974), older populations are likely to perceive issues related to social political control (e.g., governments, politics) as being more salient in their life experience than issues related to fatalism (e.g., deciding what to do by flipping a coin). Given the foregoing considerations, it is suggested that the results demonstrating the consistency of the Fatalism and Social Political Control dimensions of the I-E scale be generalized only to male and female college samples from the three populations (i.e., Canadian, American, and Australian) compared in the present research. Further research is necessary to examine the multidimensionality of the I-E scale and its factorial consistency if this scale is to be used with subject samples other than college students.

To the extent that college students have and continue to be used as subjects in the majority of locus of control studies (Coan, Fairchild, & Dobyms, 1973), the findings of Experiment 1 would appear to have some implications for future I-E research. Specifically, obtained results indicate

that fatalism and social political control expectancies represent independent and relatively stable locus of control dimensions. Consequently, in many studies, it would appear useful to calculate scores on each dimension separately either by summing factor specific items or by obtaining factor scores from a factor analysis of the I-E scale item responses. Subsequently, the relationship between a given criterion measure and internal-external control might be examined in terms of both fatalism and social political control expectancies. In studies focusing on such topics as psychological adjustment, achievement, etc., fatalism expectancies might prove to have greater predictive utility. Conversely, in areas of research concerned with the political efficacy aspect of locus of control (e.g., activism, political participation), social political control expectancies would appear more theoretically relevant and the use of scores on this dimension might provide more meaningful and consistent validity data.

The recommendation that the I-E scale be treated as a multidimensional measure of internal-external control expectancies is consistent with the views of several researchers (e.g., Cherlin & Bourque, 1974; Reid & Ware, 1973). As indicated by Reid and Ware (1973), the reason why many validity coefficients in I-E research have been disappointingly low may have been due to the differential association between criterion measures and each of the two factors in the I-E scale. These authors state, for example, that when criterion scores are related to one of the factors but not to the other, the unrelated factor could represent additional variance contributing to a reduced relationship between the total I-E scale and the personality or behavioral measure variable being studied. Research studies by Abramowitz (1973) and Zuckerman (1973) support this analysis and provide evidence

that differential predictions based on fatalism and social political control expectancies are important in terms of clarifying inconsistencies in previous research on social-political involvement. However, such studies are few and additional research is required to examine the extent to which the Fatalism and Social Political Control dimensions of the I-E scale are empirically meaningful in terms of their predictive validity.

Bipolarity of I-E Scale

Consistent with Rotter's (1966) theoretical formulation of the internal-external locus of control construct, the I-E scale was developed to measure a unidimensional, bipolar continuum. In recent years, the question of the dimensionality of this measure had received substantial research attention. In contrast, the assumption of bipolarity remained relatively unexamined (e.g., Klockars & Varnum, 1975). Therefore, two experiments were conducted to investigate whether internal versus external control expectancies, as measured by the I-E scale, constitute the opposite ends of a bipolar continuum.

The 23-scored items of the I-E scale are presented in a forced-choice format. Each item consists of a statement attributing reinforcement causality to internal or personal factors (i.e., skill, ability, or effort) paired with a statement reflecting attribution of reinforcement causality to external factors (i.e., chance, fate, luck, or powerful others). Consequently, if the paired statements of each item reflected opposite ends of a bipolar continuum (i.e., were empirically bipolar), then the degree of internal control represented by the internal statement was expected to be statistically equivalent to the degree of external control represented by the corresponding external statement. This psychometric quality of the I-E

scale was examined by determining scale values for the individual internal and external control statements. Subsequently, the scale values of paired I-E statements were compared to evaluate the empirical bipolarity of the individual items.

In Experiment 2, the internal and external control statements were scaled in terms of Rotter's (1966) theoretical definition of locus of control. Subsequent comparisons of the scale values for individual items demonstrated a general lack of bipolarity in the I-E scale. Specifically, only 9 of the 23 items of this measure were shown to consist of statements expressing an equivalent degree of internal control and external control. Recognizing, however, that any conclusions concerning the bipolarity of the I-E scale should simultaneously take into account the dimensionality of this measure, a further analysis of item bipolarity was conducted. In Experiment 3, the I-E scale statements were scaled in terms of the two dimensions identified by previous factor analytic research (i.e., Fatalism and Social Political Control). Results demonstrated that dimensional differences between statements referring to fatalism versus social-political control expectancies were perceived (i.e., the scale values of statements referring to fatalism expectancies were significantly greater in terms of the Fatalism versus Social Political Control dimension with the converse true for the scale values of statements referring to social political control expectancies). However, an examination of the bipolarity of the I-E scale, employing dimension-specific scale values, yielded overall results similar to those of Experiment 2 (i.e., only 10 items were shown to consist of statements representing opposite ends of a bipolar continuum). Five items in common were bipolar in both experiments.

Given the findings of the present research as well as those of two other investigations (Kleiber, Veldman, & Menaker, 1973; Klockars & Varnum, 1975) it would appear that the I-E scale does not provide adequate measurement of a bipolar locus of control dimension. For the majority of the I-E scale items, the internal and corresponding external control statements are shown to be only slightly related in terms of the degree of reinforcement expectancies which they represent. As indicated by Klockars and Varnum (1975), many of the paired statements are neither logical opposites nor do they represent equally separated points on the locus of control dimension. It should be recognized, however, that the present conclusions are based on a relatively limited amount of empirical data. While the individual investigations each indicate that less than half of the I-E items are bipolar, additional research is considered necessary to establish a greater consistency in the findings with respect to individual items. For example, the studies by Kleiber, Veldman, and Menaker (1973) and Klockars and Varnum (1975), employing an identical correlational methodology, each identified 7 items as bipolar and the remaining 16 items as nonbipolar. However, a comparison of the results for individual items, across the two studies, indicated inconsistencies for 6 of the I-E items (i.e., an item was identified as bipolar in one study and nonbipolar in the other). Similar reversed findings were found to occur for 8 items when the results of the two experiments in the present research were compared.

Although subsequent research might be conducted to replicate current findings, the demonstration of I-E scale item bipolarity/nonbipolarity is considered only a partial objective for future investigation. A more important research issue concerns the identification and specification of the

possible determinants of item bipolarity. As previously suggested, future research might focus on an evaluation of the different frequency adverbs used to qualify the reinforcement expectancies expressed in many of the I-E scale statements. Not only do adverbs such as "sometimes", "often", "in the long run" imply substantially different degrees of reinforcement control but recent research has demonstrated that internals and externals tend to respond differentially to probability-related frequency adverbs or phrases. Hartsough (Note 4) reported that under ambiguous conditions, low probability words and phrases (e.g., never, seldom, once in a while) were assigned significantly greater subjective probability values by internals compared to externals. In contrast, externals assigned significantly greater subjective probability values to high probability words and phrases (e.g., often, almost always, definitely) than internals. Since the I-E scale is presented as an ostensibly ambiguous task (e.g., filler items are employed to create uncertainty as to the nature of the measure, the scale is introduced as a survey of social opinion), it is conceivable that internals might similarly differ from externals in their perception of the degree of internal or external control expressed in individual statements such as "I have often found that what is going to happen will happen" or "Trusting to fate has never turned out as well for me as making a decision to take a definite course of action". Consequently, the use of different frequency adverbs in paired I-E statements as well as the differential perception, by internals versus externals, of the probability values implied by the frequency adverbs or phrases might function interactively to attenuate the discrimination provided by individual items.

In sum, the present research is considered only an initial step in the

investigation of I-E scale bipolarity. The obtained data suggest that the theoretical conceptualization of locus of control as a bipolar construct is not reflected in its measurement by the I-E scale. Further research is necessary, however, to identify, specify, and carefully evaluate the possible determinants of bipolarity or nonbipolarity in the individual I-E scale items.

Homogeneity of I-E Scale

In his summary of the psychometric characteristics of the I-E scale, Rotter (1966) stated that "the test shows reasonable homogeneity or internal consistency" (p. 17) given that the items were constructed to sample a broadly generalized characteristic over a number of different situations. Such a conclusion was based on obtained internal consistency reliability values ranging from .69 to .79. Although traditional indices of scale homogeneity (e.g., Cronbach alpha coefficient) used by Rotter and others (e.g., Hersch & Schiebe, 1967) provide an important source of reliability data, the obtained values are a function of only one source of total scale variability (i.e., the variance associated with person scores). The final experiment in the present research was thus conducted to provide additional information concerning the homogeneity of the I-E scale.

Employing Fiske's (1963, 1966, 1971) procedure for evaluating test adequacy, the total I-E scale was partitioned into the relative contributions due to person, item, and remainder components. Results of this analysis, for male and female subjects, demonstrated that the remainder component accounted for the majority of the variance (i.e., an average of 74%) while persons and items each accounted for about 13% variance. Such findings suggest several general conclusions concerning the homogeneity of

the I-E scale. First, the values for the percentage of item variance indicate that the individual items do not differ substantially in terms of the extent to which they provide measures of different amounts of the underlying locus of control dimension. Such obtained values might be expected since the I-E scale was developed employing a relative frequency approach (i.e., an external control orientation is indexed by the number of external alternatives the subject selects in his responses to the I-E scale) and the items with extreme endorsement values were eliminated during scale construction (see Rotter, 1966, 1975). However, for a scale designed to measure individual differences, the percentage of variance associated with persons is generally of greater interest (e.g., Fiske, 1966). Given the relatively low percentage of person variance compared to remainder variance, the I-E scale would not appear to provide fine discrimination among subjects in terms of their reinforcement expectancies. This scale is not typically used for individual prediction where this shortcoming would be most apparent. However, there may be certain limitations even when the measure is employed in the investigation of group differences. Specifically, the frequently employed median-split procedure might represent a very crude method for differentiating between persons with internal versus external control orientations. Since the majority of I-E scores occur near in the middle of a distribution which is somewhat leptokurtic, and given the relatively low degree of discrimination provided by the measure, it is conceivable that a proportion of internally-oriented individuals might be misclassified as externals with the converse true for externally-oriented persons.

The final, and most important source of information concerning the homogeneity of the I-E scale is provided by the percentage of variance as-

sociated with the remainder component. The large values for this variance (i.e., ranging from 71% to 78%) indicate the extent to which the I-E scale is a heterogeneous measure (i.e., the complement of what is required for reliable measurement). Although several different conditions may contribute to this source of variance, two factors would appear particularly relevant in the case of the I-E scale. As with many personality questionnaires, the I-E scale provides little structure in terms of the criteria a subject is to use in selecting responses. As discussed with respect to item bipolarity, subjects may differ in terms of their interpretation of frequency adverbs, for example, how often is "often", etc. Also, subjects might go about the process of answering a given item in several different ways. For example, given the I-E statement "When I make plans, I am almost certain that I can make them work", a subject can compare this statement to his general impression of himself or he might recall several pertinent experiences and base his response on a recollection of the outcomes. For another I-E statement, "People are lonely because they don't try to be friendly", the subject can decide that an affirmative answer would be true for most people and therefore true for him. Fiske (1966) notes that the structuring of a measure can be increased through familiarity, since an individual who has experienced a given measure has had an opportunity to develop attitudes toward it. Such an acquisition of stable reactions to the I-E scale, through its readministration, would account for the slightly higher values of the various indices of homogeneity in the retest case.

The second possible factor contributing to remainder variance (i.e., differences in the locus of control situations depicted by the items) was examined in the present research by obtaining estimates of the variance due

to person X situation interaction. Results of variance components analyses (e.g., Endler, 1966), for male and female subjects, demonstrated that person X situation interaction contributed approximately 33% to the total scale variation which represents about one-half of the remainder variance. In comparison, persons and situations (i.e., individual items) accounted, on the average, for 9% and 8% of the total I-E scale variance, respectively. Essentially similar results were obtained from the analyses of the Fatalism and Social Political Control subscale variances. These findings suggest that the presence of heterogeneous items in the I-E scale, sampling a variety of different locus of control situations, necessarily imposes a restriction on the reliability of this personality measure. As indicated by Phares (1976), it cannot be assumed that internal versus external control expectancies are uniform and invariant across all situations. Consequently, in responding to the I-E scale, a given person may endorse an internal control expectancy in certain situations depicted by the items (e.g., interpersonal relations, work involvement) but an external control expectancy in other situations (e.g., academic achievement) with the converse true for a second person. Although the two individuals might obtain identical total I-E scores, these scores might be based on entirely different items referring to different locus of control situations. The introduction of specific item variance, in this manner, substantially reduces the internal consistency of the I-E scale as is indicated by the large percentage of remainder variance.

In sum, Rotter's (1966) development of the I-E scale with somewhat heterogeneous items followed the theoretical conceptualization of generalized expectancies for reinforcement which would be manifest across a vari-

ety of conditions. This conceptualization necessitates a measure which will provide for consistent prediction across different situations. Unfortunately, however, this kind of scale might not only result in very low level and sometimes inconsistent predictions, but may also generate confusion in terms of data interpretation. As indicated by Reid and Ware (1973), "When a prediction is not supported, one does not know whether to blame the theory behind the prediction or the poor reliability of the measure" (p. 268).

I-E Measurement: Suggestions for Future Scale Development

The concept of internal versus external locus of control has proven to be an important personality variable with implications for many different areas of psychological, sociological, and educational investigation. As indicated by Coan, Fairchild, and Dobyns (1973) "the experience of control - the sense that one actively chooses, successfully wills, or achieves mastery over himself and the circumstances in which he finds himself - is obviously one of the most fundamental features of human experience" (p. 53). Consequently, the issues raised by the present research do not concern the theoretical utility of the locus of control construct but involve several limitations in the effective measurement of this personality dimension by means of the Rotter I-E scale.

An obvious question which arises from the present analyses concerns how locus of control measurement might be improved. There appear to be at least two possible options. First, subsequent research might focus on the revision and refinement of the present I-E scale. Statements which either appear or have been shown to be ambiguous might be reworded to clarify their meaning intent. As an initial procedure to improve the bipolarity characteristic of the scale, similar frequency adverbs could be used in each of

the paired internal and external control statements. Also, items phrased in the third person might be changed to refer to the first person thus establishing consistency throughout the scale. However, there are obvious limits to which the scale could be modified, and whether such revision would result in a substantial gain of predictive utility is questionable. In its present form, the I-E scale is a relatively short instrument. Its 23-item length in addition to the heterogeneity of item content necessarily restricts its reliability. Also, there is reason to doubt that individual differences in the perception of reinforcement control can be adequately described in terms of a single broad dimension, or even in terms of the two dimensions provided by the I-E scale. Coan et al. (1973) indicate, for example, that "it is a matter of common observation that people can experience control selectively with respect to different features of their lives" (p. 54). Correspondingly, there is some basis to expect that the dimensionality of reinforcement control is underrepresented by the I-E scale items. The research underlying this scale was inspired by the concept of generalized expectancy with substantially lesser emphasis placed on the measurement of specific, situationally-related expectancies. Also, the methods of item selection used in the development of the scale appear to have operated against the identification of different locus of control dimensions (e.g., subscale item refinement was not completed). Therefore, while the I-E scale offers some opportunity for the multidimensional investigation of internal-external control beliefs, this opportunity is tempered by the relatively few items that comprise the scale and also by a lack of adequate sampling of reinforcement expectancies in given situations (e.g., academic, interpersonal, work-related).

Given the foregoing considerations, a more heuristic approach to locus of control measurement might involve the construction of separate subscales designed to represent several dimensions of internal versus external control. Such an approach is consistent with the theoretical framework which underlies this personality construct. Phares (1976) states, for example, that "multidimensionality is inherent in social learning theory. An individual's perceived locus of control is composed of many separate expectancies that relate to many diverse life areas or needs ..." (p. 48). Moreover, Phares (1976) recommends the development of I-E scales of greater sophistication so that multidimensional aspects of the locus of control domain might be investigated. He indicates that "more precise prediction will ultimately be achieved through subscale approaches that indicate the strength of an individual's locus of control beliefs in several different areas. This will be superior to the reliance on a single score to characterize the individual's beliefs" (p. 175).

Future research might begin with a careful conceptual analysis of the locus of control construct to determine the various situations or contexts in which internal versus external control is most likely to function as a personality determinant of behavior. The volume of published research, demonstrating the life areas in which reinforcement control expectancies have been investigated, would obviously serve as an important guide in this respect. Furthermore, past research on the multidimensionality of locus of control might also be usefully incorporated. For example, perceived internal versus external control over large-scale social and political events (i.e., Social Political Control) has been identified and employed as a separate locus of control dimension in previous investigations (e.g., Abramo-

witz, 1973). Also, Reid and Ware (1974) have presented evidence suggesting that self-control of impulses, desires, and emotional behaviors may represent an important dimension of locus of control which is not measured by the I-E scale. This dimension was identified by constructing a separate subscale consisting of eight forced-choice items (e.g., When I put my mind to it I can constrain my emotions vs. There are moments when I cannot subdue my emotions and keep them in check). In addition to these dimensions, separate subscales might be constructed to measure internal versus external control expectancies in several other life situations such as academics (items would refer to possible determinants of one's level of achievement), social interactions (items might refer to different factors involved in securing desired reactions from others, acquiring friends, gaining popularity and social recognition), and work or occupation (items would indicate the determinants of level of success experienced in one's occupation).

The development of separate subscales to measure several locus of control dimensions might have a number of advantages. First, each subscale would represent a homogeneous content area which, in turn, would provide a better understanding of what is being measured (Reid & Ware, 1973). Moreover, by restricting items to a narrower range of situational referents, greater internal consistency reliability could be established for the individual subscales. Fiske (1966) notes that "the variance of persons can be increased, and at least questionnaires can be made more adequate, by incorporating in groups of items a single explicit set of situational conditions" (p. 81). Second, an index of generalized expectancy for reinforcement could be obtained by summing an individual's scores on the different subscales. Such a total score would be similar to the score on the I-E scale, which is

obtained by summing responses to items which refer to different locus of control situations. In addition, however, scores on each subscale would provide information concerning an individual's specific reinforcement expectancies in given life situations. In many studies, these separate subscale scores could be used in a multiple linear regression analysis of the criterion being investigated. An examination of the regression weights and proportions of variance accounted would indicate which locus of control dimensions were particularly useful in predicting the criterion measure (Reid & Ware, 1973). Alternatively, individual differences in locus of control might be examined in terms of several dimensions. Assuming, for example, that the academic and social interaction dimensions of locus of control are theoretically relevant for determining college success, subjects might be classified as being internal on both dimensions, external on both dimensions, or internal on one of the dimensions and external on the other (i.e., a fourfold categorization of subjects). Subsequently, comparisons on different measures of college success (e.g., grade-point average, participation in student organizations, etc.) might be made between the individuals classified into the four locus of control categories. Finally, the use of individual locus of control subscales might result in more precise prediction of specific behaviors of interest. For example, research on alcoholism and drug abuse has indicated inconsistent findings with some studies demonstrating that the use of alcohol and drugs is related to an internal control orientation (e.g., Berzins & Ross, 1973; Gozali & Sloan, 1971) and other studies indicating a relationship with external control attitudes (e.g., Butts & Chottos, 1973; Segal, 1974). One possible reason for the disparate results in this area of investigation might be due to the measurement of lo-

cus of control. The I-E scale does not contain any items concerned with self-control of impulses, desires, etc., which would appear theoretically relevant in such research. Consequently, the use of a locus of control subscale which measures self-control of behavior might provide clarification of the relationship between this personality dimension and such variables as alcoholism, drug use, smoking behavior, etc.

A Final Observation

The present research involving a psychometric analysis of the Rotter I-E scale suggests several limitations and deficiencies in this personality measure. In particular, the obtained findings indicate that the I-E scale is multidimensional and that the two-factor structure of this measure is generally invariant. Therefore, as noted by Reid and Ware (1973), the use of total I-E scores with most criteria may involve the overlap of only one of the dimensions with the variable studied while the presence of the second dimension might function to reduce the overall magnitude of the relationship. Data further indicate that the majority of items which comprise this measure are not bipolar (i.e., do not represent opposite ends of the locus of control dimension). Not only do such results demonstrate a lack of coordination between the theoretical conceptualization of this construct and its measurement, but it is also conceivable that item nonbipolarity may limit the discrimination in reinforcement expectancies provided by the I-E scale. Finally, the findings suggest that the heterogeneous item content of this measure results in idiosyncratic responding as reflected in the variance due to person X item interaction. Such idiosyncratic responding, in turn, substantially reduces the internal consistency of the scale. Given the foregoing considerations, it is perhaps understandable that the

I-E scale has typically yielded low level validity data (i.e., low validity coefficients) or has at times produced inconsistent results. As previously discussed, the present findings have several implications for both past and future locus of control research employing this scale. Also, the data would appear to have some implications for interactionism. Specifically, Sarason, Smith and Diener (1975) recommend that a personality X situation paradigm be considered in future research. However, the precise classification of individuals in terms of a personality dimension (e.g., internals vs. externals) is contingent upon accurate measurement. With respect to the I-E scale, factors such as item nonbipolarity and lack of homogeneity may limit the discrimination in reinforcement expectancies provided by this personality measure.

It is important to consider, however, whether such limitations and deficiencies are unique only to a particular instrument, the I-E scale, or whether they are common to personality measurement in general. In this regard, there is good reason to believe that the problems associated with locus of control measurement represent only one manifestation of a dis-ease not endemic to this research area but epidemic in the general area of personality psychology. In a recent review of personality measurement, Fiske and Pearson (1970) note several limitations which are congruent with those indicated for the I-E scale. First, most concepts in personality tend to be broad and heterogeneous in their referents so that when a concept is used to describe different persons, it is doubtful that the identical attribute is applied to each case. When measurement does not provide indices of the same attribute in the different persons measured, substantial person-instrument interaction occurs. Second, there is a general lack of specification and sufficient de-

lineation of the target concepts as well as a nonsystematic coordination of measures and constructs. Concepts tend to be linked uncritically with measurement operations and direct evaluations of whether measures reflect the basic assumptions implicit in the theoretical conceptualizations are infrequent. Finally, most theoretically oriented research suggests that both personality concepts and measures are multidimensional making untenable the assumption of the unitary nature of constructs. To have measures which can be interpreted unequivocally, it is necessary to "dissect" constructs and develop measuring instruments which are coordinated with each subconstruct (i.e., a multidimensional approach).

As is suspected the case with many important personality constructs, the potential utility of internal-external locus of control appears restricted by limitations in both its conceptualization and measurement. There is, for example, a developing consensus that an area of investigation which is based implicitly on attributed dispositions is inadequate. Consequently, greater emphasis on situational determinants of behavior and on the interaction of individual differences and situations is necessary. Also, a multidimensional reorientation in the measurement of personality constructs, to more readily encompass multiply-determined personality phenomena, warrants serious consideration. Such reformulations and other new approaches are necessary since "we seem to be approaching the limits of what can be achieved by measuring operations derived from current assumptions and orientations. The time is ripe for giant steps, for bold reorganizations of our thinking, for creative innovations in the construing of personality and its measurement" (Fiske & Pearson, 1970, p. 77).

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APPENDIX A

Internal-External Control Scale

I-E Scale

This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered a and b. Please select the one statement of each pair (and only one) which you more strongly believe to be the case as far as you are concerned. Be sure to select the one you actually believe to be more true than the one you think you should choose or the one you would like to be true. This is a measure of personal belief: obviously there are no right or wrong answers. Also, try to respond to each item independently when making your choice. Do not be influenced by your previous choices.

Mark your answers on the accompanying IBM answer sheet (e.g., A1 or B2).

-
- *1. (a) Children get into trouble because their parents punish them too much.
 (b) The trouble with most children nowadays is that their parents are too easy with them.

 - 2. (a) Many of the unhappy things in people's lives are partly due to bad luck.
 (b) People's misfortunes result from the mistakes they make.

 - 3. (a) One of the major reasons why we have wars is because people don't take enough interest in politics.
 (b) There will always be wars, no matter how hard people try to prevent them.

 - 4. (a) In the long run people get the respect they deserve in this world.
 (b) Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

 - 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.

 - 6. (a) Without the right breaks one cannot be an effective leader.
 (b) Capable people who fail to become leaders have not taken advantage of their opportunities.

 - 7. (a) No matter how hard you try some people just don't like you.
 (b) People who can't get others to like them don't understand how to get along with others.

 - *8. (a) Heredity plays a major role in determining one's personality.
 (b) It is one's experiences in life which determine what they're like.

 - 9. (a) I have often found that what is going to happen will happen.
 (b) Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

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.
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.
13. (a) When I make plans, I am almost certain that I can make them work.
(b) It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
- *14. (a) There are certain people who are just no good.
(b) There is some good in everybody.
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.
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.
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".
- *19. (a) One should always be willing to admit mistakes.
(b) It is usually best to cover up one's mistakes.
20. (a) It is hard to know whether or not a person really likes you.
(b) How many friends you have depends upon how nice a person you are.
21. (a) In the long run the bad things that happen to us are balanced by the good ones.
(b) Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

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.
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.
- *24. (a) A good leader expects people to decide for themselves what they should do.
 (b) A good leader makes it clear to everybody what their jobs are.
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.
26. (a) People are lonely because they don't try to be friendly.
 (b) There's not much use in trying too hard to please people, if they like you, they like you.
- *27. (a) There is too much emphasis on athletics in high school.
 (b) Team sports are an excellent way to build character.
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.
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: An asterisk denotes filler items. The score is the number of underlined external alternatives chosen.

APPENDIX B

Internal-External Control Scaling Instruments

I-E Statements - Form A

1. It is impossible for me to believe that chance or luck plays an important role in my life.
2. Most of the time I can't understand why politicians behave the way they do.
3. Getting a good job depends mainly on being in the right place at the right time.
4. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
5. In the long run, the people are responsible for bad government on the national as well as on a local level.
6. People's misfortunes result from the mistakes they make.
7. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
8. In the case of the well prepared student, there is rarely, if ever, such a thing as an unfair test.
9. By taking an active part in political and social affairs the people can control world events.
10. Most students don't realize the extent to which their grades are influenced by accidental happenings.
11. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
12. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.
13. Without the right breaks one cannot be an effective leader.
14. When I make plans, I am almost certain that I can make them work.
15. ~~There's not much use in trying too hard to please people, if they like you, they like you.~~
16. People are lonely because they don't try to be friendly.
17. Many times I feel that I have little influence over the things that happen to me.
18. One of the major reasons why we have wars is because people don't take enough interest in politics.

19. What happens to me is my own doing.
20. It is difficult for people to have much control over the things politicians do in office.
21. The idea that teachers are unfair to students is nonsense.
22. Most people don't realize the extent to which their lives are controlled by accidental happenings.
23. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
24. Capable people who fail to become leaders have not taken advantage of their opportunities.
25. There really is no such thing as "luck".
26. I have often found that what is going to happen will happen.
27. How many friends you have depends upon how nice a person you are.
28. With enough effort we can wipe out political corruption.
29. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.
30. The average citizen can have an influence in government decisions.
31. Sometimes I can't understand how teachers arrive at the grades they give.
32. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
33. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
34. No matter how hard you try, some people just don't like you.
35. Sometimes I feel that I don't have enough control over the direction my life is taking.
36. There is a direct connection between how hard I study and the grades I get.
37. Many times we might just as well decide what to do by flipping a coin.
38. It is hard to know whether or not a person really likes you.
39. People who can't get others to like them don't understand how to get along with others.

40. In the long run people get the respect they deserve in this world.
41. This world is run by a few people in power, and there is not much the little guy can do about it.
42. Many times exam questions tend to be so unrelated to course work, that studying really is useless.
43. In the long run, the bad things that happen to us are balanced by the good ones.
44. Many of the unhappy things in people's lives are partly due to bad luck.
45. There will always be wars, no matter how hard people try to prevent them.
46. In my case, getting what I want has little or nothing to do with luck.

I-E Statements - Form B

1. In my case, getting what I want has little or nothing to do with luck.
2. There will always be wars, no matter how hard people try to prevent them.
3. Many of the unhappy things in people's lives are partly due to bad luck.
4. In the long run, the bad things that happen to us are balanced by the good ones.
5. Many times exam questions tend to be so unrelated to course work, that studying really is useless.
6. This world is run by a few people in power, and there is not much the little guy can do about it.
7. In the long run people get the respect they deserve in this world.
8. People who can't get others to like them don't understand how to get along with others.
9. It is hard to know whether or not a person really likes you.
10. Many times we might just as well decide what to do by flipping a coin.
11. There is a direct connection between how hard I study and the grades I get.
12. Sometimes I feel that I don't have enough control over the direction my life is taking.
13. No matter how hard you try, some people just don't like you.
14. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
15. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
16. Sometimes I can't understand how teachers arrive at the grades they give.
17. The average citizen can have an influence in government decisions.
18. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.
19. With enough effort we can wipe out political corruption.

20. How many friends you have depends upon how nice a person you are.
21. I have often found that what is going to happen will happen.
22. There really is no such thing as "luck".
23. Capable people who fail to become leaders have not taken advantage of their opportunities.
24. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
25. Most people don't realize the extent to which their lives are controlled by accidental happenings.
26. The idea that teachers are unfair to students is nonsense.
27. It is difficult for people to have much control over the things politicians do in office.
28. What happens to me is my own doing.
29. One of the major reasons why we have wars is because people don't take enough interest in politics.
30. Many times I feel that I have little influence over the things that happen to me.
31. People are lonely because they don't try to be friendly.
32. There's not much use in trying too hard to please people, if they like you, they like you.
33. When I make plans, I am almost certain that I can make them work.
34. Without the right breaks one cannot be an effective leader.
35. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.
36. Who gets to be the boss often depends on who was lucky enough to be in ~~the right place~~ first.
37. Most students don't realize the extent to which their grades are influenced by accidental happenings.
38. By taking an active part in political and social affairs the people can control world events.
39. In the case of the well prepared student, there is rarely, if ever, such a thing as an unfair test.

40. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
41. People's misfortunes result from the mistakes they make.
42. In the long run, the people are responsible for bad government on the national as well as on a local level.
43. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
44. Getting a good job depends mainly on being in the right place at the right time.
45. Most of the time I can't understand why politicians behave the way they do.
46. It is impossible for me to believe that chance or luck plays an important role in my life.

Internal-External Identification/Rating Questionnaire

Name: _____ Form A or B (Circle)

Student Number: _____ Male or Female (Circle)

Having received class instruction on Rotter's internal-external control dimension, you are being asked to participate in evaluating the most widely used measure of this dimension, namely, the Rotter I-E scale. The accompanying questionnaire consists of the 46 statements used in this scale. Your task is NOT to indicate the extent to which you agree or disagree with these statements. Rather, you are to rate these statements, on the 7-point scale, regarding the extent to which they represent either internal or external control. You will recall that internal control refers to the belief that outcomes of one's behaviors are dependent upon internal factors such as ability, hard work, etc. External control, on the other hand, refers to the belief that outcomes of one's behaviors are dependent upon external factors such as powerful others, luck, chance or fate.

Your task is not difficult but it will require your very best judgement. First of all, you are to read each statement carefully and in the designated space, indicate an I (internal) or E (external) depending upon whether the statement refers to belief in internal or external control. For example, the statement "I am the master of my own fate" is an expression of internal control and would thus be identified with an I. On the other hand, the statement "Life is mostly a gamble" is an expression of external control and would thus be identified with an E.

Having identified the statements as either I or E, you are then to carefully judge the extent to which each statement represents internal or external control, as the case may be, and indicate your judgement by circling the corresponding value on the 7-point scale. To serve as a guide for your judgements, a 7 would indicate that the statement represents a high degree of either internal or external control; a 4 would represent a moderate degree of either internal or external control and a 1 would represent a low degree of either internal or external control.

PLEASE WORK CAREFULLY AND USE YOUR VERY BEST JUDGEMENT.

I or E		Low			Moderate			High
_____	1.	1	2	3	4	5	6	7
_____	2.	1	2	3	4	5	6	7
_____	3.	1	2	3	4	5	6	7
_____	4.	1	2	3	4	5	6	7

I or E	Moderate						
	Low						High
_____ 5.	1	2	3	4	5	6	7
_____ 6.	1	2	3	4	5	6	7
_____ 7.	1	2	3	4	5	6	7
_____ 8.	1	2	3	4	5	6	7
_____ 9.	1	2	3	4	5	6	7
_____ 10.	1	2	3	4	5	6	7
_____ 11.	1	2	3	4	5	6	7
_____ 12.	1	2	3	4	5	6	7
_____ 13.	1	2	3	4	5	6	7
_____ 14.	1	2	3	4	5	6	7
_____ 15.	1	2	3	4	5	6	7
_____ 16.	1	2	3	4	5	6	7
_____ 17.	1	2	3	4	5	6	7
_____ 18.	1	2	3	4	5	6	7
_____ 19.	1	2	3	4	5	6	7
_____ 20.	1	2	3	4	5	6	7
_____ 21.	1	2	3	4	5	6	7
_____ 22.	1	2	3	4	5	6	7
_____ 23.	1	2	3	4	5	6	7
_____ 24.	1	2	3	4	5	6	7
_____ 25.	1	2	3	4	5	6	7
_____ 26.	1	2	3	4	5	6	7
_____ 27.	1	2	3	4	5	6	7

I or E	Moderate						
	Low						High
_____ 28.	1	2	3	4	5	6	7
_____ 29.	1	2	3	4	5	6	7
_____ 30.	1	2	3	4	5	6	7
_____ 31.	1	2	3	4	5	6	7
_____ 32.	1	2	3	4	5	6	7
_____ 33.	1	2	3	4	5	6	7
_____ 34.	1	2	3	4	5	6	7
_____ 35.	1	2	3	4	5	6	7
_____ 36.	1	2	3	4	5	6	7
_____ 37.	1	2	3	4	5	6	7
_____ 38.	1	2	3	4	5	6	7
_____ 39.	1	2	3	4	5	6	7
_____ 40.	1	2	3	4	5	6	7
_____ 41.	1	2	3	4	5	6	7
_____ 42.	1	2	3	4	5	6	7
_____ 43.	1	2	3	4	5	6	7
_____ 44.	1	2	3	4	5	6	7
_____ 45.	1	2	3	4	5	6	7
_____ 46.	1	2	3	4	5	6	7

APPENDIX C

Social Desirability Rating Questionnaire

SDR Questionnaire

Name: _____

Student Number: _____ Male or Female (Circle)

You have completed a questionnaire to find out the way in which certain important events in our society affect different people. If your responses were to be used to describe another person, how positively or negatively would that person be described if he or she were to express agreement with the same statements which you chose.

Indicate your judgement about how positively or negatively the person would be described if he or she were to express agreement with the same statements as you chose, by circling one of the numbers on the scale below:

-3	-2	-1	0	+1	+2	+3
The person would be described very negatively.			The person would be described neither positively nor negatively.	The person would be described very positively.		

On the scale below, circle one of the numbers to indicate how confident you are of your judgement about the possible description of the person. In other words, how confident are you of your judgement that the person would be described as positively or negatively as you have indicated on the scale above.

1	2	3	4	5	6	7
Not at all Confident.		Moderately Confident.			Extremely Confident.	

APPENDIX D

Fatalism and Social Political Control
Scaling Instruments

I-E Statements - Form A

1. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
2. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
3. The idea that teachers are unfair to students is nonsense.
4. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
5. Many times exam questions tend to be so unrelated to course work, that studying really is useless.
6. The average citizen can have an influence in government decisions.
7. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
8. People are lonely because they don't try to be friendly.
9. In my case, getting what I want has little or nothing to do with luck.
10. Capable people who fail to become leaders have not taken advantage of their opportunities.
11. What happens to me is my own doing.
12. When I make plans, I am almost certain that I can make them work.
13. Many times we might just as well decide what to do by flipping a coin.
14. I have often found that what is going to happen will happen.
15. People who can't get others to like them don't understand how to get along with others.
16. In the long run, the people are responsible for bad government on the national as well as on a local level.
17. There will always be wars, no matter how hard people try to prevent them.
18. It is impossible for me to believe that chance or luck plays an important role in my life.
19. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

20. Most of the time I can't understand why politicians behave the way they do.
21. Without the right breaks one cannot be an effective leader.
22. Many of the unhappy things in people's lives are partly due to bad luck.
23. In the long run people get the respect they deserve in this world.
24. Sometimes I feel that I don't have enough control over the direction my life is taking.
25. With enough effort we can wipe out political corruption.
26. By taking an active part in political and social affairs the people can control world events.
27. Sometimes I can't understand how teachers arrive at the grades they give.
28. There's not much use in trying too hard to please people, if they like you, they like you.
29. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
30. People's misfortunes result from the mistakes they make.
31. One of the major reasons why we have wars is because people don't take enough interest in politics.
32. Getting a good job depends mainly on being in the right place at the right time.
33. How many friends you have depends upon how nice a person you are.
34. Many times I feel that I have little influence over the things that happen to me.
35. In the long run, the bad things that happen to us are balanced by the good ones.
36. This world is run by a few people in power, and there is not much the little guy can do about it.
37. In the case of the well prepared student, there is rarely, if ever, such a thing as an unfair test.
38. There is a direct connection between how hard I study and the grades I get.

39. Most people don't realize the extent to which their lives are controlled by accidental happenings.
40. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.
41. No matter how hard you try, some people just don't like you.
42. Most students don't realize the extent to which their grades are influenced by accidental happenings.
43. It is difficult for people to have much control over the things politicians do in office.
44. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.
45. There really is no such thing as "luck".
46. It is hard to know whether or not a person really likes you.

I-E Statements - Form B

1. It is hard to know whether or not a person really likes you.
2. There really is no such thing as "luck".
3. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.
4. It is difficult for people to have much control over the things politicians do in office.
5. Most students don't realize the extent to which their grades are influenced by accidental happenings.
6. No matter how hard you try some people just don't like you.
7. As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.
8. Most people don't realize the extent to which their lives are controlled by accidental happenings.
9. There is a direct connection between how hard I study and the grades I get.
10. In the case of the well prepared student, there is rarely, if ever, such a thing as an unfair test.
11. This world is run by the few people in power, and there is not much the little guy can do about it.
12. In the long run, the bad things that happen to us are balanced by the good ones.
13. Many times I feel that I have little influence over the things that happen to me.
14. How many friends you have depends upon how nice a person you are.
15. Getting a good job depends mainly on being in the right place at the right time.
16. One of the major reasons why we have wars is because people don't take enough interest in politics.
17. People's misfortunes result from the mistakes they make.
18. Becoming a success is a matter of hard work, luck has little or nothing to do with it.

19. There's not much use in trying too hard to please people, if they like you, they like you.
20. Sometimes I can't understand how teachers arrive at the grades they give.
21. By taking an active part in political and social affairs the people can control world events.
22. With enough effort we can wipe out political corruption.
23. Sometimes I feel that I don't have enough control over the direction my life is taking.
24. In the long run people get the respect they deserve in this world.
25. Many of the unhappy things in people's lives are partly due to bad luck.
26. Without the right breaks one cannot be an effective leader.
27. Most of the time I can't understand why politicians behave the way they do.
28. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
29. It is impossible for me to believe that chance or luck plays an important role in my life.
30. There will always be wars, no matter how hard people try to prevent them.
31. In the long run, the people are responsible for bad government on a national as well as on a local level.
32. People who can't get others to like them don't understand how to get along with others.
33. I have often found that what is going to happen will happen.
34. Many times we might just as well decide what to do by flipping a coin.
35. When I make plans, I am almost certain that I can make them work.
36. What happens to me is my own thing.
37. Capable people who fail to become leaders have not taken advantage of their opportunities.
38. In my case, getting what I want has little or nothing to do with luck.
39. People are lonely because they don't try to be friendly.

40. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
41. The average citizen can have an influence in government decisions.
42. Many times exam questions tend to be so unrelated to course work, that studying really is useless.
43. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
44. The idea that teachers are unfair to students is nonsense.
45. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
46. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

I-E Statement Identification Questionnaire

Name: _____ Form A or B (Circle)

Student Number: _____ Male or Female (Circle)

The questionnaire which you have received consists of 46 statements. These statements are those which form the items of the I-E scale. Each statement expresses either internal or external control. Internal control refers to the belief that reinforcements are due to one's own ability and effort. External control refers to the belief that reinforcements are due to luck, chance, fate, or powerful others.

Read each statement very carefully and decide whether it expresses internal control or external control. If a statement expresses internal control, circle the capital I beside the statement number on this response sheet. If a statement expresses external control, circle the capital E beside the statement number on this response sheet.

PLEASE WORK CAREFULLY AND USE YOUR VERY BEST JUDGEMENT.

-
- | | | |
|---------|---------|---------|
| 1. I E | 16. I E | 31. I E |
| 2. I E | 17. I E | 32. I E |
| 3. I E | 18. I E | 33. I E |
| 4. I E | 19. I E | 34. I E |
| 5. I E | 20. I E | 35. I E |
| 6. I E | 21. I E | 36. I E |
| 7. I E | 22. I E | 37. I E |
| 8. I E | 23. I E | 38. I E |
| 9. I E | 24. I E | 39. I E |
| 10. I E | 25. I E | 40. I E |
| 11. I E | 26. I E | 41. I E |
| 12. I E | 27. I E | 42. I E |
| 13. I E | 28. I E | 43. I E |
| 14. I E | 29. I E | 44. I E |
| 15. I E | 30. I E | 45. I E |
| | | 46. I E |

Fatalism Rating Questionnaire

Name: _____ Form A or B (Circle)

Student Number: _____ Male or Female (Circle)

Read a given statement on the questionnaire and decide whether the statement expresses either internal control or external control as you did in the first part of this experiment. Following this, rate each statement on the 0 to 7 point rating scale, in terms of the degree of internal control or external control expressed by the statement with reference to FATALISM. Fatalism refers to statements which indicate that a person believes that reinforcements are due either to ability and effort or to luck, chance, fate, or powerful others. Indicate your judgements by circling the appropriate numbers.

To serve as a guide for your judgements, a 7 would indicate that the statement expresses a high degree of either internal or external control referring to Fatalism, a 4 would represent a moderate degree of either internal or external control referring to Fatalism, and a 1 would represent a low degree of either internal or external control referring to Fatalism. The zero (0) rating point may be used if in your judgement the statement does not express either internal or external control referring to Fatalism.

PLEASE WORK CAREFULLY AND USE YOUR VERY BEST JUDGEMENT.

		Low			Moderate			High
1.	0	1	2	3	4	5	6	7
2.	0	1	2	3	4	5	6	7
3.	0	1	2	3	4	5	6	7
4.	0	1	2	3	4	5	6	7
5.	0	1	2	3	4	5	6	7
6.	0	1	2	3	4	5	6	7
7.	0	1	2	3	4	5	6	7
8.	0	1	2	3	4	5	6	7
9.	0	1	2	3	4	5	6	7
10.	0	1	2	3	4	5	6	7

		<i>Low</i>			<i>Moderate</i>			<i>High</i>
11.	0	1	2	3	4	5	6	7
12.	0	1	2	3	4	5	6	7
13.	0	1	2	3	4	5	6	7
14.	0	1	2	3	4	5	6	7
15.	0	1	2	3	4	5	6	7
16.	0	1	2	3	4	5	6	7
17.	0	1	2	3	4	5	6	7
18.	0	1	2	3	4	5	6	7
19.	0	1	2	3	4	5	6	7
20.	0	1	2	3	4	5	6	7
21.	0	1	2	3	4	5	6	7
22.	0	1	2	3	4	5	6	7
23.	0	1	2	3	4	5	6	7
24.	0	1	2	3	4	5	6	7
25.	0	1	2	3	4	5	6	7
26.	0	1	2	3	4	5	6	7
27.	0	1	2	3	4	5	6	7
28.	0	1	2	3	4	5	6	7
29.	0	1	2	3	4	5	6	7
30.	0	1	2	3	4	5	6	7
31.	0	1	2	3	4	5	6	7
32.	0	1	2	3	4	5	6	7
33.	0	1	2	3	4	5	6	7

		<i>Low</i>			<i>Moderate</i>			<i>High</i>
34.	0	1	2	3	4	5	6	7
35.	0	1	2	3	4	5	6	7
36.	0	1	2	3	4	5	6	7
37.	0	1	2	3	4	5	6	7
38.	0	1	2	3	4	5	6	7
39.	0	1	2	3	4	5	6	7
40.	0	1	2	3	4	5	6	7
41.	0	1	2	3	4	5	6	7
42.	0	1	2	3	4	5	6	7
43.	0	1	2	3	4	5	6	7
44.	0	1	2	3	4	5	6	7
45.	0	1	2	3	4	5	6	7
46.	0	1	2	3	4	5	6	7

Social Political Control Rating Questionnaire

Name: _____ Form A or B (Circle)

Student Number: _____ Male or Female (Circle)

Read a given statement on the questionnaire and decide whether the statement expresses either internal control or external control as you did in the first part of this experiment. Following this, rate each statement on the 0 to 7 point rating scale, in terms of the degree of internal control or external control expressed by the statement with reference to SOCIAL POLITICAL CONTROL. Social Political Control refers to statements which indicate that a person has the ability and influence to change or control social and political affairs or that social and political affairs are controlled by luck, chance, fate, or powerful others (e.g., politicians). Indicate your judgements by circling the appropriate number.

To serve as a guide for your judgements, a 7 would indicate that the statement expresses a high degree of either internal or external control referring to Social Political Control, a 4 would represent a moderate degree of either internal or external control referring to Social Political Control, and a 1 would represent a low degree of either internal or external control referring to Social Political Control. The zero (0) rating point may be used if in your judgement the statement does not express either internal or external control referring to Social Political Control.

PLEASE WORK CAREFULLY AND USE YOUR VERY BEST JUDGEMENT.

		<i>Low</i>			<i>Moderate</i>			<i>High</i>
1.	0	1	2	3	4	5	6	7
2.	0	1	2	3	4	5	6	7
3.	0	1	2	3	4	5	6	7
4.	0	1	2	3	4	5	6	7
5.	0	1	2	3	4	5	6	7
6.	0	1	2	3	4	5	6	7
7.	0	1	2	3	4	5	6	7
8.	0	1	2	3	4	5	6	7
9.	0	1	2	3	4	5	6	7
10.	0	1	2	3	4	5	6	7

		<i>Low</i>			<i>Moderate</i>			<i>High</i>
11.	0	1	2	3	4	5	6	7
12.	0	1	2	3	4	5	6	7
13.	0	1	2	3	4	5	6	7
14.	0	1	2	3	4	5	6	7
15.	0	1	2	3	4	5	6	7
16.	0	1	2	3	4	5	6	7
17.	0	1	2	3	4	5	6	7
18.	0	1	2	3	4	5	6	7
19.	0	1	2	3	4	5	6	7
20.	0	1	2	3	4	5	6	7
21.	0	1	2	3	4	5	6	7
22.	0	1	2	3	4	5	6	7
23.	0	1	2	3	4	5	6	7
24.	0	1	2	3	4	5	6	7
25.	0	1	2	3	4	5	6	7
26.	0	1	2	3	4	5	6	7
27.	0	1	2	3	4	5	6	7
28.	0	1	2	3	4	5	6	7
29.	0	1	2	3	4	5	6	7
30.	0	1	2	3	4	5	6	7
31.	0	1	2	3	4	5	6	7
32.	0	1	2	3	4	5	6	7
33.	0	1	2	3	4	5	6	7

		<i>Low</i>			<i>Moderate</i>			<i>High</i>
34.	0	1	2	3	4	5	6	7
35.	0	1	2	3	4	5	6	7
36.	0	1	2	3	4	5	6	7
37.	0	1	2	3	4	5	6	7
38.	0	1	2	3	4	5	6	7
39.	0	1	2	3	4	5	6	7
40.	0	1	2	3	4	5	6	7
41.	0	1	2	3	4	5	6	7
42.	0	1	2	3	4	5	6	7
43.	0	1	2	3	4	5	6	7
44.	0	1	2	3	4	5	6	7
45.	0	1	2	3	4	5	6	7
46.	0	1	2	3	4	5	6	7