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INVESTIGATION OF THE STABILITY OF
PERSONALITY TRAITS USING TIME-SERIES ANALYSIS

By

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B.S., Michigan State University, 1975

Presented in partial fulfillment of the requirements
for the degree of

Master of Arts

University of Montana

1980

Approved by:

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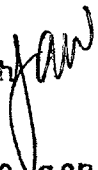
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ABSTRACT

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Psychology

Investigation of the Stability of Traits Using Time-Series Analysis

Director: James A. Walsh 

Research investigating the consistency of behavior across situations has not given unequivocal support to intrapersonal, situationist, or interactionist conceptualizations of personality. The present investigation attempted to evaluate the stability of behavior using time-series analysis. Data were recorded on 99 subjects by three measurement methods, on three traits, at three different frequencies of data collection. Each subject was assigned to one condition of each of the three independent variables and recorded data over a 20 week period. It was hypothesized that each subject's resulting time-series would be time-dependent and identifiable as a model implying a particular conceptualization of personality. The hypotheses were not supported, as only 26 of 99 series were identified as fitting time-dependent models. This implies that neither personological nor environmental factors exerted a systematic influence on data measured, and that if trait and environment were interacting, this interaction could not be considered a systematic, predictable one. Post hoc analyses strongly suggested that the more frequently a trait is measured, the greater the likelihood of time-dependence in the series. Furthermore, the particular trait chosen may influence the finding of time-dependence.

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INTRODUCTION

Within traditional personality theory, the trait model has probably been the most influential in terms of generating research. In trait personality theory, traits are viewed as latent dispositions to act in a certain way. They refer to relatively stable, enduring behavioral dispositions that individuals exhibit over time and across situations (Epstein, 1977; Magnusson and Endler, 1977).

Historical Overview of Trait Measurement

In the measurement of traits that are concerned with areas of normal functioning rather than with traits distinguishing psychopathology from adjustment, two theories of individual differences are of primary historical importance. The first was proposed by the German philosopher Edourd Spranger in his 1928 book, Types of Men. Spranger's theory posited six major value orientations among people, and led Vernon and Allport (1931) to construct their Study of Values. Their instrument underwent a third revision in 1960 and is still in use today. However, the theoretical views of Henry Murray have spawned the largest number of personality inventories.

In 1938, Murray and his Harvard colleagues described the structure of personality in their volume, Explorations in Personality. As part of their work, they distinguished

44 variables that "pertained to trends or effects of motor and verbal action" and were correlated to some degree with subjective reports of intention. They developed a pool of 545 items that was used in a questionnaire to measure 20 of the manifest (externally exhibited) needs, eight of the general traits, and the four miscellaneous internal factors they posited. No initial item pool was provided for the remainder of the personality variables. These original items have been modified over the years for use in various personality inventories based upon this theoretical framework. Goldberg (1971) points out that most of the later inventory developers have in fact focused on those constructs included in the original Harvard questionnaire and have only rarely developed new scales to measure other Murray constructs.

The first major inventory to be developed out of the work of the Murray team was the Edwards' Personal Preference Scale (EPPS). Published in 1953, the EPPS consists of 15 scales, each keyed for the measurement of one of Murray's personality variables. Other tests followed, including Heilbrun and Gough's (1965) Adjective Check List and Stern's Activity Index (1958) and his later Environmental Indexes, designed to capture the environmental "press" aspects of the Murray system.

Recent and sophisticated attempts have been made to measure some of these same constructs. The Edwards' Personality Inventory (EPI) was published in 1966. Edwards developed an initial item pool consisting of 2824 statements which were grouped by a rational-intuitive approach and subjected to a series of factor analyses. In its final form, 1500 items were used to measure 53 scales; 300 of those items make up a parallel form providing comparable measures for 14 of the scales.

In 1967, Jackson published the Personality Research Form (PRF) in several formats. PRF scales were constructed from a large item pool that was also developed by the rational-intuitive method. Two comparable forms (A and B) provide scores on 15 traits and another pair of comparable forms (AA and BB) include those scales plus another seven scales.

The development of the EPI and PRF represents a more advanced approach to the construction of personality trait measures. Edwards and Jackson used explicit, theoretically-based definitions of the particular traits they attempted to measure. Both attempted to suppress response biases of acquiescence and desirability through the process of item selection, and were relatively successful in controlling such response tendencies (Edwards & Abbott, 1973). Both also avoided item overlap in scale construction, thus eliminating spurious correlations between

scales.

Development of trait measures continues. Some of the more noteworthy include the Comrey (1970) Personality Scales (CPS), developed through a factor-analytic strategy to measure ten traits, and Lorr's (1973) Interpersonal Style Inventory (ISI), constructed by the rational-intuitive method to measure 16 of Murray's need constructs. But, even as the number of trait measures increases, factor-analytic studies have shown convergence in the personality constructs measured. The same trait domain appears to have been tapped in the EPPS, EPI, PRF, CPS, and ISI (Edwards & Abbott, 1973; Lorr, 1975).

However, even with more refined measurement instruments, interpretations and conclusions about personality trait theory based on research using these instruments have been limiting and unsatisfactory. The trait measurement model, which assumes a monotonic, linear relationship between individuals' latent positions on each personality dimension and their positions on a behavioral scale indicating the same trait, has not yielded convincing results. Critics point to a lack of generality of trait measures over method and situation and the lack of demonstrated generalized behavioral consistencies that would indicate the existence of broad dispositions or traits (Peterson, 1968; Mischel, 1968).

Development of Interactional Theories

Inadequacies in trait theories of personality have led to the development of interactional personality theories. These view the determination of behavior to be a function of the person, the situation, and the interaction of the two. Interactionist thought can be traced back to Aristotle. Kantor (1924, 1926) formulated one of the first interactionist conceptualizations applied to psychological phenomenon. Another contribution to interactional theory came from Gestalt psychology when Koffka (1935) made the distinction between the physical ("geographical") and psychological ("behavioral") environment. Lewin (1935, 1936) described the relationship between person and environment, and stressed the importance of the psychological environment. Whereas Lewin viewed person and environment as interdependent, Tolman (1935) regarded the components as independent. He also stressed the physical rather than psychological environment in his interactional model. Angyal (1941), like Lewin, emphasized the inseparability of person and environment, and stated that any attempt at separation would create artificial distinctions.

Murray's (1938) theory is an explicit interactional one, which emphasizes that the unit of study for psychology should be the organism-environment interaction. Murphy (1947) forwarded a less explicit interactionist theory, but

one similar to Lewin's and Murray's. Rotter (1954) developed an interactional theory that stressed the need for objective classification of situations. Jessor (1956, 1958) also defined the organism-environment interaction as the most important unit of study for psychology. However, his theory viewed the psychological environment as the most significant component. In psychiatry, Sullivan's (1953, 1964) interpersonal theory stressed the importance of viewing the individual in the context of his interpersonal environment. A more detailed historical review of the development of interactionism can be found in Ekehammer (1974).

More recently, most if not all theorists agree that behavior represents the result of some kind of interaction between organism and environment (Sells, 1963). Accordingly, all psychological theories should be interactionistic to some degree. Yet, there are great differences in the relative emphasis placed on "person" and "situation", and various theories differ in the conceptualization of both variables.

Starting from what has often been regarded as a strict situationist position, Mischel (1968, 1973, 1979) has recently discussed the importance of cognitive evaluation processes in determining different meanings of situations for different people. Arguing from a psychodynamic viewpoint, Wachtel (1973) implies that individual behavior

is influenced by situational factors as a result of a person's selection of situations. Both have modified their theoretical views and posited interactional theories of personality. Bowers (1973) recommended an interactionist position in an attack on situationism. Argyle and Little (1972), after critically examining the trait position, came to the same conclusion. Many others have also forwarded general interactionistic theories, including Ekehammer (1974), and Endler and Magnusson (1976).

Three research strategies have been employed in the effort to shed light on the issue of consistency of behavior across situations. These empirical approaches are the correlational study, factor analytic study, and analysis of variance study.

Correlational studies: One type of correlational evidence is derived from correlating the measurements of an underlying disposition taken across different situations. Numerous studies (Hartshorne & May, 1928; Magnusson, Gerzen, & Nyman, 1968; Magnusson & Heffler, 1969; Magnusson, Heffler, & Nyman, 1968) have found that the magnitude of the correlation coefficients decreases as situations become increasingly different. A second correlational approach looks at the correlation of measures of underlying traits with behavioral manifestations of such traits in specific situations. Such correlation coefficients have rarely been greater than .30 (Mischel,

1968), and this evidence has often been cited in arguments against the utility of trait concepts in personality theory (e.g. Magnusson, 1971; Mischel, 1968, 1971). Both types of correlational evidence suggest a lack of generality of behavior across situations, and as such have been interpreted as strong arguments against trait constructs.

Factor analytic studies: In these studies, the manifestations of an underlying disposition are observed and quantified in a number of situations. These measures are then correlated for each pair of situations. The matrix of intersituation correlations is treated with component analysis or factor analysis by which the total variance is partitioned into a set of components. A finding that one main factor explains a considerable part of the total variance would support the trait conception of personality. According to the interactionist view, there should be more than one main factor explaining a large portion of the total variance, suggesting a degree of situational specificity. Results of several studies have reflected a lack of strong cross-situational generality (Burton, 1963; Nelsen, Grinder, and Mutterer, 1969). Endler and Magnusson (1976) reviewed factor analytic studies of cross-situational anxiety and found no evidence of cross-situation consistency. Hence, factor analytic evidence has provided little support for trait conceptualizations.

Analysis of variance studies: In the analysis of variance design, a measure of the dependent variable is collected across a number of situations for a number of subjects. In a two way analysis of variance procedure, the resulting variation can be partitioned into independent components due to persons, situations, and the interaction of persons and situations. Mean squares can then be computed and variance components for each of the sources can be derived and compared. A comparatively large person variance component would give support to the personological formulation, a large situation component would support a situational formulation, and a large interaction component would give some support to the interactional formulation.

Numerous studies have been conducted using this methodology. Bowers (1973) reviewed studies and found that the average percentage of variance due to persons was 12.71%, due to situations, 10.17%, and due to person-by-situation interaction, 20.17%. The major conclusion drawn from these results is that neither the person nor situation main effects are the most important sources of variation. However, a number of factors have been cited as influencing the relative magnitude of main effects, including the particular trait being measured, the type of measure used, and the range of situations and persons sampled (Bowers, 1973; Mischel, 1973).

The empirical evidence generated by these research strategies has not given unequivocal support to any of the conceptualizations of personality. However, the necessity of modifying early trait and situationist formulations has been recognized. Intrapersonal theories have been expanded to include situational variables, and explanations of the relationship of underlying dispositions to behavior have grown more complex (Alker, 1972; Wachtel, 1973). Similarly, Mischel has modified his situationist position in recent works (1973, 1977, 1979) and has presented a theory that is interactional in nature, including the cognitive processes by which a person construes the environment. Gradually, the original trait and situationist models are being abandoned, reflecting a trend toward emphasis on both the person and his environment.

The Problem of Change Over Time

An enduring problem in the interactionistic controversy surrounds the issue of change over time. In 1938, Murray wrote:

"The organism consists of an infinitely complex series of temporally related activities extending from birth to death. Because of the meaningful connection of sequences, the life cycle of a single individual should be taken as a unit, the long unit for psychology. It is feasible to study the organism during one episode of its

existence, but it should be recognized that this is but an arbitrarily selected part of the whole."
(p. 39)

With the passage of time, the environment and individuals cannot help but be altered in some manner. Thus, a complicating factor in state-trait investigations is that situations and behavioral dispositions are completely confounded with time. As time passes, there is the opportunity for an individual to encounter new situations and also to encounter the same or similar situations. The longer the period of time, the more opportunity for the individual to encounter similar situations and develop consistent patterns of behavior to cope with situations. Behavioral variability and inconsistency could then be viewed as due to the fact that situations tend to vary, particularly over brief periods of time (Speilberger, 1977).

The few studies that have demonstrated behavioral stability were conducted over relatively long periods of time, and examined relatively extensive samples of behavior. Block (1971, 1973) and Olweus (1973, 1974, 1977) have reported stability coefficients greater than .30 for a variety of variables over time periods of three years or more. Epstein (1979) has hypothesized that behavioral stability can be demonstrated so long as the behavior in question is averaged over a sufficient number of occurrences. Averaging over observations would reduce error

of measurement and increase temporal reliability.

In general, measuring change over time presents certain methodological problems. One is the unreliability of single measures. When behavior is measured at different times, the errors of measurement of the measurement methods must be considered when comparing the scores. Problems of over-correction and under-correction may exist and can completely reverse findings (Bereiter, 1963). A second problem is the unreliability-invalidity dilemma. If a measurement instrument is sensitive to changes in performance, its reliability will be low. And the lower the correlation between two instruments, the less they can be said to tap the same domain. One must be cognizant of the possibility that in the process of change, conditions may have changed so drastically that what is measured on the two occasions may be different. All three research strategies, correlational, factor-analytic, and analysis of variance, must contend with these problems in measuring behavior over time.

As Bereiter (1963) further indicates, a major methodological problem in measuring change is correlated error between measures. However, time-series analysis was derived specifically to deal with the correlated error problem and to look at change over time. The use of time-series analysis circumvents the above problems since components that vary over time are separated into systematic

and error components.

Time-series models have long been used in economics, meteorology, and a number of other sciences. Surprisingly, it has been applied infrequently in psychology, even though the potential utility of time-series designs in the field was pointed out as early as 1963, by Donald Campbell.

Time-Series Models

Two main types of time-series models are used to describe the dependence of observations measured over time. In an autoregressive model, any particular observation in the time-series is predictable to some degree as a proportion or set of proportions of the previous observations. For example, in a first-order autoregressive process, the observation z is predicted from the observation z_{-1} . Thus, the series is regressed upon itself one time point in the past. In a second-order autoregressive process, observation z depends on the two points preceding it.

An alternative model employs the concept of moving averages of random shocks. Here, the dependence of the observations is regarded as involving the current shock to the series and a portion of one or more other prior shocks. In a first order moving averages process, for instance, only the immediately prior random shock and the current shock are considered when predicting any particular observation.

Occasionally, a process may be best described by a mixed model, in which both autoregressive and moving averages components are present. Thus, an observation depends to some extent on both a direct proportion of previous observations and a weighted average of random shocks to the series. Also, the level of a process may change in the course of its being observed. Such changes are the item of interest in estimating the effects of intervention into a time-series.

For a mathematical description of these models as well as methods for model identification and model parameter estimation, the reader is referred to Glass, Willson, and Gottman (1975).

It is possible to specify a time-series model for examining changes in observations over time which avoids the correlated error problem and allows one to attribute change to purely personological factors, to more purely environmental factors, or to a specific interaction of person and environment.

Assume that the observations being considered are scores on a measure of a particular underlying behavioral disposition, or trait. These measurements are taken repeatedly at set time intervals, and together comprise a time-series of trait scores. Suppose that upon analysis, the most descriptive model of the time-series process was an autoregressive one. This would support the hypothesis that

change in scores over time can be attributed to personological factors, or traits. Any particular observation would be dependent to some degree upon a direct proportion of prior observations. This implies that a relatively stable or consistent trend within the individual has been observed. Actual observation of that underlying disposition would vary over time, but relative consistency would be indicated since any particular observation could be predicted to a greater or lesser extent from prior observations. As time passed and the environment changed, the observations of that particular trait would remain fairly constant. This would demonstrate that individuals possess relatively stable, enduring behavioral dispositions.

Suppose that the time-series process was best described by a moving averages of random shocks model. An observation would still be dependent to some extent on what occurred before it. However, the observation would depend on the weighted average of the random shocks that entered the time-series at previous observations. This implies that any appearance of consistency would be due primarily to a series of cumulative random effects. Instead of an enduring behavioral disposition accounting for the time-dependent process, it would be based on the accumulation of random shocks encountered over time. These random shocks can be conceptualized as representing state or environmental factors, since they cannot be considered part of any consistent trend within the individual. In a sense, the

organism could be considered to sum experiences over a period of time, and then behave according to the sum of his previous experiences. Past states that had been encountered would determine actions, and not any internal, enduring disposition. A "trait" would then be an artifact of the appearance of consistency based upon an averaging of previous environmental effects.

Suppose that a mixed model, one with both autoregressive and random shocks components, was most descriptive of the observations recorded over time. This combination model would indicate that both stable trends or dispositions within the individual and environmental influences must be considered in predicting observations. This trait-environment interaction would be systematic to some extent, since observations are still dependent on previous observations and random shocks and predictable to some degree from them. Hence, a mixed time-series model would support an interactionist theory of personality.

It is possible that no time-series model would adequately describe the series of scores. This would imply that the observations were not time-dependent, and so an observation could not be predicted from what had occurred before it. Neither personological nor environmental factors would be exerting a systematic influence on what is observed. If trait and environment were interacting, the interaction could not be considered a systematic,

predictable one. Each observation would represent a unique synthesis of person and environmental factors, and suggest that behavior cannot be predicted to any significant degree from personal dispositions or past experiences.

In this study, observations comprising the time-series varied in three dimensions. Observations for a particular individual were recorded on a single trait, measured by a single method at regular time intervals. However, across individuals, a variety of traits were examined by several different measurement methods, and measurements were taken at several different time intervals. Hence, the time series varied on trait, method, and time period. Observations were taken in a manner designed to disturb the individual as little as possible. No attempts were made to change an individual's attitudes or behavior.

It was hypothesized that the resulting time-series would, in general, be identifiable as autoregressive, moving averages, or hybrid models, rather than being non time-dependent. It was further hypothesized that the models describing all these series would, for the most part, be the same. Hence, it was predicted that when the time-series data were analyzed, they would fit primarily one of the three time-series models described.

METHOD

Subjects: The original subject pool consisted of 109 undergraduate and graduate students at the University of Montana. Of these, 99 subjects continued in the study long enough to report a sufficient number of data points to conduct the time-series analysis. The 56 undergraduates who completed the study received course credit for participation. The 43 graduate students were enrolled in either the Department of Psychology or the Department of Communication Sciences and Disorders. They were acquaintances of the author who volunteered to participate in the study. All subjects were told that this study was concerned with describing how people behaved in their daily lives over a relatively long period of time. They were also told that they should not change their daily behavior simply because they were taking part in the study, and that any information they provided about themselves would be strictly confidential.

Variables and conditions: The trait observed, the method of measuring it, and the time interval between observations were varied. The frequencies of data collection were seven times a week, three times a week, and once a week. The traits measured were taken from those described by Jackson in the Personality Research Form (1967) and by Edwards in the Edwards Personality Inventory (1967),

and were: Likes to Be Alone (Edwards, 1967), Dominance, and Play (Jackson, 1967). Traits were chosen which could be measured by a variety of procedures and could be expected to show moderate variation over time. Three methods were used to measure each of these traits. One was the appropriate self-report scale from the PRF-form AA or EPI. Another was a seven-point Likert-type scale on which subjects rated the degree to which they have displayed the trait. The third was a self-monitoring procedure in which subjects were given pocket-size notebooks and asked to tally the number of times they exhibited particular behaviors considered manifestations of the trait of interest. To aid monitoring, subjects were provided with a list of categories of target behaviors and asked to divide the day into four six-hour recording segments (McFall, 1977; Nelson, 1977). Examples of measurement materials for each of the traits appear in Appendices A, B, and C.

The assignment of subjects to one of the three conditions for each of the three independent variables was not totally random. Subjects who were graduate students were generally assigned to the seven times a week condition of the frequency of data collection variable. This preselection was done since the graduate students were assumed to be more reliable about filling out their data daily and would be easier to contact for data collection. However, assignment of trait and measurement method for these subjects was random, as was the assignment of other

subjects on these variables. There were 27 different combinations of trait, method, and frequency of data collection, and at least three subjects within each of these cells completed the study.

Procedure: Subjects were asked to present themselves at a designated place and time for data collection using the three methods described. The group reporting three times a week completed data on Monday, Wednesday, and Friday. The group reporting once a week completed data on Tuesday, Wednesday, or Thursday, but subjects did so consistently on whichever of those days they chose. The third group, of course, completed data daily. A "drop box" into which subjects could place their daily data was utilized for the graduate students in this group to expedite data collection. The goal was to follow all subjects for approximately a 20 week period in order to provide the number of observations necessary to identify time-series models with any confidence.

All subjects were told that the researchers were not interested in the consistency of their repeated reports. They were instructed to consider only the previous 24 hours as a reference period when responding on measurement instruments. Subjects were given a description of the trait being measured to facilitate self-ratings on the Likert-type scale. The trait description was drawn primarily from the description appearing in the PRF or EPI test manuals. Data

was collected by the appropriate method by undergraduate psychology students who received academic credit for their assistance as well as by the author. Allowances for self-collection of data were necessary for periods when subjects were ill or away from campus for weekends and breaks between terms.

In addition, subjects were asked once each week if they had experienced any disruption or trauma in their lives during the previous week. This was done since such a disruption could have had significant effects on the traits being observed and thus possibly cause a change in the time-series after that point. To preserve the subject's privacy if such a disruption occurred, the individual was asked only to classify it into one of several categories. The categories used were: a) family--for disruptions that had occurred to members of the subject's family and had resulting effects on the subject himself, such as death, serious illness, or financial crises; b) friends--for disruptions in the subject's relationships with peers, spouse, or other loved ones; and c) personal--for disruptions involving primarily the subject alone, such as health problems, loss of a job, or unique misfortunes.

Scores on the self-report personality inventory were the number of items endorsed in the keyed direction, the scores on the Likert-type scale were the number circled on the scale, and the scores on the self-monitoring method were

the total number of times the subject reported the particular behaviors listed. These scores were plotted over time to produce a time-series of observations for each subject. The number of data points ranged from 16 to 20 for subjects in the one time a week data collection condition, from 28 to 58 for the three time a week condition, and 59 to 134 for the seven time a week condition. Each time-series was statistically analyzed using the Box-Jenkins (1970) method as described by Glass, Willson, and Gottman (1975) to determine the most descriptive model for the observations. Their CORREL and TIMSRX computer programs were used to conduct the analysis. The unit of analysis was the type of time-series model identified.

RESULTS

The major hypothesis that the time-series would in general be identifiable as autoregressive, moving averages, or hybrid time-dependent models, rather than non time-dependent, was not supported. Of 99 time-series, six were identified as fitting autoregressive models, 20 were identified as fitting moving averages models, and the remaining 73 were non time-dependent. The distribution of the classifications of all the time series by trait, measurement method, and frequency of data collection is presented in Appendix D.

Since no type of time-dependent model was found to identify a large number of time-series, the data were collapsed across the two models of time-dependence that were represented. These data are presented in Tables 1, 2, and 3. The data were then analyzed for possible systematic differences in time-dependence versus non time-dependence by trait, measurement method, and frequency of data collection.

The number of time-dependent and non time-dependent series for each of the three frequencies of data collection, summed across trait and method, is presented in Table 4. A chi squared statistic was calculated and indicated a significant difference ($\chi^2 = 14.485$, $df=2$, $p < .01$) in the number of time-dependent models as a function of frequency of data collection. An examination of the percentage

Table 1

Classifications of Time-Series by
Measurement Method and Frequency of
Data Collection for the Trait Dominance

Frequency	Model*	Likert	Inventory	Self-Monitor
7X	TD	1	2	1
	NTD	3	1	2
3X	TD	0	0	0
	NTD	4	4	4
1X	TD	0	0	1
	NTD	4	5	2

* The abbreviation TD stands for time-dependent and NTD stands for non time-dependent.

Table 2

Classifications of Time-Series by
Measurement Method and Frequency of
Data Collection for the Trait Play

Frequency	Model*	Likert	Inventory	Self-Monitor
7X	TD	2	2	4
	NTD	1	1	0
3X	TD	2	3	0
	NTD	3	0	4
1X	TD	0	1	0
	NTD	3	3	3

* The abbreviation TD stands for time-dependent and NTD stands for non time-dependent.

Table 3

Classifications of Time-Series by
Measurement Method and Frequency of
Data Collection for the Trait Likes to be Alone

Frequency	Model*	Likert	Inventory	Self-Monitor
7X	TD	1	0	2
	NTD	3	3	2
3X	TD	1	2	1
	NTD	3	2	3
1X	TD	0	0	0
	NTD	3	4	3

* The abbreviation TD stands for time-dependent and NTD stands for non time-dependent.

distribution of time-dependent models indicates a clear decrease as the frequency of observation decreases.

The number of time-dependent and non time-dependent series for each of the traits, summed over method and frequency of observation, appears in Table 5. Calculation of chi squared indicated a significant difference ($\chi^2 = 8.83$, $df=2$, $p < .02$) in time-dependence by trait. Examination of the distribution of time-dependence by trait indicates that the trait Play was much more likely to yield a time-dependent series than were the traits Dominance and Likes to be Alone.

Table 6 shows the number of time-dependent series by measurement method summed over trait and frequency of observation. Statistical analysis revealed no significant differences ($\chi^2 = .90$, $df=2$, $p > .05$) in time-dependence as a function of measurement method.

Post hoc analyses examined the average amount of autocorrelation found for each of the 27 cells formed by the combinations of trait, measurement method, and frequency of data collection. Since there was no evidence of drift (Glass, Willson, & Gottman, 1975) within the vast majority of time-series, only average autocorrelations for difference order 0 were calculated. The average autocorrelations by cell for lags 1, 2, and 3 were computed. There were no striking results for lags beyond 1, however, and average autocorrelations by cell for lag 1 appear in Tables 7, 8,

Table 4

Number of Time-Dependent and Non Time-Dependent
Series by Frequency of Data Collection

<u>Frequency</u>	<u>Time-Dependent*</u>	<u>Non Time-Dependent*</u>
7 Times A Week	15 (57.7)	16 [21.9]
3 Times A Week	9 (34.6)	27 [37.0]
1 Times A Week	2 (7.7)	30 [41.1]

Table 5

Number of Time-Dependent and Non Time-Dependent
Series by Trait

<u>Trait</u>	<u>Time-Dependent*</u>	<u>Non Time-Dependent*</u>
Play	14 (53.8)	18 [24.7]
Dominance	5 (19.2)	29 [39.7]
Likes to be Alone	7 (26.9)	26 [35.6]

Table 6

Number of Time-Dependent and Non Time-Dependent
Series by Measurement Method

<u>Method</u>	<u>Time-Dependent*</u>	<u>Non Time-Dependent*</u>
Likert	7 (26.9)	27 [37.0]
Inventory	10 (38.5)	23 [31.5]
Self-Monitor	9 (34.6)	23 [31.5]

Note: In each table, $n = 99$, total time-dependent = 26,
total non time-dependent = 73.

* Numbers in () are percentage of total time-dependent series; numbers in [] are percentage of total non time-dependent series.

and 9. The average autocorrelations for lags 2 and 3 are presented in Appendix E. Since some autocorrelations were negative, both algebraic and absolute value averages are included.

The values of averaged autocorrelations computed by cell ranged from .03 to .53 for absolute value averages and from -.14 to .52 for algebraic averages. The algebraic average autocorrelations for the three frequencies of data collection across trait and method were .32 for seven times a week, .18 for three times, and .06 for one time. Thus, the autocorrelations increased as frequency of observation increased. The algebraic average autocorrelations for the three measurement methods across trait and frequency of data collection were .31 for the personality inventory scales, .15 for the Likert scales, and .10 for the self-monitoring method. Hence, the personality inventory method yielded higher autocorrelations than the other methods, and the autocorrelation for self-monitoring was generally within one standard error of 0.0. The algebraic average autocorrelations for the three traits across the other two variables were .26 for Play, .14 for Dominance, and .16 for Likes to be Alone.

The average autocorrelations were graphed for each of the six two-way combinations of the three independent variables to examine any trends that might be present as a function of trait and measurement method, trait and

Table 7

Average Autocorrelations for Difference Order 0, Lag 1,
by Measurement Method and Frequency of
Data Collection for the Trait Dominance

Frequency	Mean*	Likert	Inventory	Self-Monitor
7X	Algb	.30	.52	.16
	AbsV	.30	.52	.19
3X	Algb	-.05	.24	.08
	AbsV	.19	.24	.10
1X	Algb	-.14	.32	-.14
	AbsV	.14	.38	.28

* The abbreviation Algb stands for algebraic mean and AbsV stands for absolute values mean.

Table 8

Average Autocorrelations for Difference Order 0, Lag 1,
by Measurement Method and Frequency of
Data Collection for the Trait Play

Frequency	Mean*	Likert	Inventory	Self-Monitor
7X	Algb	.41	.52	.29
	AbsV	.41	.53	.29
3X	Algb	.25	.48	.03
	AbsV	.25	.48	.03
1X	Algb	.10	.25	.00
	AbsV	.17	.25	.17

* The abbreviation Algb stands for algebraic mean and AbsV stands for absolute values mean.

Table 9

Average Autocorrelations for Difference Order 0, Lag 1,
by Measurement Method and Frequency of
Data Collection for the Trait Likes to be Alone

Frequency	Mean*	Likert	Inventory	Self-Monitor
7X	Algb	.24	.14	.33
	AbsV	.24	.15	.33
3X	Algb	.17	.19	.25
	AbsV	.19	.24	.25
1X	Algb	.12	.15	-.13
	AbsV	.32	.26	.15

* The abbreviation Algb stands for algebraic mean and AbsV stands for absolute values mean.

frequency of data collection, or measurement method and frequency of observation. The graphs of the algebraic average autocorrelations are presented in Figures 1-6. The graphs of the absolute value average autocorrelations showed similar trends, but less distinctly, and are included in Appendix F.

The algebraic sums of autocorrelations for measurement method and frequency of data collection were averaged across traits. Figure 1 shows that the measurement method employing the scales of personality inventories yielded a higher average autocorrelation than Likert scale and self-monitoring methods for each frequency of data collection.

Figure 2 shows that average autocorrelations were higher the more frequently data was collected, regardless of the measurement method used.

Figures 3 and 4 are the graphs of the algebraic sums of autocorrelations for trait and frequency of data collection averaged across measurement method. Again, average autocorrelations were greater when the frequency of data collection was greater. In this instance, however, the trait showed no effect (see Figure 3).

Figure 4 shows that average autocorrelations were influenced by trait, with the autocorrelations for the trait Play being greater than the two other traits regardless of

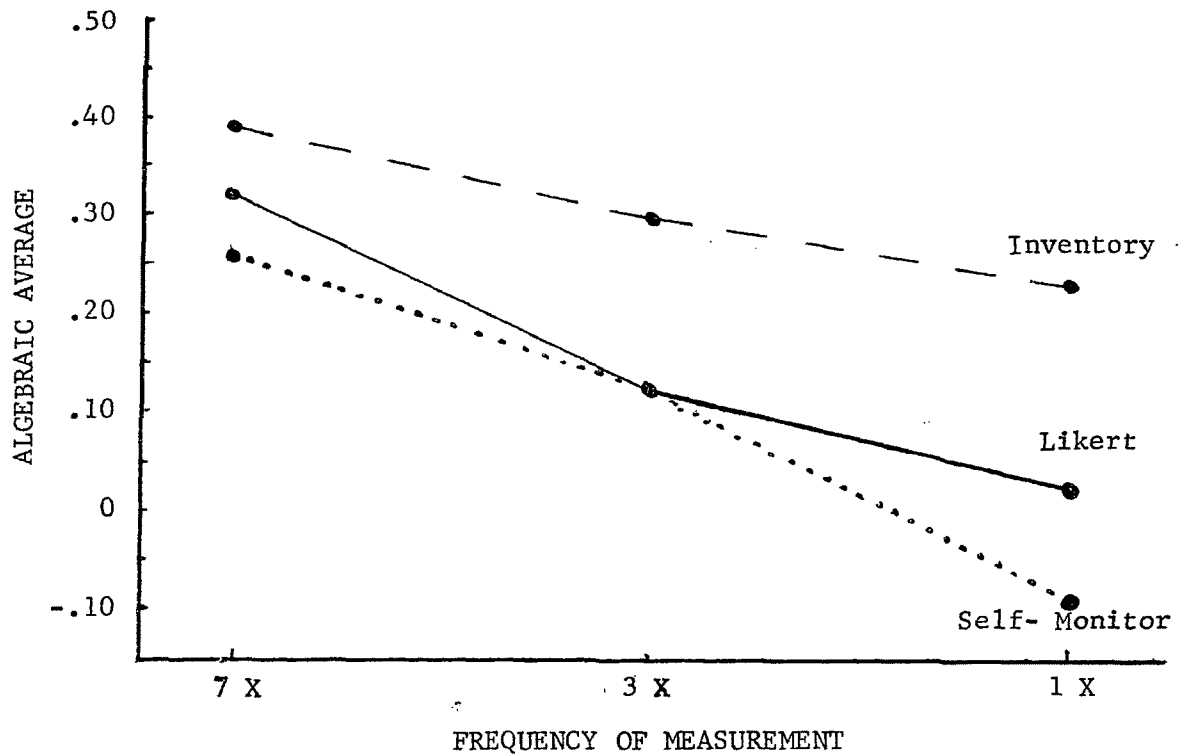


Figure 1. Autocorrelations for Measurement Method Averaged Across Traits by Frequency of Data Collection.

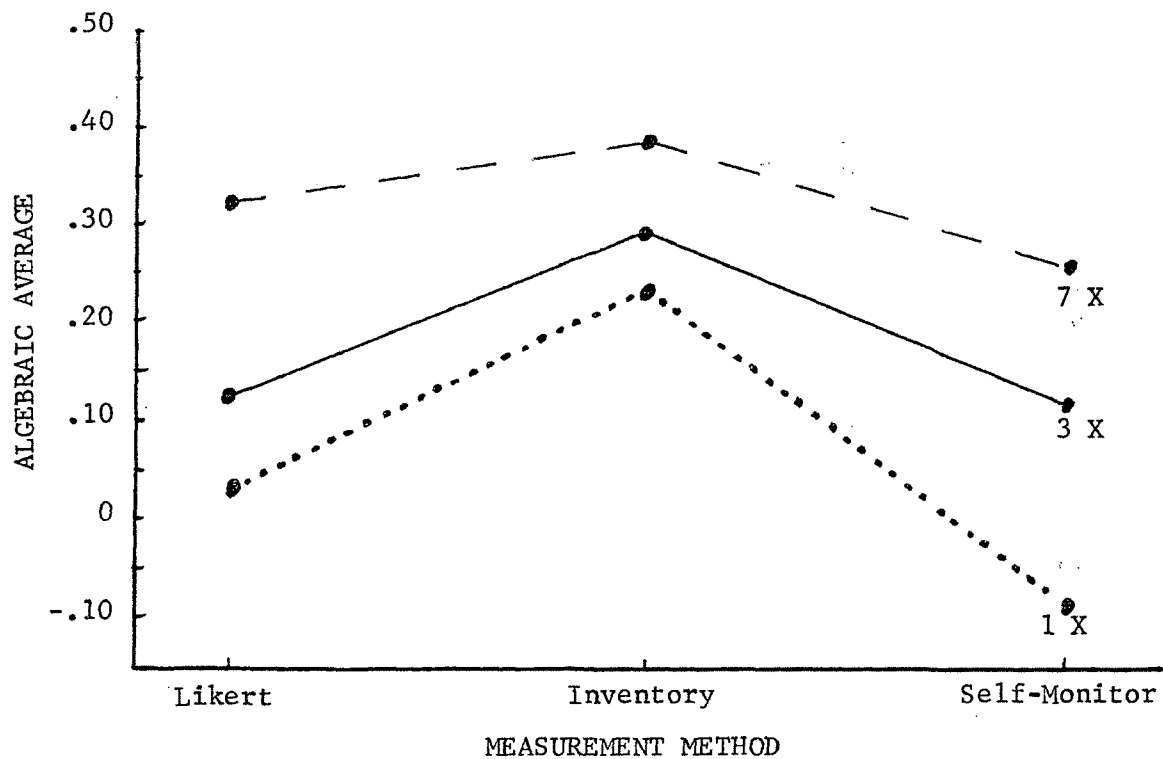


Figure 2. Autocorrelations for Frequency of Measurement Averaged Across Traits by Measurement Method.

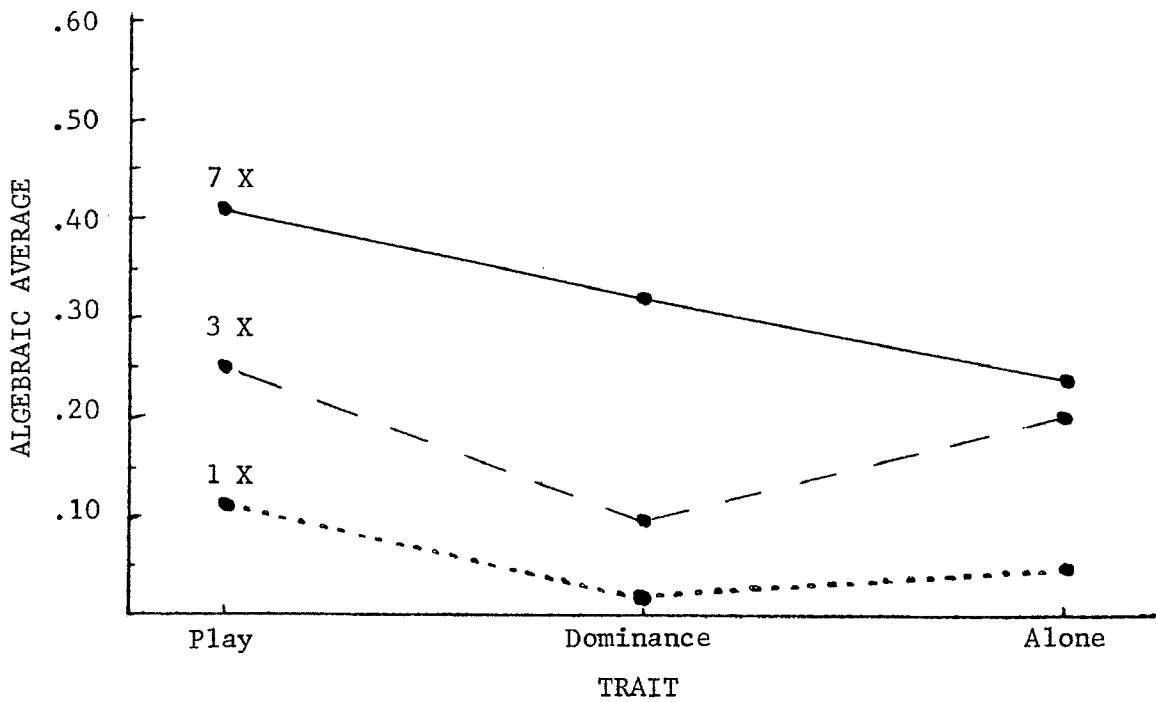


Figure 3. Autocorrelations for Frequency of Data Collection Averaged Across Measurement Method by Trait.

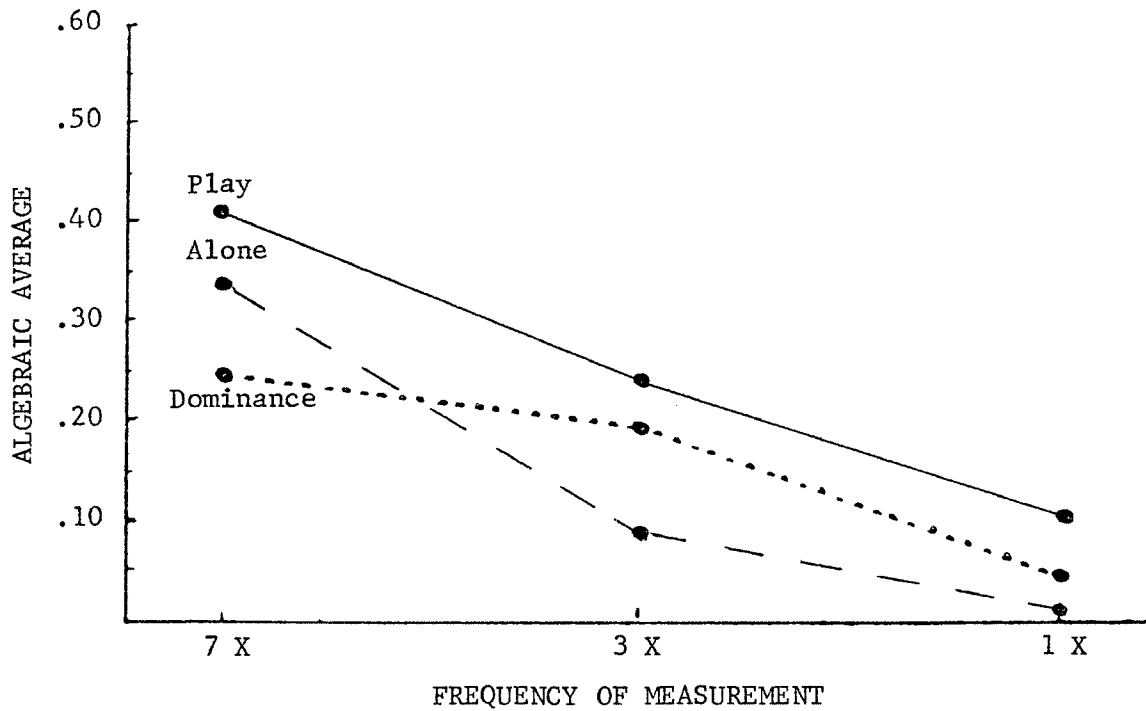


Figure 4. Autocorrelations for Trait Averaged Across Measurement Method by Frequency of Data Collection.

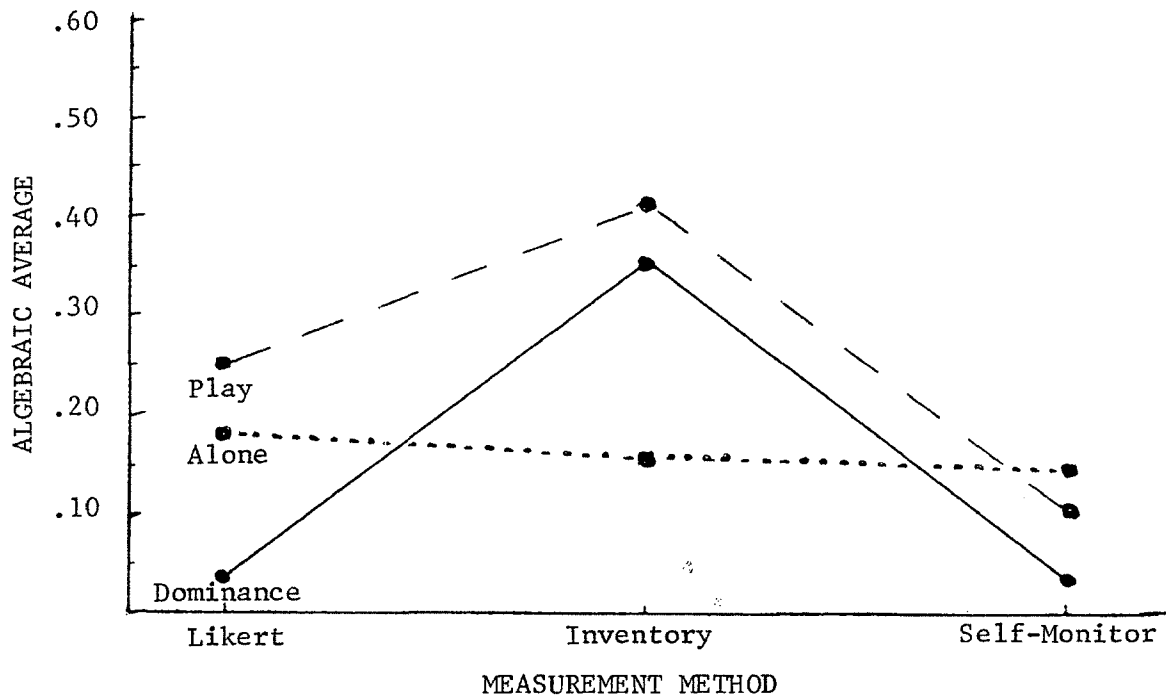


Figure 5. Autocorrelations for Trait Averaged Across Frequency of Data Collection by Measurement Method.

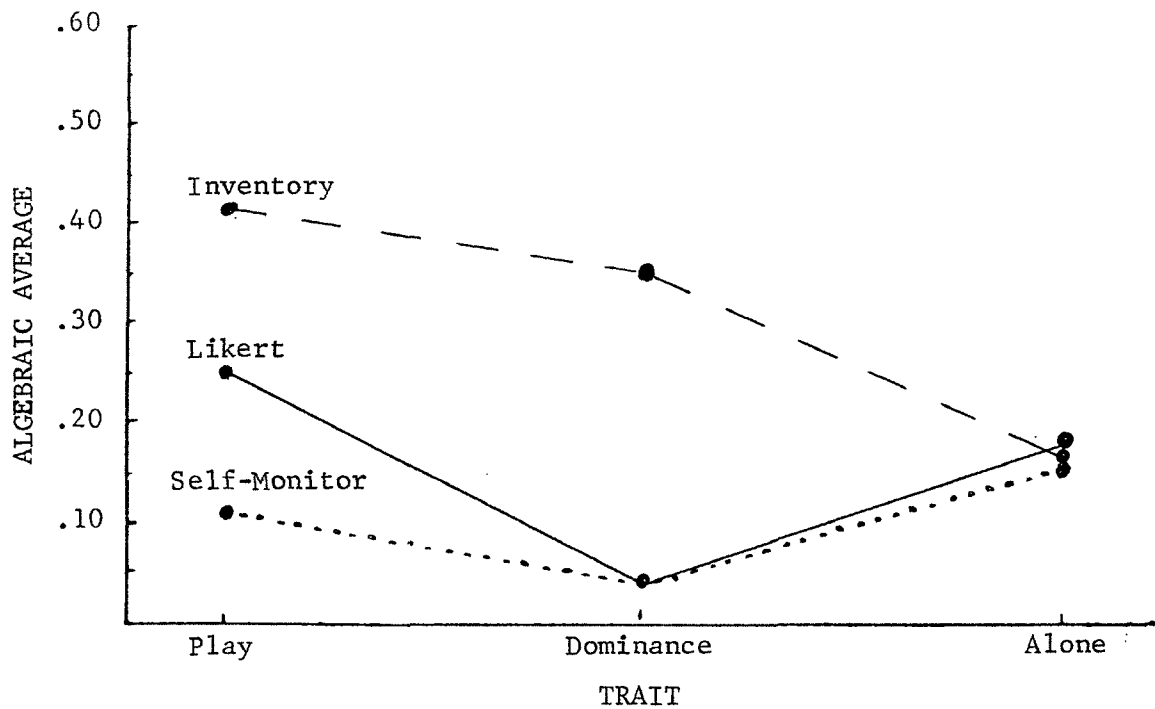


Figure 6. Autocorrelations for Measurement Method Averaged Across Frequency of Data Collection by Trait.

the frequency of data collection.

In figures 5 and 6, the algebraic averages of the autocorrelations for trait and measurement method are graphed. The relationship between these two variables is less distinct than the previously mentioned relationships. From Figure 5, it appears that the personality inventory method resulted in higher autocorrelations on the traits of Play and Dominance, but measurement method made little difference in the magnitudes of the autocorrelations when averaged over frequency of data collection for the trait Likes to be Alone.

Figure 6 shows that the algebraic average autocorrelations for inventory scales tended to be higher across traits, with the exception of Play, for which all methods produced moderately high autocorrelations.

DISCUSSION

The primary objective of this study was to identify the type of time-series model that best described data recorded on several traits as measured by several methods at different time intervals. It was hypothesized that the majority of the resulting time-series would be identifiable as a type of time-dependent model rather than being non time-dependent.

This was based on the assumption that whatever influences behavior, be it personological factors, environmental factors, or the interaction of the two, does so in a systematic manner. However, the finding that three-quarters of the time-series were not time-dependent suggests that, in general, neither personological nor environmental factors exerted a systematic influence on what was measured. Furthermore, any interaction of person and environment was generally not a systematic, predictable one. Thus, the ideas presented about trait and environmental factors and their possible organization across time did not receive empirical support.

The broad implication of this research is that behavior, or at least data as measured by varieties of self-report methods, cannot be predicted to a high degree from personal dispositions or past experiences. Hence, application of the methodology of time-series analysis leads

to the same conclusions reviewers (e.g. Bowers, 1973; Endler & Magnusson, 1976; Sarason, Smith, & Deiner, 1975) of more traditional research methods, such as correlational, factor analytic, and partitioning of variance, have reached--both the trait and situationist conceptualizations of personality are largely untenable positions.

Nevertheless, 26 of 99 time-series were identifiable as fitting time-dependent models. Furthermore, measurements across time were found to be correlated to a modest degree. Both findings are somewhat encouraging when the breadth of the study is considered. This was not a tightly controlled laboratory study, but rather one in which subjects experienced minimal interruption of their lives and essentially no experimental constraints on their behavior while recording data over a five month period. In addition, this research was certainly not exempt from the potential influence of contextual effects, ranging from extremes in weather to changing work and school schedules, on subjects' responses. Thus, considering the lack of controlled conditions, the wide range of situations a subject could encounter in five months, and the frequent finding of situational specificity of behavior reported in the literature, the magnitude of the autocorrelations in some of the cells is actually quite remarkable. In fact, five of the nine cells for the data collected seven times a week had average autocorrelations greater than .30, a barrier rarely broken in correlational studies of behavioral consistency

(Mischel, 1968). In this regard, this research has implications with respect to the methodological conditions which may facilitate the study of behavior that is time-dependent and thus predictable to some extent. When the number of time-dependent series was examined as a function of the frequency of data collection, a distinct pattern emerged. Results indicated that as the frequency of observation increased, the number of time-dependent series increased. In fact, almost half (15 of 31) of all the time-series generated under the daily data collection condition were identified as time-dependent. This strongly suggests that the more frequently measurements are taken, the more likely this series of measurements will be time-dependent.

Apparently, a relatively frequent sample of behavior is necessary for a pattern of time-dependence to become evident. Conversely, if measurements are taken at relatively infrequent intervals, it is unlikely that later observations can be predicted from earlier ones. This is similar to the difficulties encountered in prediction when limited behaviors are sampled and then correlated with test measures (Epstein, 1980). In both cases, there is simply not enough data to connect the different components in a meaningful way, unless the relationship is extremely robust.

This research also suggests that the choice of what is measured makes a difference in whether or not a series of data points is time-dependent in a predictable pattern. The present study found more time-dependent series (14) for the trait Play than for the other two traits combined (12).

This implies that Play was a more predictable characteristic than Dominance or Likes to be Alone in the population sampled. A finding that some "traits" may be more consistent than others has been supported in other research. Bem and Allen (1974) found that they were able to predict "some of the people, some of the time" if they measured a dimension on which subjects considered themselves consistent. Kenrick and Stringfield (1980) have also suggested that individuals may indeed be consistent on some dimensions but not on others. Considering this, the finding that Play yielded more time-dependent series than the other traits may be a result of the population used. College subjects, taken as a group, may simply be more predictable on the amount they play than on other dimensions. Other dimensions, such as Dominance and Likes to be Alone, may show greater time-dependence for individuals in different populations.

Regarding the method of measurement, it is interesting to note that although there were no significant differences in time-dependence due to method, the personality inventory consistently yielded higher autocorrelations than the Likert

scale and self-monitoring methods. Bowers (1973) suggested that research employing self-report measures tended to yield greater person effects than studies using behavioral observation measures. Perhaps personality inventories are most subject to this bias, tapping a domain in a manner resistant to reflecting changes that occur over time.

Sarason, Smith, & Diener (1975) stated that the development of a better methodology to study situational and dispositional variables concurrently was a more important issue than the relative potency of one over the other. In spite of the lack of support for the major hypotheses, this research suggests that time-series analysis may contribute to such a methodology. However, future research on trait stability using the time-series methodology might have greater success at generating more time-dependent series if consideration is given to the dimension chosen and the frequency of its measurement. A greater frequency of data collection, perhaps even several times daily, on a dimension thought to be consistent for the individual or population, could be expected to yield more time-dependent models and thus allow a degree of predictive accuracy.

SUMMARY

Within traditional personality theory, the trait model has probably been the most influential in terms of generating research. However, even with refined measurement instruments, interpretations and conclusions about personality trait theory have been limiting and unsatisfactory. Inadequacies in trait theories of personality have led to the development of interactional personality theories. These view the determination of behavior to be a function of the person, the situation, and the interaction of the two.

Three research strategies have been employed in the effort to shed light on the issue of consistency of behavior across situations. These empirical approaches are the correlational study, factor analytic study, and analysis of variance study. However, the empirical evidence generated by these research strategies has not given unequivocal support to any of the conceptualizations of personality.

In the present study, time-series analysis was employed to investigate the consistency of behavior across situations. It is possible to specify a time-series model for examining changes in observations over time which allows one to attribute change to purely personological factors, to more purely environmental factors, or to a specific interaction of person and environment.

In this study, 99 subjects recorded data for up to 20 weeks. Observations for a particular individual were recorded on a single trait, measured by a single method at regular time intervals. However, across individuals, a variety of traits were examined by several different measurement methods, and measurements were taken at several different time intervals. Hence, the time-series varied on trait, method, and time period. The traits chosen were Play, Dominance (Jackson, 1967), and Likes to be Alone (Edwards, 1967). The measurement methods used were a seven point Likert scale, the appropriate scale from a personality inventory, and self-monitoring. The frequencies of data collection were one time a week, three times a week, and seven times a week. Observations were taken in a manner designed to disturb the individual as little as possible. No attempts were made to change an individual's attitudes or behavior.

It was hypothesized that the resulting time-series would, in general, be time-dependent and identifiable as models implying a particular conceptualization of personality, rather than being non time-dependent. It was further hypothesized that the models describing all these series would, for the most part, be the same. Each time-series was statistically analyzed using the Box-Jenkins (1970) method as described by Glass, Willson, and Gottman (1975) to determine the most descriptive model for the observations. Their TIMSRX computer program was used to

conduct the analysis.

The major hypothesis that the time-series would in general be identifiable as time-dependent models, rather than non time-dependent, was not supported. Of 99 time-series, 26 were identified as fitting time-dependent models, and the remaining 73 were non time-dependent. This finding suggests that, in general, neither personological nor environmental factors exerted a systematic influence on what was measured. Furthermore, any interaction of person and environment was generally not a systematic, predictable one. The broad implication of this research is that behavior, or at least data as measured by varieties of self-report methods, cannot be predicted to a high degree from personal dispositions or past experiences.

Nevertheless, 26 of 99 time-series were identifiable as fitting time-dependent models. Furthermore, measurements across time were found to be correlated to a modest degree. Both findings are somewhat encouraging when the breadth of the study is considered. In this regard, this research has implications with respect to the methodological conditions which may facilitate the study of behavior that is time-dependent and thus predictable to some extent. Calculation of chi squared statistics indicated significant differences in time-dependence versus non-time dependence for both trait and frequency of data collection independent variables. It was found that as the frequency of

observation increased, the number of time-dependent series increased. Apparently, a relatively frequent sample of behavior is necessary for a pattern of time-dependence to become evident. Also, significantly more time-dependent series were found for the trait Play than for the other two traits. This suggests that the choice of what is measured makes a difference in whether or not a series of data points is time-dependent in a predictable pattern. Therefore, future research on trait stability using the time-series methodology might have greater success at generating more time-dependent series if consideration is given to the dimension chosen and the frequency of its measurement.

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APPENDIX A

Materials Used To Measure "Likes To Be Alone"

1. E.P.I.--Form IA, Scale M

Assume that those persons who know you best have been able to observe you the past 24 hours. Mark each statement True or False to indicate the answer that most of these people would give if asked to describe your actions during the past 24 hours.

- 1-10 He is quite content to spend an evening alone watching television.
- 2-29 He becomes depressed if he is separated from his friends for any length of time.
- 3-41 He likes to be alone with his thoughts whenever possible.
- 4-60 He has a number of hobbies he can work on alone that keep him busy during spare time.
- 5-72 He dislikes going to a movie by himself.
- 6-103 He doesn't depend on the company of others to keep from being bored.
- 7-134 He likes to work on a project by himself.
- 8-165 He is completely happy spending an evening alone reading an interesting book.
- 9-181 He has periods during which he wants to be alone.
- 10-196 He spends most of his spare time doing things with others.
- 11-212 He understands something better by studying it alone than by discussing it with others.
- 12-227 He is happiest when relaxing with a group of friends.
- 13-243 He doesn't seem to be able to enjoy himself when he is alone.
- 14-258 He has no desire to have many close personal friends.
- 15-274 He likes to take walks by himself.
- 16-289 He likes to do things that require the participation of others.

2. Likert Scale--Likes To Be Alone

Likes to be alone: People who display a great amount of this trait are ones who spend time alone with their thoughts and are content when spending an evening alone watching television. Such people work on projects or hobbies alone and don't depend on the company of others to keep from being bored. They are happy spending an evening alone reading a book and take walks by themselves. They are not depressed when friends aren't around and do not mind engaging in activities such as shopping, eating, or going to a movie, alone.

Keeping in mind the characteristics of people who "like to be alone," think about how often you tried to be alone and/or enjoyed being alone during the past 24 hours. Rate how much you have "liked to be alone" during the past 24 hours by circling one of the numbers on the scale below.

1-----	2-----	3-----	4-----	5-----	6-----	7-----
Very much disliked being alone	Disliked somewhat			Liked somewhat		Very much liked being alone

3. Self-Monitoring--Likes To Be Alone

Tally the number of times you have done or felt the following.

1. I spent spare time doing something alone and was content to do so (such as watching television, working on a hobby, reading for pleasure, listening to music, just relaxing, going to a movie or concert).
2. I did something in order to be alone with my thoughts (such as taking a walk, going for a drive).
3. I did something by myself even though it would have been relatively easy to do it with others (such as walking to class, studying, eating meals, jogging, or shopping alone).
4. When doing something with friends, I felt that I'd really prefer to be alone.
5. Any other times I was alone and didn't feel particularly bored or depressed about it.

APPENDIX B

Materials Used To Measure "Play"

1. P.R.F.--Form AA, "play" Scale

Answer True or False to the following items based on what you have felt and done during the past 24 hours.

- 1-16 I feel that adults who still like to play have never really grown up.
- 2-38 I love to tell, and listen to, jokes and funny stories.
- 3-60 I consider most entertainment to be a waste of time.
- 4-82 I enjoy parties, shows, games--anything for fun.
- 5-104 When I have a choice between work and enjoying myself, I usually work.
- 6-126 Once in a while I enjoy acting as if I were tipsy.
- 7-148 I only celebrate very special events.
- 8-170 Most of my spare moments are spent relaxing and amusing myself.
- 9-192 Practical jokes aren't at all funny to me.
- 10-214 I like to go "out on the town" as often as I can.
- 11-236 I prefer to read worthwhile books rather than spend my spare time playing.
- 12-258 I spend a good deal of my time just having fun.
- 13-280 Most of my friends are serious-minded people.
- 14-302 I like to watch television comedies.
- 15-324 People consider me a serious, reserved person.
- 16-346 If I didn't have to earn a living, I would spend most of my time just having fun.
- 17-368 I usually have some reason for the things I do rather than just doing them for my own amusement.
- 18-390 I delight in playing silly little tricks on people.
- 19-412 I would prefer a quiet evening with friends to a loud party.
- 20-434 Things that would annoy most people seem humorous to me.

2. Likert Scale--Play

Play: People who display a great amount of this trait are ones who do many things "just for fun." They spend a good deal of time participating in games, sports, social activities, and other amusements. They enjoy jokes and funny stories and maintain a light-hearted, easy-going attitude toward life.

Keeping in mind the characteristics of "playful" people, think about how playful you have been during the past 24 hours. Rate how "playful" you have been during the past 24 hours by circling one of the numbers on the scale below.

1-----2-----3-----4-----5-----6-----7
 Not playful Somewhat playful Quite playful Very playful

3. Self-Monitoring--Play

Tally the number of times you have done the following.

1. I told or listened to a funny story or joke.
2. I played a trick or practical joke on someone.
3. I went to a party or "out on the town" (such as going to a movie, out for dinner or drinks).
4. I participated in a game, sport, or some other amusement.
5. I spent time relaxing or kidding around with friends.
6. I watched a television comedy show.
7. Something struck me as humorous today that most people would consider serious.
8. Other things I did just for fun.

APPENDIX C

Materials Used To Measure "Dominance"

1. P.R.F.--Form AA, "Dominance" Scale

Answer True or False to the following items based on what you have felt and done during the past 24 hours.

- 1-19 I would enjoy being a club officer.
- 2-33 I try to control others rather than permit them to control me.
- 3-97 I feel confident when directing the activities of others.
- 4-141 I am quite good at keeping others in line.
- 5-185 I seek out positions of authority.
- 6-229 When I am with someone else, I do most of the decision making.
- 7-273 When two persons are arguing, I often settle the argument for them.
- 8-317 If I were in politics, I would probably be seen as one of the forceful leaders of my party.
- 9-361 I try to convince others to accept my political principles.
- 10-405 With a little effort, I can "wrap most people around my little finger".
- 11-31 I am not very insistent in an argument.
- 12-75 I have little interest in leading others.
- 13-119 I would make a poor judge because I dislike telling others what to do.
- 14-163 Most community leaders do a better job than I could possibly do.
- 15-207 I think it is better to be quiet than assertive.
- 16-251 I would make a poor military leader.
- 17-295 I would not do well as a salesman because I am not very persuasive.
- 18-339 I feel incapable of handling many situations.
- 19-383 I would not want to have a job enforcing the law.
- 20-427 I don't have a forceful or dominating personality.

2. Likert Scale--Dominance

Dominance: People who display a great amount of this trait are ones who attempt to control their environment. They attempt to influence or direct other people and they express opinions forcefully. They enjoy the role of leader and may assume it spontaneously.

Keeping in mind the characteristics of people who display "dominance," think about how dominant you have been during the past 24 hours. Rate how "dominant" you have been during the past 24 hours by circling one of the numbers on the scale below.

1-----2-----3-----4-----5-----6-----7
 Not dominant Somewhat dominant Quite dominant Very dominant

3. Self-Monitoring--Dominance

Tally the number of times you have done the following.

1. My opinion or suggestion prevailed over someone else's.
2. Without being asked, I told someone what to do or how to do something.
3. I made the decision about what a group of friends and I would do.
4. I settled an argument today.
5. Other acts of dominance.

APPENDIX D

Table 10

Classifications of Time-Series by
Measurement Method and Frequency of
Data Collection for the Trait Dominance

Frequency	Model*	Likert	Inventory	Self-Monitor
7X	AR	1	0	1
	MA	0	2	0
	NTD	3	1	2
3X	AR	0	0	0
	MA	0	0	0
	NTD	4	4	4
1X	AR	0	0	0
	MA	0	0	1
	NTD	4	5	2

* The abbreviation AR stands for autoregressive, MA stands for moving averages, and NTD stands for non time-dependent.

Table 11

Classifications of Time-Series by
Measurement Method and Frequency of
Data Collection for the Trait Play

<u>Frequency</u>	<u>Model*</u>	<u>Likert</u>	<u>Inventory</u>	<u>Self-Monitor</u>
	AR	0	1	0
7X	MA	2	1	4
	NTD	1	1	0
<hr/>				
	AR	0	1	0
3X	MA	2	2	0
	NTD	3	0	4
<hr/>				
	AR	0	1	0
1X	MA	0	0	0
	NTD	3	3	3
<hr/>				

*The abbreviation AR stands for autoregressive, MA stands for moving averages, and NTD stands for non time-dependent.

Table 12

Classifications of Time-Series by
Measurement Method and Frequency of
Data Collection for the Trait Likes to be Alone

Frequency	Model*	Likert	Inventory	Self-Monitor
	AR	0	0	0
7X	MA	1	0	2
	NTD	3	3	2
<hr/>				
	AR	0	0	1
3X	MA	1	2	0
	NTD	3	2	3
<hr/>				
	AR	0	0	0
1X	MA	0	0	0
	NTD	3	4	3
<hr/>				

* The abbreviation AR stands for autoregressive, MA stands for moving averages, and NTD stands for non time-dependent.

APPENDIX E

Table 13

Average Autocorrelations for Difference Order 0, Lag 2,
by Measurement Method and Frequency of
Data Collection for the Trait Dominance

Frequency	Mean*	Likert	Inventory	Self-Monitor
7X	Algb	.25	.50	.24
	AbsV	.25	.50	.24
3X	Algb	.13	.08	.06
	AbsV	.13	.11	.52
1X	Algb	-.14	.16	-.15
	AbsV	.29	.19	.15

* The abbreviation Algb stands for algebraic mean and AbsV stands for absolute values mean.

Table 14

Average Autocorrelations for Difference Order 0, Lag 2,
by Measurement Method and Frequency of
Data Collection for the Trait Play

Frequency	Mean*	Likert	Inventory	Self-Monitor
7X	Algb	.11	.48	.11
	AbsV	.11	.48	.11
3X	Algb	.08	.40	.04
	AbsV	.13	.40	.12
1X	Algb	.05	.13	.14
	AbsV	.06	.21	.14

*The abbreviation Algb stands for algebraic mean and AbsV stands for absolute values mean.

Table 15

Average Autocorrelations for Difference Order 0, Lag 2,
by Measurement Method and Frequency of
Data Collection for the Trait Likes to be Alone

Frequency	Mean*	Likert	Inventory	Self-Monitor
7X	Algb	.09	.07	.15
	AbsV	.15	.09	.17
3X	Algb	.10	.11	.12
	AbsV	.10	.18	.13
1X	Algb	.10	.24	-.17
	AbsV	.21	.24	.17

* The abbreviation Algb stands for algebraic mean and AbsV stands for absolute values mean.

Table 16

Average Autocorrelations for Difference Order 0, Lag 3,
by Measurement Method and Frequency of
Data Collection for the Trait Dominance

Frequency	Mean*	Likert	Inventory	Self-Monitor
7X	Algb	.19	.47	.18
	AbsV	.19	.47	.18
3X	Algb	.04	.11	-.05
	AbsV	.04	.11	.08
1X	Algb	-.12	.13	-.10
	AbsV	.12	.27	.22

* The abbreviation Algb stands for algebraic mean and AbsV stands for absolute values mean.

Table 17

Average Autocorrelations for Difference Order 0, Lag 3,
by Measurement Method and Frequency of
Data Collection for the Trait Play

Frequency	Mean*	Likert	Inventory	Self-Monitor
7X	Algb	.00	.41	.12
	AbsV	.04	.41	.17
3X	Algb	.00	.28	.19
	AbsV	.11	.28	.19
1X	Algb	-.12	.20	-.01
	AbsV	.12	.20	.24

* The abbreviation Algb stands for algebraic mean and AbsV stands for absolute values mean.

Table 18

Average Autocorrelations for Difference Order 0, Lag 3,
by Measurement Method and Frequency of
Data Collection for the Trait Likes to be Alone

Frequency	Mean*	Likert	Inventory	Self-Monitor
7X	Algb	.06	.13	.07
	AbsV	.08	.14	.07
3X	Algb	.04	.15	.17
	AbsV	.10	.15	.21
1X	Algb	-.14	.12	.06
	AbsV	.14	.25	.17

* The abbreviation Algb stands for algebraic mean and AbsV stands for absolute values mean.

APPENDIX F

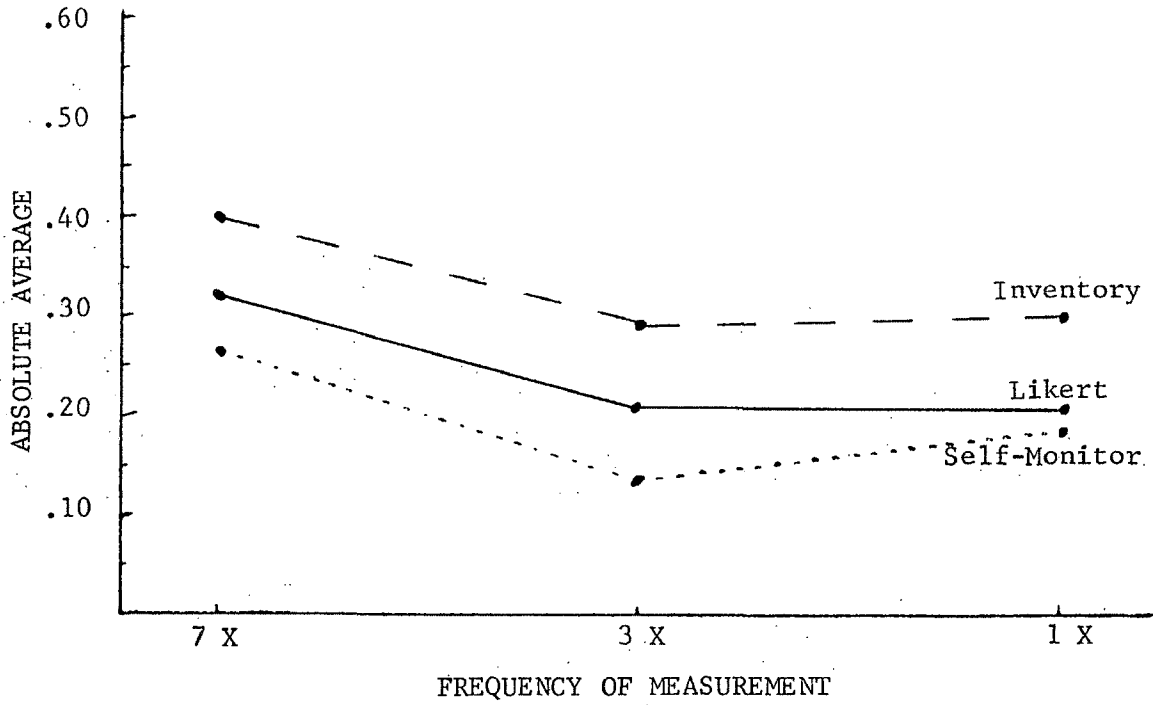


Figure 7. Autocorrelations for Measurement Method Averaged Across Traits by Frequency of Data Collection.

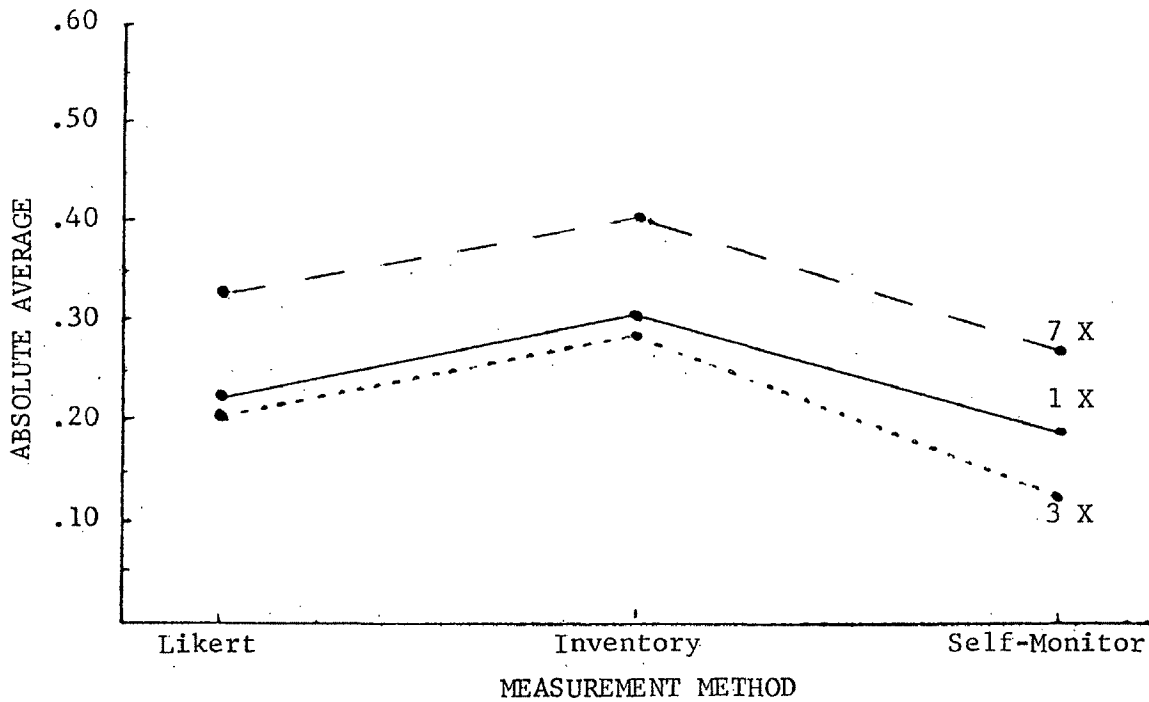


Figure 8. Autocorrelations for Frequency of Measurement Averaged Across Traits By Measurement Method.

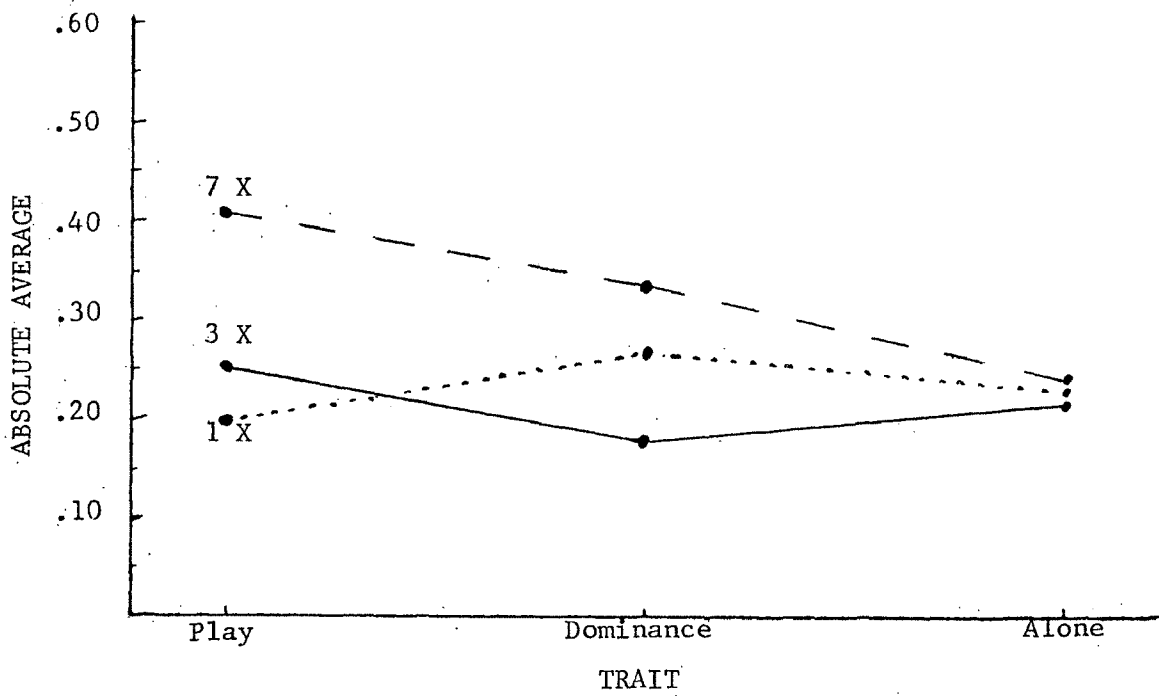


Figure 9. Autocorrelations for Frequency of Data Collection Averaged Across Measurement Method by Trait.

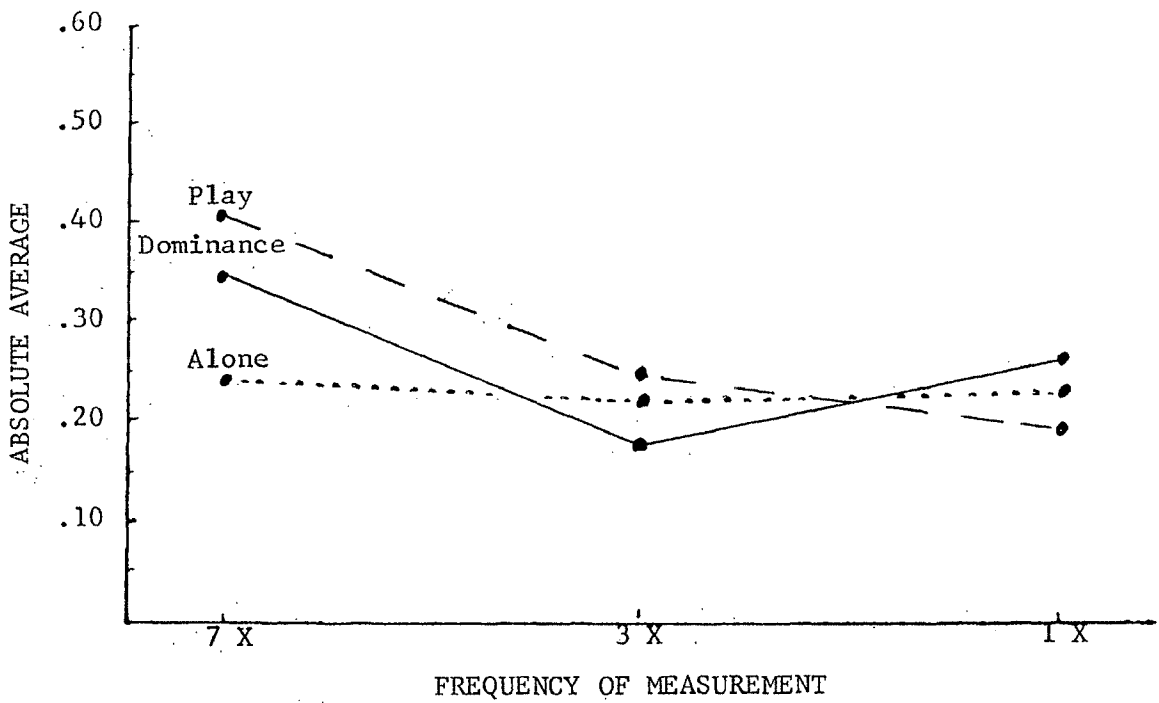


Figure 10. Autocorrelations for Trait Averaged Across Measurement Method by Frequency of Data Collection.

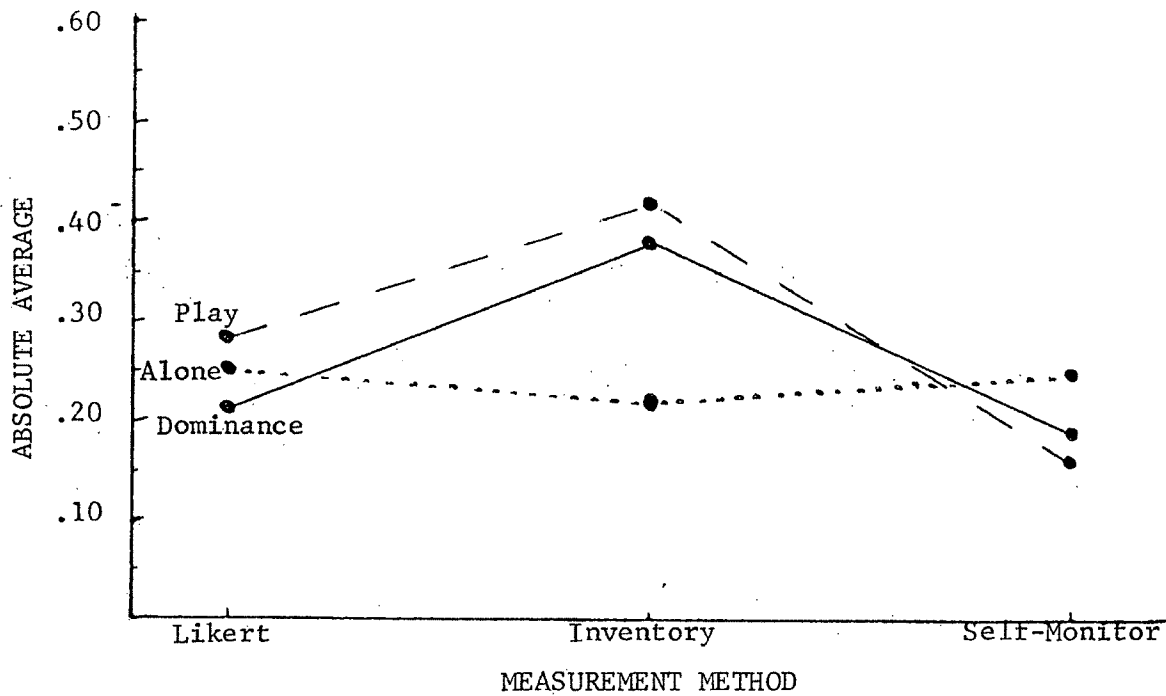


Figure 11. Autocorrelations for Trait Averaged Across Frequency of Data Collection by Measurement Method.

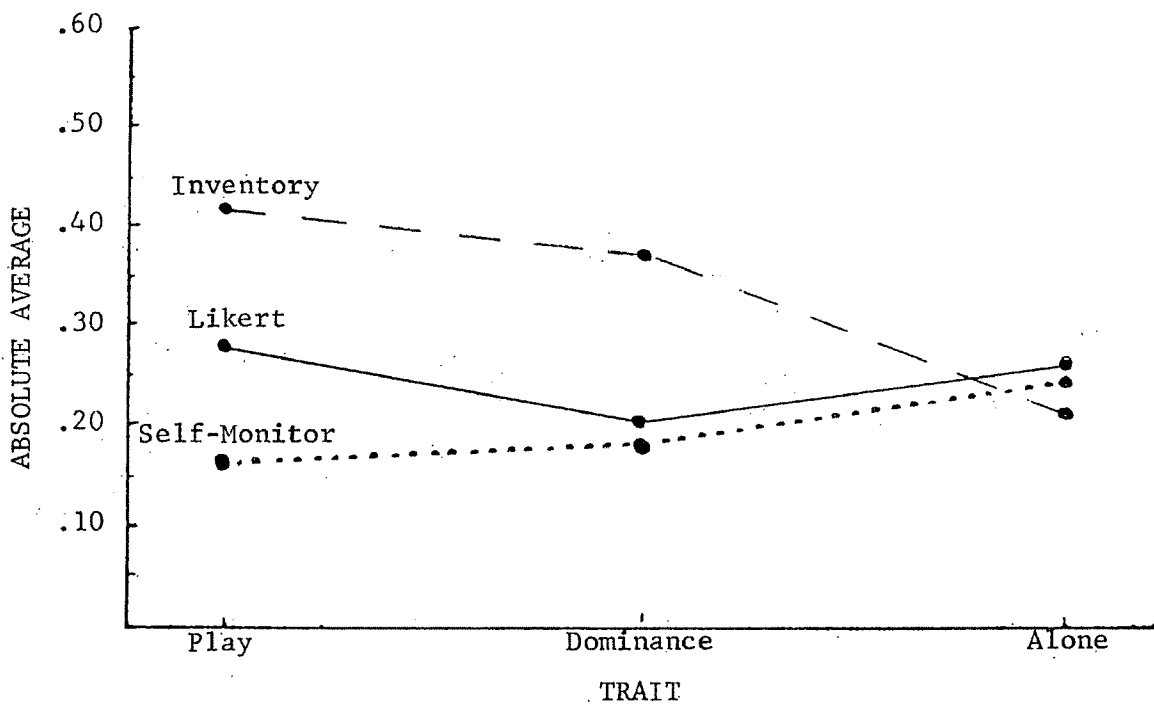


Figure 12. Autocorrelations for Measurement Method Averaged Across Frequency of Data Collection by Trait.