PERSONALITY STRUCTURE, GROUP COMPOSITION, AND GROUP FUNCTIONING

By

Bruce W. Tuckman

Princeton University

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Bruce W. Tuckman
Princeton University

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Abstract

The problem investigated was the relation between the level of cognitive abstractness of the members of groups composed homogeneously and the behaviors of such groups. It was hypothesized that differences in behavior and performance between groups of different composition were predictable on the basis of the theory used for classifying individuals.

Thirty-six Princeton University male graduate students were selected for this study from a sample of 64 volunteers, all of whom were given a battery of tests to determine the level of abstractness of their personality structures. The participants were classified, on the basis of these tests, into one of four personality systems as described by the theory of Harvey, Hunt, and Schroder. Individuals not readily classifiable were rejected.

The systems postulated by the above authors are laid out on a concrete-abstract continuum where concrete and abstract refer to the level of cognitive complexity (i.e., potential for differentiation and integration of inputs) of

the individual. The systems are labelled as I, II, III, and IV where System I is the most concrete and System IV the most abstract. System I individuals seek to avoid diversity and complexity, and typically utilize external rules and authorities for the resolution of ambiguity. System II individuals develop the "self-not self" distinction (a primitive concept) and seek to avoid external control. System III individuals develop superordinate "matching" schema that enable them to be sensitive to the behavior of others, and seek to avoid interpersonal rejection. System IV individuals can generate new higher order schema for combining information, and seek to process environmental information without interpersonal constraint.

Twelve three-man teams were composed so that each personality system was represented by three homogeneous teams. The teams played a simulated stock market game involving a number of complex inputs. Trained personnel observed the teams and coded and rated certain of their behaviors.

As predicted, the level of abstractness of the interpersonal organization, or structure, adopted by the teams was a function of the level of abstractness of the members. Teams of more concrete individuals adopted structures which limited

or eliminated diversity from the environment (or from within the team). Teams of more abstract individuals adopted structures which enabled diversity to be experienced.

Also, as predicted, more concrete teams used decision mechanisms which eliminated the possibility of diversity, while more abstract teams used decision mechanisms which fostered diversity.

As predicted, more abstract teams sought more information, played a more active game, and used more abstract strategies in approaching the game than did the more concrete teams.

It was concluded that dispositional factors are major determinants of group behavior and worthy of intensive study. On the basis of pre-knowledge of individual personality structure, and using groups composed homogeneously, it was possible to predict quite accurately a number of group behaviors. It was demonstrated that groups of different composition behave differently (such differences being systematic), and that a theory of individual personality, such as the one employed in this study, yields highly predictive results. Abstractness of individual personality structure, and consequent abstractness of group structure, appear to be meaningful dimensions.

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Chapter 1

INTRODUCTION

The scientific study of group composition is a relatively new field in which many different approaches are possible. Basically, a study of group composition attempts to demonstrate that measuring the personalities of individuals and combining them in particular ways in forming groups (for present purposes - homogeneously) will enable the designer to successfully predict some aspect of the behavior of the resultant groups. Such predictions would be based on the particular personality combinations existing in the group. Thus, a group composition study tests the validity of the personality theory used to classify individuals, the general hypothesis that group behavior is a function of the kind and combination of individuals in the group, and predictions concerning specific behaviors to be expected from such a combination.

Group composition studies are concerned with examining dispositional factors affecting the group and the particular nature of these effects. The question typically asked has been: If groups made up of individuals who are specifiably similar or specifiably different are placed in the

same environment and faced with the same problem, will there be any systematic differences between the behaviors of these groups?

Accordingly, the study of group composition must concern itself with four problems, namely: 1) the manner of classifying the individual members; 2) the method of composing the groups; 3) the nature of the group task; 4) the aspects of group behavior to be measured.

The study described herein was concerned with examining specific differences in interpersonal behavior and task performance between groups whose members were similar to one another but different from the members of other groups. The manner of classifying individuals was on the basis of their degree of cognitive complexity or abstractness using the theory originated by Harvey, Hunt, & Schroder (1961). Four groups of subjects differing in level of integrative complexity of schema for organizing interpersonal stimuli were used in this study. Groups were composed of individuals homogeneous with respect to personality structure.

The group task was the SOBIG stock market game (cf. Kennedy, 1962) which represented a simulation of actual market conditions in which teams competed for profits. A number of group measurements were taken in the areas of interpersonal relations and game performance.

It was predicted that groups composed of members with different levels of integrative complexity (as determined by a battery of personality tests) would display systematically different interpersonal behaviors and game behaviors, in accord with theoretical concepts relating personality structure and group organization (cf. Schroder, and Harvey, 1963).

A Review of Relevant Literature

Since a group composition study requires the specification of four interrelated problems, it is not surprising to find a lack of standardization in the literature. Individual classification criteria are different from study to study as are group tasks. Although the diversity of group behavior measurements from study to study is not quite as great, classification is still difficult. In order to attempt to systematize the literature, the method of group composition was adopted as the most significant variable in that it helps break down the studies into meaningful classes.

The following four different approaches to group composition have been used in previous research: 1) composition based on all member combinations, 2) composition based

on member preferences, 3) homogeneous vs. heterogeneous composition, and 4) homogeneous of one type composition vs. homogeneous of another type composition. The present study falls into the last category, and this category will be most closely examined.

Composition based on all member combinations

Composition based on all possible combinations was utilized by Rosenberg, Erlick, and Berkowitz (1955) to demonstrate an assembly effect, i.e., that some combinations of participants perform better than other combinations. Using a problem-solving task, they demonstrated an assembly effect and suggested that "similarity" of group members might be the factor accounting for this effect.

Chapman, and Campbell (1957) assembled all possible triads from a group of individuals selected to be either low in authoritarianism and dominance or high in authoritarianism and dominance. They found no differences in performance on either a verbal or motor coordination task between any of the triads. However, the relatively short duration of the group tasks raises the question as to whether these authors were dealing with organized group phenomena as opposed to individual repetitive performances.

This class of investigations leads to the conclusion

that group assembly variables may be expected to influence performance.

Composition based on member preferences

In the studies of group composition based on mutual perference (i.e., participants mutually choose their own team members), it was found that groups composed on the basis of mutual preference outperformed or outproduced groups composed randomly (Van Zeist, 1952; Stafford, Moore, Adams, and Hoehn, 1955). Furthermore, Schacter, Ellerson, McBride, and Gregory (1951) demonstrated that group liking facilitated acceptance of group standards, and Haythorn (1953) showed that groups functioned more efficiently when the members liked one another. These studies lead the reviewer to inquire as to the basis of "liking." Finally, a study by Rosenberg, and Roby (1956) demonstrated that if choice was made on the basis of test scores and biographies of the various participants rather than personal acquaintance, the groups based on choice were no different in achievement from those composed randomly.

Homogeneous vs. heterogeneous combinations

Examining studies of composition based on mutual preference leads naturally into the examination of studies of homogeneous vs. heterogeneous composition since the latter

are an attempt to more particularly specify the variables underlying better performance, such as similarity vs. dissimilarity of individual cognition.

Schutz (1955) composed homogeneous groups of individuals all favoring close personal relations and homogeneous groups of individuals all favoring dependence and control relationships and compared them with heterogeneous groups (combining the two types). He found the homogeneous groups (of both types) to be more compatible and more productive. Haythorn, Couch, Haefner, Langham, and Carter (1956b) found the same result, namely that homogeneous groups (i.e., groups whose leaders and followers had equal F Scale scores) had higher morale and productivity than heterogeneous groups (i.e., leaders and followers of differing authoritarianism).

Hoffman (1958) composed homogeneous and heterogeneous groups using the Guilford-Zimmerman Temperament Scale and confronted them with an intellectual problem in order to obtain sociometric ratings. He found no differences on mutual attraction between homogeneous and heterogeneous groups. Using the same study and measuring problem-solving effectiveness, Hoffman (1959) found the heterogeneous groups to be superior and suggested that heterogeneity leads to a greater multiplicity of solutions. Shaw (1960) challenged the latter finding by Hoffman with new data which showed no

differences. However, the Shaw criticism appears minimally valid since he used different degrees of homogeneity, all being very close together, rather than sharply dichotomous. Also, Shaw's group members had no face-to-face interaction but communicated via a communication net.

Triandis (1959, 1960) demonstrated that cognitive dissimilarity between individuals (measured as differences in political attitudes)resulted in low communication effectiveness and low interpersonal attraction. Coupled with the finding of Zeleny (1955) that individuals were less creative when they worked with persons they disliked, the logical conclusion is that heterogeneity of attitudes should reduce creativity. Triandis, Mikesell, and Ewen (1962) tested this conclusion under two conditions. Half of the homogeneous and heterogeneous groups (with regard to political attitudes) worked on a cooperative task and got to know one another, prior to working on the creativity task. The other half were not afforded this opportunity. In the first condition the heterogeneous groups showed more creativity while in the second condition the homogeneous groups were more creative. The authors concluded that antagonism, the state presumably avoided in the first condition, was a detriment to the heterogeneous group performance. In the absence of antagonism (due to differences in attitudes), heterogeneity furthers creativity.

The conclusion that heterogeneity facilitates creativity appears to be limited by a further demonstration by these authors that groups heterogeneous in both attitudes and abilities were less creative than groups heterogeneous in attitudes but homogeneous in abilities (in both cases in the absence of antagonism).

What conclusions can be drawn from this mass of seemingly contradictory evidence? One general conclusion might be that heterogeneity is conducive of greater problem-solving effectiveness provided no disruptive side-effects (i.e., antagonism) result from this heterogeneity of attitudes. However, direct efforts must be taken to reduce or avoid the disruptive effects of heterogeneity, and in the studies reported this was rarely the case. It is difficult to ascertain the factors that are in operation in these studies, and although they may represent a gain in specificity over studies using composition based on mutual preference, they do not supply the final answers to the composition puzzle. For instance, in the study by Triandis et al. (1962), homogeneous groups of liberals and homogeneous groups of conservatives were paired against all possible combinations of the two types. The homogeneous liberal and homogeneous conservative groups represented the homogeneity condition while the various combinations of the two types

represented the heterogeneity condition. Under these complex circumstances it is difficult to assess the contribution made to creativity by liberalism and that made by conservatism of attitudes. It is also difficult to ascertain whether political attitudes represent a generic dispositional measure or a complex of more generic measures such as personality structure. If individuals with more abstract personality structure can tolerate and generate more diversity (as we assume they can), the effects of homogeneity of attitudes will vary as a function of personality structure. Research presently being done indicates that this is the case, and leads one to question the generality of the findings of Triandis et al. (1962).

Group composition cannot be thoroughly studied unless the characteristics of each group member can be specified and the composition itself can be based on individual characteristics which are generic in nature and thus readily generalizable to other situations. The notions of homogeneity and heterogeneity described above are too imprecise.

Homogeneity of one type composition vs. homogeneity of another type composition

The higher level of composition specificity called for in the previous paragraph is found in studies where groups

composed homogeneously of "type A" individuals are compared to groups composed homogeneously of "type B" individuals (where "A" and "B" represent personality types, attitudinal types, or the like).

Haythorn (1953) demonstrated that those characteristics which are strongest in the members of a group most typify the behavior of the group in the sense that the group behaviors are predictable from a knowledge of the characteristics of the members. For instance, individuals high on the trait cooperativeness formed a group that was judged to be highly cooperative.

Roberts, and Strodbeck (1953) compared groups of depressed patients to those of paranoid schizophrenic patients using a discussion task and Bales interaction coding categories. They found the latter groups to exhibit a higher activity rate, more positive acts, and to contain more aggressive leaders.

Borgatta, and Bales (1953) composed homogeneous groups of low and high "participators" and found that the initiation rate of any individual was inversely related to that of his group mates.

McCurdy, and Eber (1953) composed homogeneous groups of high and low authoritarians and instructed half their groups to behave autocratically and the other half to behave demo-

cratically. They found that low authoritarian groups with democratic instructions performed better (on some performance measures) than high authoritarian groups with democratic instructions. No other significant differences were found.

Haythorn, Couch, Haefner, Langham, and Carter (1956a, 1956b) observed that high authoritarian groups were more aggressive, less effecitve in dealing with the problem, and less supportive and warm than low authoritarian groups. Furthermore, the leaders in the high F groups were more autocratic than those in the low F groups. All of these observations had been accurately predicted by the authors.

Schutz (1961) composed five homogeneous groups, each featuring different characteristics (as measured by firo-B). Three of these groups were composed of individuals who preferred to initiate some kind of activity while the final two groups were composed of non-initiators. Each group also had specific areas of interaction which the members characteristically sought to initiate, avoid, or receive. Schutz found that the three initiator groups were better able to select the statements which best described their composition than were the non-initiator teams. He concluded that this effect was based on the fact that initiator groups were better able to express their feelings, thus making their characteristics more apparent to their fellow group members.

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Schutz also observed the topics of discussion in each group (no particular topics or group task had been assigned). He found that the topics and nature of discussion and interaction in each group were systematically different from that of the other groups and directly predictable from the characteristic interpersonal orientations of the individual members.

McGrath (1962) found that homogeneously combining participants who tended to perceive other individuals as warm led to a group in which all members perceived one another as warm, whereas homogeneously combining participants who tended to be perceived by others as warm led to a group in which none of the members were perceived as warm.

From this group of studies we can draw one obvious conclusion, viz., there is a high degree of constancy between the characteristics of individuals and the characteristics of groups in which such individuals are combined homogeneously. Group behavior appears to be highly predictable on the basis of individual behavior. That is to say, that the group may be represented by the sum of its parts, and, given data about the parts, the whole may be accurately predicted. Insofar as the studies just described utilized systems for classifying individuals that are different from (and considerably less generic than) the one utilized in this study, it would be difficult if not impossible to make specific generaliza-

tions from the former to the latter. The studies are cited in support of the position that this type of study has greater specificity than studies using other methods of classification (previously described), and that characteristics of the group may be derived from those of its individual members.

Three studies which are directly relevant to the present study have been carried out in the Princeton University laboratory under the auspices of H. M. Schroder.

Driver (1960), using the personality theory of Harvey, et al. (1961), composed groups that were homogeneously high and groups that were homogeneously low in integrative complexity. He attempted to show (with only a minimal degree of success) that high complexity teams perform better when measured against abstract criteria, and low complexity teams perform better when measured against concrete criteria. Using a modified version of the SOBIG stock market game, he attempted to identify abstract and concrete criteria. The failure to confirm the hypothesis (although the results tended in the predicted direction) may be attributed to the difficulty encountered in classifying the different game criteria as to degree of abstractness.

Brooks (1962) composed homogeneous groups of high and low cognitive complexity (as measured by a battery of

personality tests). The groups were also composed so that half were homogeneously high in ascendance with the other half low in this characteristic. His groups played a modified war game. Brooks found that in general high complexity group members were more satisfied with their group's behavior and performance than were low complexity members. He also found that low ascendant group members displayed more satisfaction than high ascendant group members.

Lawrence (1962) examined the performance of high complexity and low complexity teams in the modified war game mentioned above. He observed striking differences using reaction to feedback as his criterion. High complexity teams used feedback in making future decisions to a far greater extent than low complexity teams. The latter made decisions that stood in isolation from past information that had been recieved in the form of feedback while the former stored and integrated feedback for use in future decision making. It was concluded that high complexity groups display behavior of high complexity, i.e., display differentiation and integration of environmental information while low complexity groups display behavior of low complexity, i.e., display minimal environmental sensitivity and minimal integration of game information.

These studies of high vs. low complexity groups leads

one to reaffirm the conclusion that there is a high degree of constancy from the individuals to the group. More specifically, it appears that level of abstractness or complexity of the group's performance is an increasing function of level of abstractness of the individual members of the group. Groups composed of highly abstract individuals can be expected to differentiate and integrate within their environment to a far greater extent than groups composed of less abstract individuals. This has been clearly evidenced in performance (Lawrence, 1962) and, on a more individual level, in perception (Driver, 1962).

The Princeton studies described above do not consider two definite aspects of the problem. First, these studies only compare groups selected at two points along the continuum of integrative complexity of personality structure. Secondly, these studies did not examine the sphere of interpersonal relations, i.e., emerging group structure, as a function of personality and composition. The purpose of the present study was to examine more points along the continuum of integrative complexity of personality structure and to determine the effects of personality structure not only on performance, but on group structure and interpersonal functioning as well. Rather than attempting to demonstrate that groups of more abstract individuals perform more abstractly than groups of

less abstract individuals, this study was aimed at relating level of abstractness of group members to particular types of group structure, as well as at examining the effects of personality structure of group members on information processing in a new environment.

The following pages will describe the theory of Harvey, Hunt, and Schroder (1961) used for classification purposes, the method of composition, and specific predictions derived from the model.

The System of Classification

The first aspect of consideration in a group composition study is the system of classification to be used. For this study a theory proposed by Harvey, Hunt, and Schroder (1961) was used (see also Harvey, and Schroder, 1963; Schroder, and Harvey, 1963: and Schroder, Driver, and Streufert, 1963).

The authors of this theory define personality as cognitive structure by use of such terms as differentiation, integration, schema, concepts, and level of abstractness. They postulate a dimension of abstractness, with maximum concreteness at one end to maximum abstractness at the other, where abstractness is defined as the level of integrative complexity (integrative complexity refers to the rules or programs available for integrating concepts or dimensions).

Along this dimension a number of systems are defined, each representing a category of personality with possible behavioral derivatives. A system is defined as the manner in which the parts that go to make it up (i.e., concepts) are organized when the system is engaged in information processing. System properties are defined in terms of the number of parts and the way the parts are interrelated. These structural properties enable the authors to define system properties in terms of the relation of the self to others and also to state behavioral derivatives.

A system is an organization of parts of which there are two types: dimensions or concepts, and schema. A dimension (or concept) is a system for organizing or grouping stimuli. Two operations may be applied to dimensions: 1) differentiation between dimensions, and 2) discrimination between stimuli on a dimension. These dimensions enable an individual to "map" his environment by "matching" inputs and outputs. A schema is a set of rules or a program for combining dimensions. Increasing integrative complexity is the interdependent use of more than one dimension simultaneously as governed by a schema (not to be confused with using more than one dimension independently which is compartmentalization).

To recapitulate in the words of the authors: "A system

is described in terms of the number of dimensions available for 'reading' a given stimulus or range of stimuli and the integrative complexity of the rules for combining such dimensions in order to generate new perceptions and judgments." (Schroder, Driver, & Streufert, 1963, p. 4). As the schema for integrating the dimensions become more complex, the system is said to be more abstract.

The origins of these systems are developmental according to Harvey, Hunt, and Schroder (1961; Schroder, and Harvey, 1963; Harvey, and Schroder, 1963; Schroder, Driver, and Streufert, 1963). More specifically the developmental process is hypothesized to proceed in saccadic fashion from the most concrete system toward the abstract. The limit of this progression is a function of the training or socialization conditions (i.e., the relationship between trainer, trainee, and environment). "The evolvement of more abstract system properties is a process of generating new and conflicting differentiations (new interpretations of the same events) and unifying these differentiated components." (Schroder, et al., 1963, p. 5). If the trainer provides the trainee with a learning environment that he can explore and which will provide him with feedback as to the consequences of his actions (informational interdependent training, Harvey, et al., 1961; autotelic environments, Anderson, and Moore, 1959), development

will proceed to the most abstract level. This type of training induces the learner to generate rules for governing his responses.

If, on the other hand, the agent provides the trainee with a simplified and restricted environment along with ready-made schema and controls the trainee's behavior via rewards and punishments until he learns the required response (unilateral training), then development will not proceed beyond the most concrete level. The trainee will not learn to generate rules but will accept fixed rules external to himself.

At a midway point between unilateral and interdependent training is autonomy, a condition in which schema are neither imposed nor evolved via an effective environment.

Three other training variables which can be combined with unilateral or interdependent conditions are presented. These are: 1) protection, which limits differentiation under interdependent conditions; 2) unreliability (inconsistency), which produces more differentiation (i.e., more degrees of freedom) than reliability under unilateral conditions; and 3) acceleration, which increases the degree of differentiation from the minimal point in each condition.

Any particular combination of these training variables can result in arrestation or closedness to further progression

at a level of abstractness which is peculiar to that combination of training variables. Four such combinations result in arrestation at each of four nodal systems described below.

System I. "Conditions which provide a basis for learning stimulus categorization, which provide fixed rules for their placement and combination and restrict the opportunity for S to generate alternate schema, provide an appropriate environment for the development of System I properties." (Schroder, et al., 1963, p. 17). Such training is termed reliable unilateral training.

System I functioning (the most concrete type of functioning) is characterized by undifferentiated schema which provide rules for fitting stimuli into dimensions (i.e., categorization) and thus provide structure for the individual. Such schema lead to gross categorization of the "fit-don't fit" variety. Furthermore, such schema minimize the potential for generating conflict or ambiguity or for resolving ambiguity by any means other than exclusion. The system can generate many categories but they are discrete since there is a lack of conceptual equipment for relating or combining such categories into differentiated organizations.

What are the behavioral patterns generated by such a system in which the world is ordered by rules external to the self and rigid in the face of refutation? Such behaviors

as categorical black-white thinking, and the minimization of conflict, diversity, and ambiguity (all threatening states) via exclusion, distortion, overgeneralization, or compartmentalization are characteristic of System I functioning. Since the System I individual has a lack of differentiation between schema for dimensionalizing stimuli relevant to the self and concepts which map aspects of the external world, he cannot conceptualize the self-not self distinction and is dependent upon external anchors for his self definition. Such an individual is controlled externally.

A type of behavior and categorical thinking which is somewhat similar to that of the System I type is the authoritarian personality as described by Adorno, Frenkel, Brunswick, Levinson, and Sanford (1950), the bureaucratic personality as described by Merton (1940), and the stage of moral realism described by Piaget (1932).

System II. Although many transitional systems can be described, the next system relevant to the present study has been called nodal System II structure. Conditions which 1) are relatively unstable, i.e., permit sufficient structure for the learning of rules for categorizing stimuli, but provide a premature differentiation of the self from external rules or sources; 2) provide the opportunity for the evolvement of alternate schema but fail to produce interrelations

between these schema; 3) are provided by a relevant "other" who is somewhat distrusted or unreliable lead to the emergence of System II structure. Such training is termed unreliable unilateral training. (This assumes optimal unreliability; excessive unreliability would lead to severe structural regression.)

System II structure features alternate schema for organizing common dimensions and for placing stimuli on these dimensions. This increase in differentiation leads to the delineation of schema for "self" and the differentiation of "self" from "other." There is, however, an absence of conceptual processes for relating or organizing these differentiated schema. Whereas the world of the System I individual was unitary at a given time (the epitome of concreteness), the world of System II individual is more complex. A number of alternate schema are available for organizing dimensions. System II structure is slightly more differentiated than that of System I in that the former can generate ambivalence or more than one interpretation of the same event. The rules or programs for integrating these schema are, however, primitive.

The consequences of a System II orientation is moving away or "pushing against" any form of absolutism as represented by external control of oneself by another or by fixed

rules. In this differentiation of self from external standards there emerges a primitive notion of internal causation. Relevant dimensions are based on the self-not self demarcation with differentiation within the self, but an absolutistic orientation away from or concerning the "other." The dependence of self standards upon external standards is experienced as conflict and the individual "wards off" anything that conflicts with his own conceptual anchors. This detachment with regard to others, and a definite tendency to avoid the imposition of external control and dependency, is termed a negatively independent orientation.

Furthermore, the generation of categorical alternatives and the resultant ambivalence leads to the characteristics of instability and non-commitment (weak super-ego development).

The System II character bears some resemblance to what Levy (1955) has termed the oppositional syndrome in child development and to the Machiavellian personality (Christie, and Merton, 1958).

System III. Training conditions which permit the trainee to explore and delineate alternate schema and provide sufficient structure and support for relating and comparing schema are termed interdependent conditions. Interdependent training conditions in which S is provided with advanced information about the consequences of internally generated actions

before the consequences actually occur (i.e., the trainee is protected against outcomes of his own behavior) lead to the emergence of System III structure.

System III structure features increased abstractness characterized by the emergence of simple schema for identifying relations between other differentiated schema. Thus, the individual has available to him simple rules for combining schema. These rules of combination enable the individual to "match" or compare pairs of specific schema and thus make finer differentiations and discriminations. For the System III individual more alternatives exist and are apprehended.

Rules, for the System I individual, define conditions under which stimuli are categorized in a particular way. For the System II individual, additional rules specify conditions under which alternate schema are used. And for the System III individual, further rules specify various wasy schema can be combined or related under varying conditions. The resultant combinations are small independent organizations of schema.

The System III individual is capable of "matching" schema representing his own standards with schema representing the standards of others as he perceives them. Thus the individual can interpret the intentions of others which are

independent of the "self." This implies the following behaviors: sensitivity to interpersonal relationships and the standards and intentions of others, concern about mismatching, and a continual structuring of the situation so as to keep interaction between "self" and "other" open. Conflict will arise if this interaction tends to become closed (i.e., rejection).

Furthermore, the System III individual not only can track the environment in terms of both the "self" and the "other" but also has a greater range of alternate interpretations of any environmental event. This process is a highly internal one (i.e., decreasingly dependent upon immediate external stimulus conditions).

System III functioning bears a slight resemblance to Piaget's (1932) stage of mutuality in which the individual becomes sensitized to the intentions of others.

System IV. Training conditions which permit the trainee to explore, delay, and experience the consequences of internally generated action (i.e., informational interdependent conditions; and reactive environments: Anderson, and Moore, 1959) provide for the development of maximally complex integrative principles (System IV structure).

Whereas System III schema are organized into pairs or other small units, System IV schema are organized into

systems which feature more complex rules than those for "comparing" of the System III variety. This difference is one of degree. System III functioning is more empirical in that it "matches" outputs whereas System IV functioning is more theoretical in that it generates outputs.

The focus in System IV functioning is on exploring alternate informational consequences and on the delineation of standards which are generalized to encompass both "self" and "other" as well as being differentiated and interrelated on many levels. A greater degree of diversity can be handled as a result of the increased integrative complexity of this system (i.e., capable of a higher level of organization of schema). System IV individuals are minimally dependent on external conditions for the generation of alternatives or for self-definition. Both can be generated from within. There is also a greater potential to discover and utilize information about a range of stimuli at a given time. The capability for working with many schema simultaneously is made possible by the complex superordinate rules of combination which exist in this most abstract system.

Validity for this theory has been obtained in the following studies: Streufert (1961, 1962), Driver (1962), Janicki (1960), Lawren. (1962), Brooks (1962), Davis (1962), and Allen (1962). These studies show that when personality is

conceived in terms of (and classified into) four nodal systems described by Harvey, et al. (1961), a systematic relationship exists between personality structure and social interaction.

Of particular relevance in regard to validity and to the predictions made in the present study is the study by Driver (1962). Driver found individuals at the abstract end of the continuum (i.e., high cognitive complexity) to have perceptions featuring greater differentiation and integration than the perceptions by Ss of low cognitive complexity. As demonstrated via multidimensional scaling, the former used more dimensions in making similarity judgments and distributed their weightings on these dimensions to a greater extent than did the latter.

Chapter 2

PROBLEM

The particular problem to be investigated was that of attempting to predict a number of interpersonal behaviors of groups composed homogeneously on the basis of individual personality measurement, as well as predicting various aspects of the performance of such groups on a group problem-solving task. The study was planned not only to investigate particular behaviors and performances characteristic of groups of different personality composition, but also to test the prediction that group behavior is predictable from a knowledge of group composition.

This investigation required that three problems be considered: 1) a means of classifying individual personality (which in this case was the Harvey, et al. theory, previously discussed); 2) a formula to govern the operation of combining individuals to form the groups; 3) a series of differential predictions along a number of dimensions for the groups of different personality composition, each prediction being derived from individual personality characteristics of the members and the method of combination.

The latter two problems will now be discussed and related to the experimental situation into which the groups were placed.

Group Composition

In this study the formula for composition was homogeneity, i.e., all three members of any one group were of the same personality "type." Specifically, the groups were composed as follows: a) three teams composed exclusively of System I individuals; b) three teams of System II individuals; c) three of System III individuals; and d) three of System IV individuals. This formula for composition enabled one to study the group system properties for each of the four individual systems selected. Grouping members of an individual personality system homogeneously enabled the research to be directed at the group system without the complication of interaction between different individual personality systems. Homogeneous composition is a necessary first step in explaining the nature of the system properties which emerge in the group.

The independent variable of this study, therefore, was the group system (i.e., individual personality systems composed homogeneously into groups) while the dependent variables were behavior (i.e., modes of interaction or interpersonal relations) and performance on a complex meaningful task.

The Nature of the Task

The task was a simulation game with the stock market as

its reality referent. The game, developed under the auspices of J. L. Kennedy, presented a market that simulated some aspects of the real stock exchange (see Kennedy, 1962). There were four stocks in this market (a most obvious deviation of the simulated market from the real market) and a host of quasi-predictive indicators. These indicators, such as sales index, dividend rate, and appraisal values were made available to the teams at times, and could be obtained at other times at a cost. The market price of a stock was a function of supply and demand while the predictive indicators were preprogrammed by the experimenter. The experimenter did not interact in any way with the market or the teams during the course of the experiment.

The environment facing the teams can be described as an informational interdependent environment (cf. Harvey, et al., 1961; Schroder, and Harvey, 1963; as a reactive environment: Anderson, and Moore, 1959). This kind of training environment is one that the individual can explore, react to, and then experience the consequences of his behavior. The training agent (in this case the experimenter) influences the participant in no formal way other than his structuring or preprogramming of the environment so that certain behaviors will lead to certain consequences with a desired degree of certainty. However, the game environment is complex because

of delayed feedback and a large information processing load.

The game is a problem-solving situation where many solutions to the problem of accumulating profit exist. Therefore, the task was defined as a complex, problem-solving task in an informational interdependent environment. Participants were paid as a team on the basis of session-to-session game profits with a bonus based on final accumulated game profits.

The Group Systems

As was mentioned above, the homogeneity formula for composing the groups led to the use of the term group system to identify and label the resultant group characteristics. From the statements about individual system, it was possible to generalize to statements about any one of the four postulated group systems.

It was postulated that Group System I (a label used to identify the homogeneous combination of three System I individuals) would be characterized by tendencies to reduce ambiguity and diversity to a minimum level by formally structuring the situation in some way. This would result from the fact that ambiguity and diversity are maximally threatening to each individual member. Such an orientation is the resultant of the minimal level of cognitive complexity

of System I functioning. In short, Group System I was postulated to be the most concrete of all group systems and most oriented toward limiting diversity. Limited cognitive complexity implies an inability to make fine discriminations along many dimensions or to make complex integration among environmental phenomena. Such cognitive limitations were expected among groups in this system.

In the interpersonal area, the expectation was for the establishment of dependence relationships and authority since the individuals are oriented in this direction as a means of limiting ambiguity.

Group System II was assumed to have a greater ability to differentiate and integrate than that of the previous group system, but such abilities were assumed to be at a primitive level. The low level of cognitive complexity of the individual members was assumed to result in a group only somewhat less concrete than Group System I. This led to the expectation that this group system would be characterized by an attempt to avoid diversity and ambiguity, but to a somewhat lesser extent than Group System I.

In the interpersonal area, Group System II was expected to be characterized by an attempt by the members to avoid close interaction, resulting in a "splintered" group. Again, this followed directly from the personality characteristics

of the individual members which feature an orientation directly away from control and dependence.

Group System III was postulated to have a greater ability to differentiate and integrate environmental inputs than that of the previous two group systems. The cognitive complexity of the individual members would lead to a group functioning at a relatively abstract level characterized by the tendency to seek diversity rather than avoid it.

In the interpersonal area, the tendency would be toward the establishment of the group as an harmonious unit since the individual members are oriented toward close interpersonal relations, and potential rejection is threatening.

Group System IV was expected to function at the highest level of abstractness with the ability to differentiate and integrate environmental inputs at a maximum level. This expectation was derived from the postulate that the individual members are maximally abstract.

The emphasis of the individual member in this group system on the acquisition of and reaction to information was expected to lead to a group system in which interpersonal relations were of secondary importance to information processing. Furthermore, such a group system would be characterized by maximum tolerance of diversity.

The preceding predictive descriptions of the group systems

were intended to develop the hypothesis of essential constancy from the individual member to the group when the individual members are all highly similar (i.e., homogeneous). It is further assumed that group systems can be distributed on the same concrete-abstract continuum as were the individual systems with a one-to-one correspondence between the position of the individual system and the position of the group system. Also described, albeit in a general way, were the predicted interpersonal orientations for each group system, again as a function of the individual members' system. The next step in the prediction chain was to make specific predictions concerning the different group systems. These predictions were of two types: 1) behavioral predictions which cover the area of interpersonal relations, and 2) performance predictions which cover those activities directed toward the game as opposed to one another

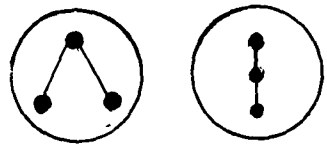
Behavioral Predictions

Behavioral predictions were directed toward four specific categories: 1) structure, 2) leadership, 3) cohesiveness and cooperation, and 4) decision-making mechanisms.

Structure was the major descriptive dimension of the group interaction pattern. It was defined as the pattern of organization the group assumes as a response to the individual

personalities of the members and the situation with which they are confronted. The predicted structures were based on the interpersonal characteristics of each group system and the orientation of each with respect to diversity.

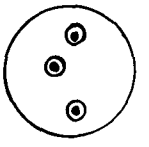
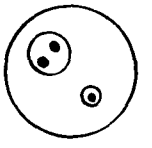
Because Group System I was expected to be oriented toward dependence relationships and the existence of authority, and because this group system was assumed to be maximally concrete and oriented toward "shutting out" diversity and ambiguity, the predicted structure was that of hierarchy. Hierarchy may be diagrammed in either of the two following ways:



Hierarchy was defined as a set of well-defined power relationships with one member having the most power. In this way ambiguity and diversity would be avoided since the member with the most power (i.e., the authority) would have the final word in decision making. The authority would make and enforce the rules. The other members would be dependent upon the authority for making the decisions and he on them for accepting his leadership. Hierarchy was thus assumed to be the most concrete structure because it most effectively limits or "shuts out" diversity or reorganization of the parts.

This structure is similar to that described by Merton (1940) as bureaucracy; by Bion (1961) as the dependence group; and by Bennis, and Shepard (1956). In each case the group was seen to have an excessive concern for or reliance on authority and rules to govern their behavior.

Because Group System II was expected to be oriented away from dependence relationships or control, and because this group system was assumed to be relatively (but not maximally) concrete and somewhat oriented toward "shutting out" diversity and ambiguity, the predicted structure was that of either <u>independents</u> or <u>factions</u>. In these structures (diagrammed as follows) differences are permitted to exist:

independents   factions

Independents (the more ideal case) was defined as an organization in which each individual "insulates" himself against the other group members by creating a barrier, perceivably as hostility, coldness, an unwillingness to work on a group effort, or an unwillingness to attend to the game. It was assumed that such a structure could be arrived at by displaying hostility while attempting to play the game or by avoiding the game, a condition which would insure the avoidance of control without the necessity for hostility, uncooperativeness, etc. In either event, the individual would be

"pushing against" control.

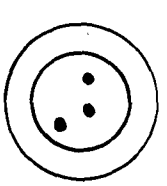
A faction was defined as an organization in which two members competed for the support of the third member or in which two members forced the third member to be a non-participant or scapegoat. In either instance, individuals would be exercising their independence but to a lesser extent than that of the "independents" structure. "Pushing against" is directed toward the major source of threatened control or against a more expendable member. Beyond that, some cooperation may be possible.

Both independents and factions should serve to limit awareness of diversity but not to the extent afforded by the hierarchy. In the former cases, environmental diversity, when perceived by the group members, should not influence group decisions to any great extent since the members would be intolerant of and "pushing against" one another. Thus, diversity, although perceived at times, should be severely limited in the extent to which it could be used as information. Each member should react to the stated perception of diversity by any other member as an attempt at control and thus reject the perception. For this reason the existence of within-group barriers should severely limit game-directed efforts and further reduce the possibility of perceptual diversity entering the group. As these barriers are reduced

in number or extent, diversity (to a limited extent) should be tolerated. Furthermore, the perceptions of the individual members in this system (and in System I as well) can be expected to be of low integrative complexity (cf. Driver, 1962) and thus limit the perception of diversity on the individual level. The expectation was for both independents and factions to be more abstract than the hierarchical structure of group System I with factions being somewhat more abstract than independents (since fewer barriers exist in the former).

Similar group structures have been observed by Bennis, and Shepard (1956) who report a stage of group activity characterized by a preoccupation with rebellion, and Miles (1953) who described this phase as characterized by anxiety, threat, and resistance.

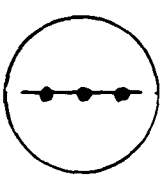
Because Group System III was expected to be oriented toward close, secure interpersonal relations with a major emphasis on the group as a unit, and because this group system was assumed to be relatively (but not maximally) abstract, and only slightly oriented toward "shutting out" diversity and ambiguity, the predicted structure was that of <u>holding together</u>. In this structure differences are included and simple group processes emerge for their integration. This structure is diagrammed as follows:



Holding together was defined as the existence of a close-knit group where the members seek to keep interaction open and relations on a friendly, cooperative level; where each member has relatively equal power and an equal voice in decision making. Holding together was, therefore, assumed to be a more abstract structure than any previously described because it permits diversity to be entertained in all cases other than those which lead to a threat of rejection and a dissolution of the existing integrative structure.

Similar group structures have been ovserved in group development studies by Schroder, and Harvey (1963) who describe a group phase of mutuality; Miles (1953) who describes a phase directed toward "patching up" differences and promoting harmony.

Because Group System IV was assumed to be oriented toward information processing with a relative freedom from concern for interpersonal relations, and because this group system was assumed to be maximally abstract and oriented toward producing diversity, the predicted structure was that of a more highly integrated system of parts, like a <u>single-organism</u>, diagrammed as follows:

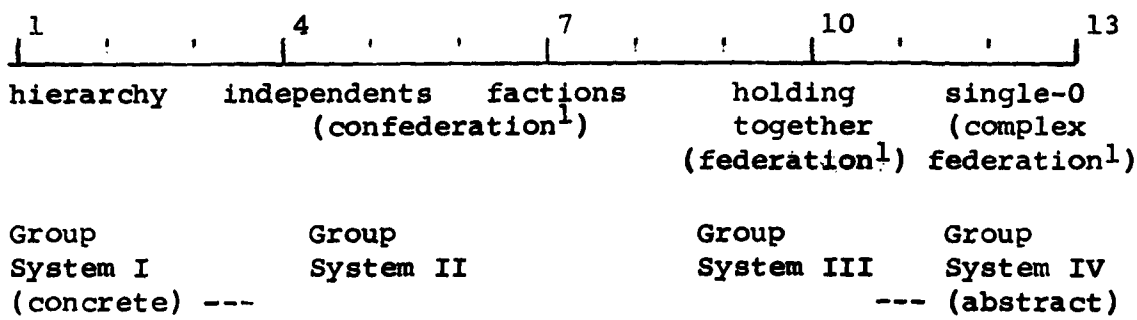


Single-organism was defined as an organization, which by virtue of its relative freedom from the limitations imposed by interpersonal threat, allows individuals to work in unison in processing information in any manner which permits the most efficient pursuit of this endeavor. Individual members are related interpersonally as "links" in the information processing "chain." The manner in which these "links" process information may be changed if the results do not lead to a desired goal, but the "links" themselves retain a permanent position in the chain, distinguishable from the other "links" primarily in the operations performed and not in interpersonal behaviors. Members react to others in terms of information. For this reason, they function more like a complexly-integrated single-organism. Thus, this was assumed to be the most abstract structure because it in no way "shuts out" environmental diversity and permits maximum group processes for integration.

A similar mode of group behavior has been called the work group or sophisticated group by Bion (1961). Bennis, and Shepard (1956) as well have observed a phase of group functioning where substantive issues are handled via rational discussion rather than through a compulsive attempt at unanimity. Miles (1953) describes a similar phase as one of individual self-assessment with group flexibility and an

an emphasis on problem solving. Kennedy (1962) refers to this form of organization as a synthetic organism.

To recapitulate, five group structures were postulated and described, and were ordered on a continuum. Furthermore, this continuum was assumed to proceed from most concrete at the extreme left to most abstract at the extreme right. The continuum was hypothesized to correspond to the group system concrete-abstract continuum. The group structure-group system continuum is presented below:



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[1] Following the experiment an attempt was made to use more meaningful terms to describe the group structures. These new terms are drawn from the sphere of politics and roughly fit the descriptions of the structures. The term hierarchy has been retained. The "loosely" held together structures have been termed confederation with the "tightly knit" structure being called federation. A satisfactory term for the most abstract structure could not be found in the political terminology. As an approximation, the term complex federation was adopted.

Thus, the prediction to be tested was that a correspondence existed between group system and group structure, and that the position of group structure on the structure continuum was predictable from the position of group system on the abstract-concrete continuum. Specifically, Group System I was predicted to have the most concrete structure, with Group System II having a structure somewhat less concrete, Group System III a more abstract structure than the previous two, and Group System IV the most abstract structure (see Table 1).

Leadership was a secondary dimension used to describe the groups (secondary in the sense that it was assumed that structure subsumed leadership). Leadership cannot be considered in isolation from the system properties operating.

Leadership was broken down into two categories: the extent of leadership, and the type of leadership. The extent of leadership defined whether a leader existed, and to what extent the team members regarded one member as the leader. The scale used for this dimension ran from clearly well-defined leader to no leader.

Type of leadership defined the manner in which the leader related to or led the other members. The scale ran from autocratic to democratic. An autocratic leader was defined as one who told the other members what to do and when to do

it without permitting them a voice. A democratic leader was an organizational leader who attempted to direct the group's efforts and attention, and who guided the group in discussion. Such a leader would not exert superior power or attempt to limit any other member.

For Group System I and for Group System III, it was predicted that the extent of leadership would be maximal, while for Group Systems II and IV, the extent of leadership was predicted as minimal. Group System I was expected to exhibit maximal leadership because of the orientation of the members toward dependence and authority. For Group System III, leadership would help to keep the group functioning smoothly and might serve to maintain open relationships and avoid conflict. Here the leader would be influenced by others and influence others equally. Such leadership would be like the chairman of the board of a modern corporation who serves to insure that each member will get a chance to speak and vote. Group System II which is oriented away from control and dependence should avoid leadership, while Group System IV would not need leadership in small groups since its aim is toward information processing and not interpersonal relations. In larger groups, leadership or various alternative leadership processes would probably be necessary to facilitate information processing.

It was further predicted that for Group System I, leader-

ship would be most autocratic in order to serve the functions of dependence and authority. To the extent that any leadership occurred in Group System IV, it was predicted to be most democratic (used here in the sense of an interdependent role) since it would serve not to control the group in any way but to allow for the establishment of the information processing network. Group Systems II and III were predicted to fall somewhere between the extremes on this dimension. In either case, leadership would not be as autocratic as that of Group System I because Group System III is not nearly as threatened by diversity as Group System I (assuming that autocratic leadership is a means of warding off diversity), while Group System II would not tolerate an autocrat who attempted to exert control over the group. In both cases, leadership would not be quite as democratic as that of Group System IV because neither were assumed to be as open to diversity as Group System IV, and might have to rely, at times, on something approaching autocracy to limit incoming diversity.

These predictions of leadership are summarized in Table 1.

Cohesiveness was defined as the extent to which the group avoided disagreements or conflict and were able to function in a friendly manner. This was in effect related to avoidance of diversity since diversity would produce some conceptual disagreements rather than a state of perfectly

harmonious coexistence. It was predicted that Group System II would be least cohesive because of the members' striving for negative independence and avoidance of control. Such "pushing against" activities should lead to disharmony. Group Systems III and IV were predicted to be of intermediate cohesiveness because of the tolerance of diversity in both cases. Group System I was expected to be maximally cohesive (i.e., to maintain a rigidly cohesive structure) because of its formal structure and intolerance of diversity. (See Table 1).

Game cooperation was defined as the extent to which the group members worked together in pursuit of game-directed goals. It was arrived at by a combination of the ratings on cooperation and motivation so as to reduce the ratings of those groups that cooperated when playing the game but did not spend much time and energy in playing the game but rather in out-of-field activities. These groups were rated as cooperative but such cooperation would not represent extensive cooperation in game-directed behavior. (Motivation was primarily a measure of the extent to which the group directed its activities toward the game.) For this reason, ratings of cooperation and motivation were combined and termed game cooperation. Game cooperation is different from cohesiveness in that some disagreement is considered an essential

part of working together.

Again, Group System II was predicted to be least game-cooperative because of negative independence strivings, while Group Systems III and IV were predicted to be most game-cooperative since a high level of abstractness lends itself to game cooperation. Since more diversity could be tolerated, more of it could be allowed into the group, implying a working through of alternative ideas. Cooperation requires that alternatives be discussed and evaluated cooperatively with each member contributing to this process. Since Group System I teams were postulated to be oriented away from diversity, they should have less opportunity to cooperate and thus be less cooperative than Group Systems III and IV. Group System I should be more cooperative than Group System II, the latter being actively non-cooperative rather than neutral. These predictions are summarized in Table 1.

The decision making mechanism was defined as the manner in which the group members related to one another in the process of making decisions. It was predicted that the more intolerant of diversity (i.e., the more concrete) the group system, the more closed to diversity the decision making mechanism. Thus, the mechanisms can be ordered on the concrete-abstract continuum.

It was predicted that Group System I would use power to

Table 1

Summary of Behavioral Predictions

Independent Variables		Dependent Variables					
Group System	Abstractness of Group System	Abstractness of Structure	Abstractness of Decision Mechanism	Extent of Leadership	Type of Leadership	Cohesiveness	Game cooperation
I	least	least	least	most	autocratic	most	between
II	↓	↓	↓	least	between	least	least
III				most	between	between	most
IV	most	most	most	least	democratic	between	most

make decisions. Power represented an absolute judgment by a single individual and would enable diversity to be avoided since such a decision would not be challenged. The acting authority would tell the group what they were going to do or not do.

It was predicted that Group System II would make decisions in a unilateral manner. One member would act without consulting the group or would attempt to ignore another team member. Such a mechchanism would not avoid diversity entirely but would limit or "sidestep" it.

It was predicted that Group System III would make decisions via explanation. A member would be called upon to explain why a decision was wise or unwise and would attempt to convince the other members. Diversity could be limited only by automatic acceptance of this explanation by the members for purposes of fostering harmony via consensus.

It was predicted that Group System IV would make decisions via processing. All incoming information would have to pass through the group channels and be converted to a decision according to an ever-changing "program" that seemed to fit the environment best. Thus, no attempt would be made to limit the diversity in the environment. Processing involves explanations by all group members concerning actions contingent upon the environment. These actions are then carried out

when appropriate. Processing differs from explanation to the extent that all group members interact in the former case whereas one member serves as the explainer for any one decision in the latter case. Also, processing enables the group to continue to make decisions without engaging in further explanation and exposition after a "contingency program" has been arrived at.

It was predicted that unanimity (i.e., automatic unquestioned consensus by all group members) would be characteristic of all groups and not group system-specific. Verba (1961) concludes from an examination of the small group literature that decisions by acclamation or consensus stem "... more from a desire to avoid challenging the solidarity of the group by overt dispute than from agreement with the decision. Even those who disagree will not do so openly in order to preserve at least the semblance of group cohesion." (p. 28). Since it is assumed that all groups, even groups of System II individuals, will be oriented toward "some semblance of group cohesion," it was expected that all groups would make many decisions (especially the less important ones) unanimously in order to produce some group cohesion.

These predictions are summarized in Table 1.

It was assumed that the structure dimension wa not independent of the other dimensions (.eg., leadership, cooper-

ation, etc.) but was based, in fact, on all of these dimensions as well as having some characteristics over and above these dimensions.

Performance Predictions

In order for performance predictions to be made, it was necessary to first define concrete and abstract criteria. Driver (1960) emphasized the need to examine criteria and determine whether they favor concrete or abstract performance. One would not expect an abstract team to perform better if performance was measured against a concrete criterion. Similarly, a concrete team might have the same shortcomings with an abstract criterion. Driver, using a variation of the stock market game, found that profit (i.e., net accumulated financial gain over the course of the game) was not clearly an abstract nor a concrete criterion. Davis (1962) using roughly the same stock market game as was used in this experiment found a slight tendency for abstract teams to perform better than concrete teams using profit as the criterion, although this tendency was not significant due to the small sample of homogeneously composed teams.

Because of the unclear nature of profit as an abstract or concrete criterion, it was decided to look for other possible criteria that could be more readily identified as

abstract or concrete. The following criteria were chosen: 1) information seeking, 2) verbal forecasting of the future state of the market, 3) sales index tracking, and 4) dividend tracking. Each of the four will be discussed in turn.

Information seeking was a measure of the extent to which a team attempted to get information via a formal game mechanism known as a "Mason-Cox" call. Mason-Cox was presented as an agency (like Dunn and Bradstreet in the real world) which, for a cost of $200 per call, would reveal one item of otherwise unavailable information about one stock. Teams were advised that during the first two months of any quarter (see time schedule, Appendix) sales index information only would be given by Mason-Cox, and during the third month, only earnings information would be given. The sales index information revealed by Mason-Cox could be obtained without charge at the beginning of the following session while earnings information could be obtained at the beginning of the following quarter without charge. Thus, all Mason-Cox information obtained via the telephone represented advance information.

The sales index and earnings were designed to be predictive of short-term changes in a stock's price. Earnings were derived from sales index but were of greater variability and thus presumably more difficult to "read." (See Method section for a more detailed description of the game. Also, see the

Player's Manual in the Appendix.)

It was assumed that information seeking as measured by the number of calls to Mason-Cox was an abstract criterion. Thus, it was predicted that number of calls to Mason-Cox would be an increasing function of level of abstractness of the group system and would correlate significantly with group system (Group System I teams making the fewest M-C calls, Group System II somewhat more, etc.) This prediction was made on the basis that more abstract teams would be more sensitive to small environmental changes and would make an increased effort toward awareness of these changes. The Mason-Cox mechanism would be one way in which these changes could be apprehended.

Verbal forecasting of the market's future was a measure of the extent to which a team could predict what would happen next. The observer was instructed to record all instances of "correct" and "incorrect" verbal forecasting. The measure of verbal forecasting was then defined as the per cent correct. Again, this was assumed to be an abstract criterion. This measure also represented an awareness of changing environmental conditions and was expected to be highly related to number of Mason-Cox calls.

Sales index tracking was a measure of the extent to

which all major changes in a team's holdings during active trading paralleled changes in sales index of the same stock at the same time that the change in holdings occurred. Thus, it was a measure of the extent to which a team's trading behavior paralleled (and presumably was governed by) the sales index.

The sales index was so sensitive and highly variable that it was difficult to "read" (a graph of sales index appears in the Appendix). Furthermore, the sales index had to be "searched out" and successful tracking required that information be sought after rather than received passively. Since it was predicted that abstract teams would have greater environmental sensitivity and more information seeking behavior, it was assumed that sales index tracking was an abstract criterion and thus would be related to level of abstractness of the group system. Thus, it was expected that abstract teams would pick a sensitive albeit difficult variable to track and would track it well. It was further expected that concrete teams would either not track sales index at all or would track it poorly.

Dividend tracking was a measure of the extent to which major changes in a team's holdings during active trading paralleled changes in the dividend rate of the same stock at the same time that the change in holdings occurred. Thus,

it was a measure of the extent to which a team's trading behavior paralleled (and presumably was governed by) the dividend rate.

The dividend rate was so insensitive to short-term price changes that it was easy to "read" (a graph of the dividend rate appears in the Appendix). Furthermore, advance information on the dividend rate was not available as it was for the sales index. Therefore, teams only received dividend information when it was given to them (quarterly) and could not actively seek it.

Two avenues were open to a team to make profit, speculation, and investment. There were a number of ways to pursue either but one of the most efficient ways of pursuing an investment strategy was to track dividends. Buying and holding only high dividend stocks meant a high return with a minimum of information search, sensitivity, and activity. Thus, it was assumed that dividend tracking (a method of pursuing an investment strategy) was a concrete criterion and that teams functioning at a concrete level would emphasize dividend tracking. Because dividend tracking required less activity, it was further assumed that concrete teams would be less active (i.e., transact fewer lots of stock over the course of the game run) than the abstract teams.

The speculation strategy can be pursued by sales index

tracking and responding to short-term market changes. Such a strategy should require a high level of activity. Since the abstract teams were predicted to be the sales index trackers, it was also predicted that number of lots transacted would relate positively to group system level of abstractness.

To summarize the performance predictions, the following relationships were expected: 1. a positive relationship between group system level of abstractness and a) information seeking, b) verbal forecasting of the market's future, c) sales index tracking, and d) activity; 2. a negative relationship between group system level of abstractness and dividend tracking. These predictions were of a correlational nature.

Breaking the four group systems down into two classes: abstract (Group Systems III and IV) and concrete (Group Systems I and II), it was predicted that the abstract teams would exceed the concrete in information seeking, verbal forecasting, sales index tracking, and activity, while the concrete teams would exceed the abstract in dividend tracking. This followed from the assumption that abstract teams would adopt a speculation strategy and that concrete teams would either adopt an investment strategy or pursue a speculation strategy ineffectively.

It was not assumed that the various performance measures were completely independent of one another. For instance, sales index tracking should require more information seeking and more activity than the absence of this kind of tracking.

The performance predictions were consistent with findings of Lawrence (1962) who observed that more abstract individuals when grouped homogeneously produce more abstract teams (i.e., teams that perceive and perform in a more complex fashion than teams of concrete Ss). The predictions described above are based on the same expectation. It is assumed throughout that more abstract group members will be more aware of environmental diversity (i.e., have more complex perceptions) than concrete group members (cf. Driver, 1962), and the predictions are based on the interaction of level of complexity of individual perception and individual interpersonal orientation (i.e., resultant group structure).

Chapter 3

METHOD

Participants and Participant Selection

Sixty-four Princeton University graduate students volunteered for the experiment and were given a battery of tests composed of 1) the Sentence Completion Test developed by Schroder (see Schroder and Streufert, 1962) 2) the Situational Interpretation Test developed by Schroder and Hunt (1959) 3) the California Short Form of the F Scale developed by Adorno, Frenkel-Brunswick, Levinson, and Sanford (1950), 4) the Dogmatism Scale developed by Rokeach (1960), 5) the Rigidity Scale developed by Gough and Sanford (1952), 6) the Machiavellian Scale developed by Christie and Merton (1958), and 7) the Ascendance-Submission Scale developed by Guilford and Zimmerman (1949).

F, Dogmatism, and Rigidity Scales

The F Scale, Dogmatism Scale, and Rigidity Scale were used to measure the individual's concreteness as exemplified in his point of view concerning specific issues and the flexibility of his behavior. The F Scale taps the following variables: conventionalism, authoritarian submission and

aggression, anti-intraception, superstition and stereotopy, power and toughness, destructiveness and cynicism, projectivity, and sex attitudes. Since System I individuals are relatively concrete, reliant upon norms and structure for guidance, and think categorically, we would expect them to endorse a highly dogmatic point of view, be rigid in their behavior, and have sympathies in the authoritarian direction, specifically in their feelings toward authority figures, conventions, stereotopy, and members of the out-group. Thus, these three scales are used to corroborate the classifications made on the basis of the Situational Interpretation Test and Sentence Completion Test (see below). Individuals who scored high on these three scales were not acceptable as System IV and doubtful as System III. High scores on these scales would reinforce a System I classification.

The Machiavellian Scale

The Machiavellian Scale was used for supporting evidence in making a System II classification. The Mach Scale is composed of two sub-parts, a Mach plus which measures the extent to which the individual endorses the view that manipulation of one's fellow men is a reasonable way of furthering one's personal interests, and a Mach minus which measures the extent to which the individual endorses the view that Man is a good, honest,

sincere, trustworthy, in short, a perfect creature. People with Machiavellian leanings are those who endorse the Mach+ items and reject the Mach- items. Such an individual rejects the notion of Man's essential goodness and accepts manipulation and deceit as a means of gaining one's ends.

The System II individual, as described in the theory, seeks negative independence and is threatened by potential control. These characteristics should result in a negative orientation toward people and a low evaluation of them. It was assumed that System II orientation would result in rejection of Mach- items, and to a lesser extent, endorsement of Mach+ items. Furthermore, in the past a high negative correlation has been observed between tests of social desirability and the Mach Scale, indicating that individuals who respond on the basis of social desirability tend to reject Machiavellianism due to its social undesirability. System II individuals were hypothesized to be least influenced by social desirability and thus to reject Machiavellianism. An individual was not classified as System II unless his score on the Mach Scale was in the upper half of the scores for the sample.

The Situational Interpretation Test

The Situational Interpretation Test (SIT) was one of the two major instruments used in classification. Janicki (1960)

has reported test-retest reliabilities for this test as follows: .72 for System I, .62 for System II, .58 for System III, and .65 for System IV; (N = 38). Predictive validity for this instrument (as well as for the theory) is evidenced in Janicki (1960), Harvey et al. (1961, pp. 204-271), and Driver (1962).

The SIT consists of 36 pairs of statements, each statement representing an ideal response to interpersonal criticism for one of the four systems. System I items on this test represent a resolution of the conflict brought on by interpersonal criticism as a function of the authority vested in the criticizer or in other rules or norms. System II resolution is one of rejecting the criticism as interference. System III resolution is that of maintaining the relationship in spite of the criticism, while System IV resolution is that of viewing the criticism as information.

The test statements are paired so that each system-specific response must be compared and judged against each of the other three system-specific responses six times. Thus, the maximum frequency score for any one system is 18. Individuals typically obtained scores in all four systems.

Participants were given quintile scores for their frequency of response in each system (standardization being based on the

sample , N = 64). Ideally, an individual would be assigned to that system in which his score was fifth quintile if and only if he scored no higher than third quintile in the three remaining systems. The size of the sample did not permit the application of this criterion since 36 participants did not satisfy the criterion with the desired distribution (i.e., 12 in each system). The above criterion was therefore relaxed and it was tentatively decided that participants would be classified into that system on which their score was in the fifth or fourth quintile provided no other system score was as high. Furthermore, to be classified as System I, an individual had to score in the upper half on the F, Dogmatism, and Rigidity Scales while a System IV classification was dependent on scoring in the lower half on these three tests. Also, to be classified as System II, a score in the upper half on the Mach Scale was required. Using these criteria it was possible to classify only 23 participants satisfactorily. When scores on the Sentence Completion Test were taken into account, it was possible to classify 36 participants required by the experimental design.

The Sentence Completion Test

The Sen ıce Completion Test (SC Test) is a projective test in which 11 sentence fragments or stems are presented to

the individual and he is required to complete each and then write an additional sentence with 1 1/2 minutes allowed per item. The stems used are of three varieties: 1) those which can imply the presence of alternatives, 2) those which can imply the imposition of external standards, and 3) those which can imply interpersonal conflict. A manual for scoring the test and a detailed description of the test have been presented by Schroder and Streufert (1962). The scoring manual is based on the theoretical referents for each system presented in the introduction and in Harvey et al. (1961) and Schroder et al. (1963). Construct validity for the test (and the theory) is based on Streufert (1962).

The SC Test is scored on three scales. One is an abstract-concrete scale on which all items are judged as to their level of abstractness. The second is a scale on which the System II character of each response is scored, and the third is a scale on which the System III character of each response is scored. Scores for each stem on each scale are averaged (omitting responses judged as unscorable) and each individual is given three scores. A low score on abstract-concrete with a low score on System II and System III leads to a System I classification while a high abstract-concrete score and low II and III scores leads to a System IV classification. A System II

classification is based on a high II score, a low III score, and an abstract-concrete score only slightly above that for System I. System III classification requires a high III score, low II score, and an abstract-concrete score slightly below that for System IV.

The SC Tests were scored by a trained rater who had no access to the other test scores nor to the names of the participants. Inter-rater reliability has been reported as ranging from .70 to .98 by Schroder and Streufert (1962). Relationships between this and other tests are reported by Schroder and Streufert (1962).

Classification of Participants

It was hoped originally that a minimum of conflicting scores on all the tests in the battery would be obtained. In the case of such conflicts, the participant was rejected if possible. However, due to the small size of the sample, it was necessary to resolve some conflicting instances on the basis of which tendency appeared the stronger. For instance, if the participant satisfied the aforementioned criterion for System II classification and scored as concrete on the SC Test but did not have a high II score on the SC Test, he was classified as a II nevertheless.

Fourteen participants, equally distributed between the

systems, satisfied all the criteria for classification. The remaining 22 participants required for the study did not have perfect agreement between their scores on the SIT and the SC Test. They were classified on the basis of which of the two tests gave the clearer and more definite indication and was supported by the other four auxiliary tests. In such cases, more weight was placed on the SC Test.

The resulting 36 participants were considered as instances of the "pure" type to a lesser or greater degree as a function of how well they satisfied the classification criterion. The 14 participants who satisfied all criteria were considered to be "pure" while the remaining 22 were broken down into two categories, those with tendencies toward the "pure" type, and borderline cases, as a function of the amount of disagreement between SIT and SC Test scores.

Team Assembly

The 36 participants who were satisfactorily classified were then assigned to teams. An effort was made to balance the teams on two variables, namely: 1) "pureness" of personality, and 2) ascendance. As mentioned above each participant was rated as a function of how closely his test data exemplified

the "pure" system type as defined by Schroder, Driver and Streufert (1963). Three teams for each system were composed and matched so that each team had one member who was considered a "pure" type, one who had definite tendencies in that direction, and a borderline case. For instance, the Georgia team (a System I team) had one member with a maximal loading in System I and minimal loadings in the other three systems on the SIT, high scores on the F, Dogmatism, and Rigidity Scales, and scored as highly concrete on the SC Test. This high agreement among test scores indicated a greater confidence in selection. The second member of the Georgia team loaded maximally in System I but high in System III as well (although the I was higher) on the SIT. He had high Dogmatism, and Rigidity scores and was midway between concrete and abstract on the SC Test. He was classified as having definite System I tendencies. The third member of this team loaded equally highly on both System I and III on the SIT and had high scores on the F and Dogmatism Scales. His SC Test score was the same as the second member's. He was classified as a less than satisfactory instance of a System I individual but was used due to a shortage of more clearly defined cases. Thus, Georgia exemplified the three classes of system fit that were combined to make each team. In this way, it could be expected that the

three teams in any one system would replicate one another since they had equal goodness of fit to the ideal case.

Teams were matched for ascendance using the Guilford-Zimmerman Ascendance-Submission Scale. This scale was used since it is easy to score and measures ascendance-submission in a social context. Ascendance-submission represents degree of outgoingness or assertiveness and, as such, is independent of cognitive complexity; cf., Schroder and Streufert (1962). The teams were composed so that the sum of the ascendance scores of the members of any one team roughly equaled that of each of the other two teams in the same system.

An attempt was made to control for intelligence using scores on the Verbal and Numerical tests of the Graduate Record Examination developed by the Educational Testing Service. Unfortunately, fewer than half of the participants used in the experiment had taken this examination prior to entering graduate school. However, when this data was available, it was used to equate the teams as far as possible on the numerical and verbal factors. Since intelligence could not be completely controlled in this manner, evidences that it would not affect the data were sought. Streufert (1962) reported a correlation of .45 between individual level of cognitive complexity and intelligence for high school students, while other studies

(Lawrence, 1962; Driver, 1962) reported a correlation of about .22 between level of cognitive complexity and intelligence for college undergraduates. We would expect the correlation for graduate students to be even lower (as age and the extent of education are increased beyond that of the two populations above). Thus, we would expect no systematic relation between level of cognitive complexity and intelligence at the graduate student level.

Further evidence that the phenomena to be investigated in this study are a function of level of cognitive complexity and not of intelligence can be seen in the studies of Lawrence (1962) and Driver (1962). In both studies intelligence as a variable was carefully controlled, and large differences between concrete and abstract groups or individuals in performance (in the former) and in perception (in the latter) were still observed.

Graduate students in economics and in psychology were not used in this study in order to decrease the range of familiarity of the participants with the game materials.

Each team was identified by a geographical name as follows:

System I: a) Bangor, b) Georgia, c) Wyoming

System II: a) Rutland, b) Maine, c) Ohio

System III: a) Athens, b) Dayton, c) New York

System IV: a) Casper, b) Syracuse, c) Vermont

The Game

The SOBIG stock market game was played by investing cash in stocks (of which there were four) or bonds in order to earn money in the form of interest or dividends, or to increase the value of holdings. It was played almost as one plays the real market. The teams were instructed to play the role of investment committees of fictitious banks. They invested bank funds in stocks in the hope that these stocks could be sold later at a profit. This game deviated from the real market situation in that a team's portfolio was evaluated once a year, and it was this evaluation plus the cash on hand that determined a team's total worth. The evaluation tended to discourage the strategy of holding declining stocks for long periods of time while waiting for their recovery, as occurs in the real market.

The game was built around two major variables introduced by the experimenter, one overtly and one covertly. The overt variable was the sales index and was made available to the teams at the start of each session. The covert variable was

the Mason-Cox Basic and was never made directly available to the teams. Both variables closely paralleled one another (i.e., the sales index was constructed to be an approximate but not exact linear function of the M-C Basic) so that the former could have been used as an indicator of the latter. However, both variables were included to add complexity. The M-C Basic, representing "corporate reports," had values falling in the market price range (see below); the sales index was computed with a standard three-year period used as a base of 100, thus placing it in a range comparable to the range of sales indices of "real" companies. Each variable was cyclical in nature to simulate the economic cycles of the real world. At the end of each quarter the M-C Basic and the market price of each stock were averaged and this average was presented to the teams as the Mason-Cox appraisal. The teams were told that their holdings would be evaluated on the basis of whichever of the two values, the market price or the Mason-Cox appraisal, was lower.

Each game year consisted of two sessions. Half of the teams played during the first session while the other half played during the second session. The game was continuous, however, so that each session began with the situation created by the previous session (i.e., market price, appraisal values,

etc. produced by the behavior in one session then confronted the next session at its onset). In this way, all the teams could be considered as playing in the same market.

Each session (i.e., each half game-year) consisted of two quarters with three months per quarter. At the start of each session, each team received a market publication, which announced all sales indices as of that time as well as other economic indices which, by virtue of their abstract and inconsistent relationship with other game variables, were of less obvious relevance. Teams also received The Wall Street Journal, a quarterly publication, for their two active quarters and for the two quarters during which the were inactive. The Wall Street Journal appeared at the beginning of each quarter and was relevant to the quarter just completed. Thus, it told the values of several variables as of the moment. It contained the quarterly earnings of each stock which, unbeknownst to the teams, was a function of the sales index but fluctuated to a greater extent. The Wall Street Journal also contained the dividend rate for each stock, the yield of each stock (i.e., the ratio of market price to yearly dividends), the earnings ratio of each stock (i.e., the ratio of yearly earnings to market price), the book value of each stock (which varied as a function of sales index), the opening, high, low, and closing market price

for each stock, the Mason-Cox appraisal value of each stock, and the bond interest rate as of the moment.

The market price was a function of supply and demand and was announced over an intercom immediately following each transaction. Teams were not told how the market price or Mason-Cox appraisal were determined nor the relationship between any game variables. These had to be discovered.

To make a market order the team used a phone to contact a central switchboard. This switchboard could only handle one call at a time and answered the calls in a fixed sequence which was changed from session to session so that no team had any priority advantages in the long run. Market orders were made in 100 share amounts, each 100 shares being termed a lot. No market order could exceed 10 lots nor be less than one lot. Bonds could be purchased at the beginning of each quarter only and were ordered in writing. Information could also be purchased from the central switchboard at a cost of $200 per item of information. The agency that supplied this information was known as Mason & Cox and would, during the first month of any quarter, reveal the trend of any index, during the second month of any quarter the value of any index, and during the third month of any quarter the value of earnings. Each item of information concerned only one stock. Teams had to place

four calls and pay four times to get a piece of information about each stock. The indices that Mason & Cox would reveal were given free to all teams at the beginning of each session only while earnings were given out at the beginning of each quarter. Since all of these variables changed on a quarter-to-quarter basis and the free information applied to the preceding quarter and not the present one, the Mason & Cox information was new information that could not be obtained otherwise at that time.

The goal of the game was to be worth more (in money and portfolio assets) than one's competitors. Since the amount of any one stock available was unlimited, teams did not directly compete with one another but played to "beat" the market. The manner in which the market could be "beaten" was by predicting with some degree of accuracy its future state or by investing in stocks with a high return. Teams could attempt to predict the immediate future of a stock by developing the empirical concept that a rise in the earnings or the sales index meant a rise in the Mason-Cox appraisal and usually the market price. This concept would generally work since sales index and earnings paralleled the Mason-Cox Basic which contributed half to the M-C appraisal value; as the M-C appraisal value rose, teams tended to buy

the stock because it looked good, thus elevating the market price. On the other hand, teams could follow the market's rate of return on investments and invest for dividends. These strategies will be considered again in the Results section.

A second means of making transactions was provided in the form of limit orders. Limit orders could be placed by a team at the end of an active session to be transacted while it was inactive if the market price coincided with the buying or selling price specified in the order. Thus, a limit order might request that 10 lots of a particular stock (Atlas Alloys, Banner Brands, Monarch Machines, and Sceptre Studios) be bought for the team if the price of the stock reached 53. If the stock in question reached 53, the transaction was made.

Teams could ask questions of the experimenter concerning the game. These questions were submitted in writing in the form of a statement and were answered as true, mainly true, false, mainly false, ambiguous, or unanswerable if they were requests for market information. Questions of a conceptual nature were answered. The team asking the question received the answer immediately and one-half year later (in game time) all the other teams received both the question and the answer.

Teams could also borrow money up to a specified maximum

at a given rate of interest. The rate of interest varied from 4 to 8%. Most of the game inputs varied correspondingly. When a "depression" occurred, the sales index and Mason-Cox Basic of the stocks, and stock dividend rates went down, while the bond interest rate, and the interest to be paid on borrowed money went up. Cash was also withdrawn from the bank account of each team. In this way money was "tight" and the only good investment was bonds. During an "inflation" the opposite was true. The entire game was preprogrammed, and once it began no changes in programmed economic inputs were made. Two major "depressions" were programmed into the game, one, one-third of the way through, and the other, two-thirds of the way through. Graphs of sales index, dividend rate, and market prices over the 10 game years appear in the appendix along with a copy of the Player's Manual which was distributed to the players prior to the start of the game. The Manual states the game rules.[2]

Figure 1 shows the relationships between the various game inputs as well as the available outputs and output-produced inputs. The diagram is restricted to economic

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[2]The Project SOBIG Stock Market Game Experimenter's Manual, stating explicitly all details for running the game, may be obtained from the author upon request.

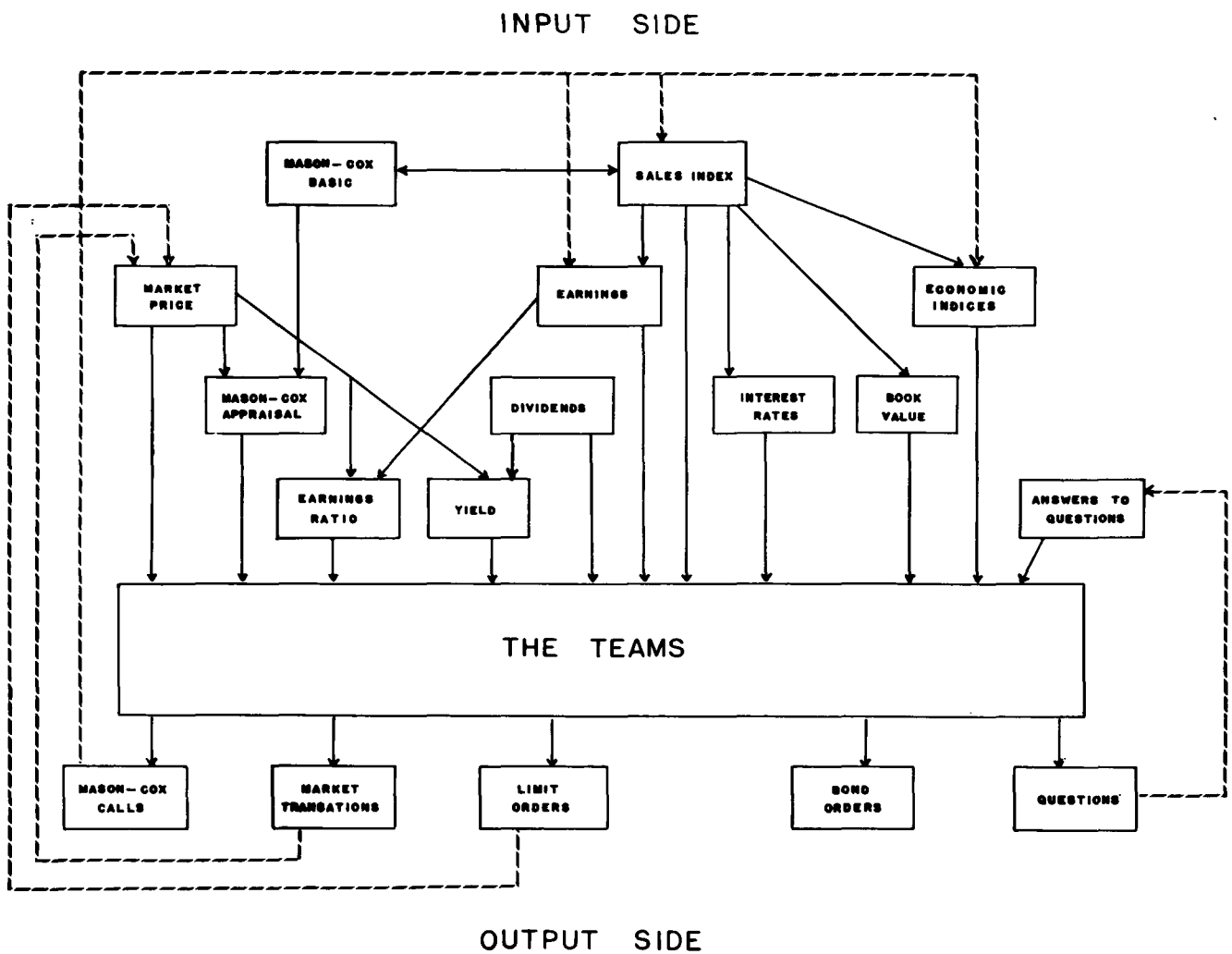

FIGURE I. GAME INPUTS AND OUTPUTS AND THEIR RELATIONSHIPS

inputs and outputs and any interpersonal, motivating, or reinforcing inputs (such as relative standings which were made available to the teams once a year) have been omitted.

In order to clarify the relationships presented in Figure 1, a description of how inputs might be apprehended and acted upon by an "ideal" team that knew all the relationships is presented below.

At the beginning of the session, the team would receive all the inputs displayed in Figure 1 except for the Mason-Cox Basic and the Answers and Questions. The input information would be specific for each of the four stocks and would apply to input values existing at the close of the previous session. Thus, these inputs would all represent opening information. The team would also receive at this time requirements as to the minimal holdings allowable in each stock (i.e., diversification requirements), and information as to how much money was to be added to or removed from their account.

The "ideal" team would then adjust its holdings, if necessary, to satisfy the diversification requirements. It would then have to decide how much money it wished to commit to speculation, how much to investment, and to what extent the same purchases could be effective in both areas. By examining the sales indices of the stocks relative to those

in the past, and the market prices of the stocks in relation to those in the past, the team could determine whether the market was inflated or depressed and the direction in which the market was moving for each stock. If, for instance, the sales index of Atlas Alloys had been increasing for the past year and was now at a higher point than it had ever been previously, it might be expected that the sales index of this stock was due to go down. The team would also look at the relationship between the market price and Mason-Cox appraisal value for this stock. If the market price had been increasing at a considerably more rapid rate than the M-C appraisal value, and the two were becoming more and more discrepant, then the cost of the stock would be far in excess of its worth.

The team's first action would be to call Mason & Cox and ask for the trend of the sales index of Atlas Alloys. Let us assume that the team discovered that the trend was "slightly down." It would realize that the sales index for this stock had reached its peak and was now on the decline, and that this condition would lower the M-C appraisal value as well. While the market price was still high, the team might decide to sell some of this stock since the original purchase price was lower than the present market price. In this way the team would make a profit and avoid holding a stock of questionable future worth. Using the same reasoning

and discovering that the sales index in Sceptre Studios, for instance, was up, but still relatively low in relation to past values, the team might buy this stock. It would be speculating that the sales index would rise further as well as the M-C appraisal value. The market price might be expected to rise concommitantly since other teams would buy a stock "on the way up," thus elevating the market price.

From the above description of speculation, it can be seen that the only inputs attended to directly are the sales index, the market price, and the M-C appraisal value while the only responses are market transactions and Mason-Cox calls. The latter responses bring in new information while the former produce new market prices.

In order to make wise investments, the "ideal" team would determine whether bonds or stocks provided a higher rate of return. In a market beginning an upswing, the yields of the stocks would exceed the bond interest rates. Also, the interest rates on borrowed money would be low. Therefore, the team would borrow money (up to the maximum allowed) and use this money to buy into a stock (or stocks) having a dividend rate which is high with respect to its market price and high with respect to the dividend rates of the other stocks. It might also decide to choose stocks for investment that were

rather stable or in a stable period where extreme fluctuations in any of its values were not to be expected (based on past performance). In a market on the down swing, it might decide not to borrow money and to invest in bonds rather than stocks since the high prices of the latter would make stock yields relatively small compared to bond interest rates.

Similar reasoning as that used in speculation and investment in active trading would apply in formulating limit orders. Here the team would determine, based on past relationships, what price would serve as a good buying price and what price would serve as a good selling price.

Finally, the real teams, being somewhat less than "ideal," would not be aware immediately of all the relationships presented in Figure 1, and could facilitate their knowledge by asking questions and receiving answers.

Apparatus

Six game rooms standing off a central corridor with an operations room at its head describes the layout of the Project SOBIG gaming laboratory where the study took place. Figure 2 shows this layout (see also Kennedy, 1962). The rooms were made of cement block lined with sponge rubber matting to

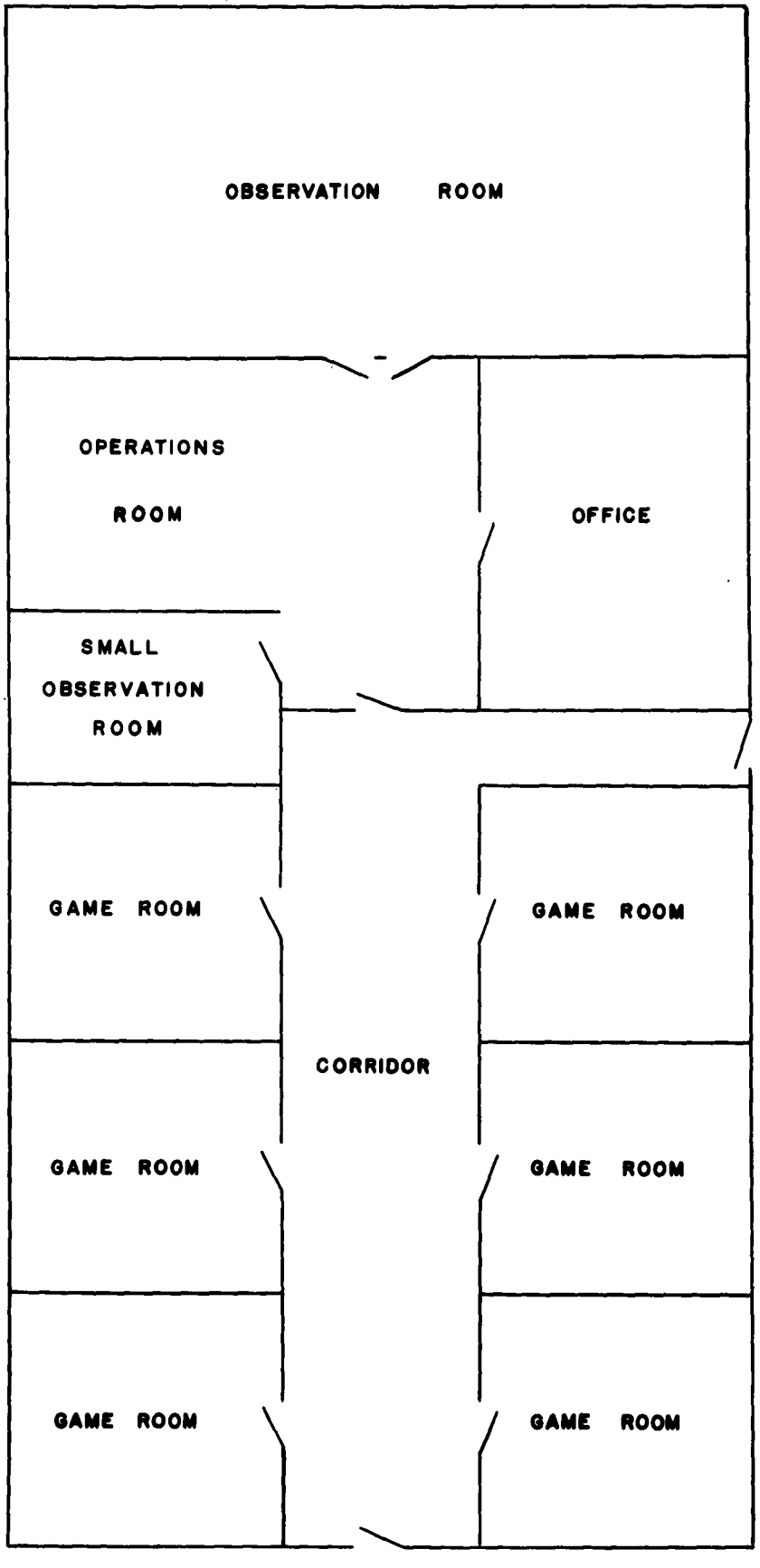

FIGURE 2. LAYOUT OF THE PROJECT SOBIG GAMING LABORATORY

reduce sound reverberations. Each room was equipped with the following: a closed circuit television camera, a microphone, an Army field telephone, an intercom, a blackboard, a bulletin board, a triangular table, three chairs, and two mailboxes - one on the inside of the door leading to the corridor and one on the outside.

The central telephone switchboard was located in the operations room along with an intercom (used for announcing market prices following a transaction) and blackboard. An office adjoining the operations room contained six tape decks for recording all verbal material from each of the rooms. Finally, a large observation room contained six television monitors, one for each room, and six sound pickups. Each sound pickup enabled from three to five people to listen to the same game room.

Procedure

Twelve three-man teams played the SOBIG stock market game for 10 hour-and-a-half sessions, each session representing one year of game time. Six of the teams, with city names, played in the morning while the remaining six, the "state" teams, played in the afternoon. The game was played on alternate

days over a span of four weeks. Participants were requested to leave all game materials except Player's Manuals in the game room following each session. No restrictions were placed on their behavior when not in the game rooms.

The sequence of events for morning and afternoon sessions appears in the Appendix on page 16, in the Players' Manual. Mail was delivered to and picked up from each game room by a mailman. Players did not leave the game rooms at any time during a session.

Records were kept of the game (e.g., market transactions, limit orders, etc.). Furthermore, each session was tape recorded. In the observation room trained observers watched and listened to the teams (one observer for one team in each session) and coded and rated certain of their behaviors.

At the middle of each session there was a 14 minute break in order to give the operations crew time to prepare the materials for the second half of the session. During this break the switchboard was closed and questionnaires were distributed to the Ss in order to collect additional data and to discourage game-relevant discussions. The data from these questionnaires will be reported by a different author.

Coding and Rating Scales

A copy of the coding-rating form used by the trained observers appears on pages 1 - 3 of the Appendix. The observers were asked to code the decision mechanism employed by the team every time a decision was made, as well to keep count of all predictions of the future state of the market made by the team and to code them as correct or incorrect whenever possible. This coding was done while the session was in progress. Following each session, the observers rated the team as to 1) intensity of conflict, 2) motivation, 3) over-all view of leadership,[3] 4) extent of leadership, 5) type of leadership, 6) cooperation, 7) extent of conflict, 8) structure. Observers also indicated on a scale the two decision mechanisms that occurred most frequently during the session. This scale was scored on the basis of the decision coding. Definitions of the coding categories and the scale terms mentioned above appear in the Appendix on pages 4 - 6. Scales and coding categories appearing on the coding-rating sheet but not listed above were omitted from the data analysis because their inclusion did not appear fruitful and/or they were of low reliability.

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[3]This scale was later dropped from further analysis due to the fact that it appeared redundant.

Definitions of the these codes and scales have also been omitted in the Appendix.

Preceding the experiment, seven observers were trained to use the coding scheme and rating scales. During this time the scales were themselves continuously refined until they reached the form appearing in the Appendix. Training to code and rate proceeded as follows: 1) trainees were given definitions of all relevant terms and categories (see Appendix, pp. 4 - 6); 2) trainees were then given some verbal examples of each definition or category and questions were answered; 3) trainees listened to tape recordings of game sessions taken from a previous run of the game in which teams were composed in the same manner as in this experiment. The trainees coded and rated these taped sessions and their results were checked by the experimenter who had already listened to these tapes. Where differences occurred, the experimenter attempted to clear them up.

For the observations called for in this experiment, each coder-rater was assigned to two teams, one in the morning session and one in the afternoon, to be watched for all ten sessions. The seventh coder was a floating coder who watched a different team each session that he was able to attend in order to collect some reliability data. The floating coder

worked independently.

At the start of each session each coder-rater was given a report of the changes that were to be expected in the stocks over that session against which predictions were to be coded.

None of the coders were aware of the composition of the teams they were observing (other than the fact that they might deduce this from their observations and knowledge of the theory). Interaction between coders when not in the presence of the experimenter was minimal, and coders were requested not to discuss the experiment.

Following each session (there were 20 sessions - ten morning sessions and ten in the afternoon) each coder-rater completed and submitted a coding-rating form and also gave the experimenter a verbal description of the activities of the team for that session.

Reliability Data

Following the completion of the actual experiment, reliability data were collected. It was desired that 20% of the data be recollected for reliability purposes; since the total experimental data consisted of 120 sets of observations (12 teams over ten sessions), 24 sets of observations were

needed. Seven of these sets of reliability observations were made by the floating coder while the experiment was in progress. The additional 17 sets of observations were made from tapes by three coders who had coded during the experiment (giving the desired total of 24 sets of reliability observations). The selection of tapes was made so as to insure that each team would appear in two reliability observations including the observations by the floating coder. The sessions to be listened to were selected randomly in each case omitting the first and the last, and none of the reliability coders made oberservations on the teams they had observed during the experiment. Reliabilities are presented only for those measures upon which predictions had been made and which were subjected to further analysis. Some of these measures were complex in that they required combining two rating scale scores. All reliabilities were obtained by correlating reliability observations (i.e., floating coder observations plus post-experiment observations) with the corresponding experimental observations using the Pearson product-moment correlation coefficient.

The reliabilities were as follows:

1) decision mechanisms (data: mechanisms that occurred first and second in rank order of frequency over the session), r = .76

2) cohesiveness (data: average of scale scores on intensity of differences and extent of differences

over the session), r = .55

3) extent of leadership (data: score on scale), r = .57

4) type (i.e., autocracy) of leadership (data: score on this scale), r = .78

5) structure (data: score on this scale), r = .96

6) game cooperation (data: scale score on cooperation scale minus scale score on motivation scale over the session), r = .51

7) ability to forecast the future state of the market (data: number of correct predictions divided by the total number of scorable predictions, i.e., C/C+I), r = .57.

The above seven reliabilities have a range of .51 to .96 with an average of .67. It is worthwhile to compare these reliabilities to those obtained by other authors using similar observer rating scales. Haythorn (1953), in an exploratory study, had two observers watch each group and rate the group on a number of scales such as cohesiveness, morale, productivity, etc. The group members also rated the group on these same scales. The resulting inter-observer reliabilities had an average of .70 with a range of .20 to .92. Correlations between Ss' ratings and observers' ratings had an average of .64. Haythorn felt that these reliabilities, although somewhat lower than optimal, were satisfactory.

Haythorn, Couch, Haefner, Langham, and Carter (1956a,b)

again had two observers watch and rate each group. Ss were rated individually on 16 traits (e.g., friendliness, striving for individual prominence, influence, submissiveness, etc.). These ratings had an average corrected reliability of .75 (range: .31 to .91). Observers also rated the groups on five scales similar to the ones used in this study (e.g., group atmosphere, leadership, motivation, etc.). These ratings had an average corrected reliability of .71 (range: .56 to .87). For both types of ratings the reliabilities obtained were slightly higher than those obtained in the study described herein. It is important to note why this was the case and why the difference between the reliabilities obtained by Haythorn et al. and those obtained herein was smaller than might be expected. There are three reasons why higher reliabilities should be expected in the Haythorn et al. studies:

1) The reliability observers in the Haythorn et al. studies watched the groups "in action" and were able to refer to what they saw as well as what they heard to make their ratings. In this study, reliability observations were made from tape recordings so that reliability observers heard but did not see the groups. Their observations were

then compared to those made during the experiment by observers who both watched and listened. In this latter case, lower reliabilities would be expected since reliability observations were based on less information than experimental observations.

2) In the Haythorn et al. studies, two observers watched the same group at the same time. The observation conditions were, therefore, quite comparable for each. In the study described herein, reliability observations were made at a different time from experimental observations, which afforded considerably less comparability. Furthermore, experimental raters had the advantage of observing a group over time (i.e., all ten sessions) and probably gained information from this sense of continuity which the reliability observers would not have available to them since they observed a group only once. This again served to lessen comparability, a difficulty not encountered by Haythorn's observers.

3) In the Haythorn et al. studies, all observations were made twice (i.e., two observers watched each

session). These two sets of observations were then correlated and pooled enabling the authors to correct the reliabilities using the Spearman-Brown formula. Such pooling is possible only when all observations have been made at least two times. In the study described herein only 20% of the observations were made twice (due to the fact that there were many sessions and only a limited number of trained observers). Thus, data could not be pooled and, consequently, reliabilities could not be elevated using the correction formula. This would lead one to expect that Haythorn's corrected reliabilities would be higher than the uncorrected reliabilities in this study. Had reliabilities been corrected in this study, an average reliability of about .80 would have been obtained.

More intensive training of observers would have been required in order to obtain higher reliability especially on those scales that yielded low reliability. However, this can only be improved upon in the future. The reliabilities obtained appear to be at a satisfactory level. Should the scales yield results of high significance, then the problem of reliability will have been minimized. Where such significance is not obtained, reliability can be looked at as an important source of error.

Chapter 4

RESULTS

Testing of Behavioral Predictions

Hypotheses concerning the following six behavioral dimensions were formulated: structure, extent of leadership, autocracy of leadership, game cooperation, cohesiveness, and decision mechanisms. The data for the dimensions of structure, autocracy of leadership, and extent of leadership were session-by-session (i.e., yearly) ratings given by a judge. For the dimension of game cooperation, the data was the yearly raing given by a judge on the cooperation scale minus the yearly rating on the motivation scale. (Subtraction was used since cooperation was scaled from least to most cooperative while motivation was scaled from most to least motivated. See the rating form in the Appendix.) The cohesiveness data was the average of the yearly rating on the intensity of differences scale and the yearly rating on the extent of differences scale. The decision making data was the yearly scale position of the mechanism used most frequently.

End-Game and Beginning Game Effects

To test for systematic differences over time (more

specifically the presence of beginning-game and end-game effects), the predicted ranks and observed ranks for each game year were correlated using Kendall's tau coefficient for three dimensions: structure, autocracy of leadership, and game cooperation. The graph of these correlations over time appears in Figure 3.

Figure 3 demonstrates the presence of a beginning-game effect lasting two game years. No significant correlations were obtained on any of the three scales during this period. There is also a strong suggestion of an end-game effect covering the last two game years. This is most strongly supported by the autocracy of leadership dimension with some support from the game cooperation dimension. However, the end-game effect does not appear on the structure dimension. An explanation of the absence of an end-game effect on structure will be attempted in the discussion section. Figure 3 is also suggestive of the hypothesis that game years 1974 and 1977 were somewhat different from the other years. In fact, these two years were the major "depression" years of the game's economic cycle with 1974 being the more severe of the two. This observation will be discussed later.

On the basis of the data displayed in Figure 3, it was concluded that beginning-game and end-game effects did occur.

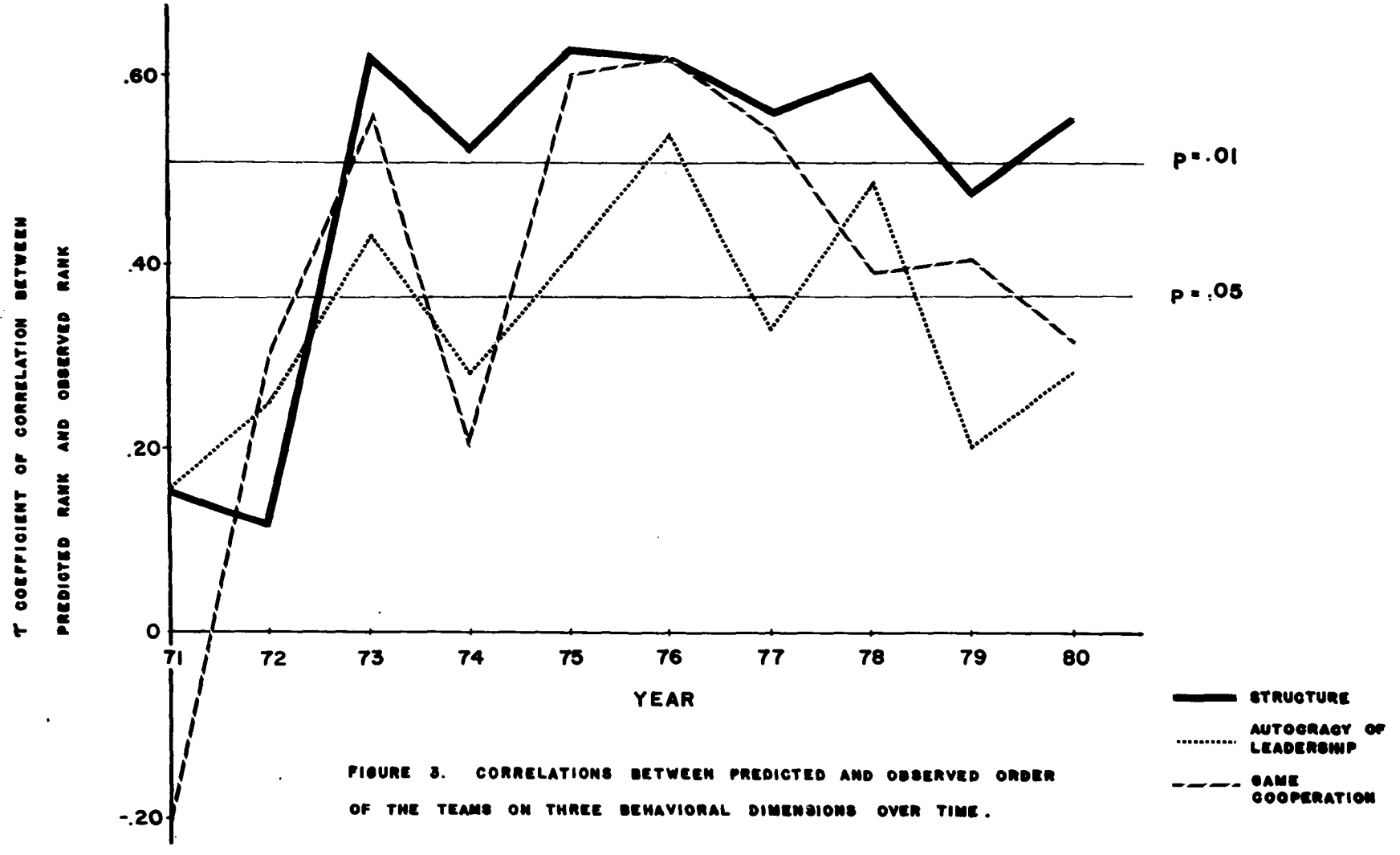

FIGURE 3. CORRELATIONS BETWEEN PREDICTED AND OBSERVED ORDER OF THE TEAMS ON THREE BEHAVIORAL DIMENSIONS OVER TIME.

The presence of these effects is not surprising and an intuitive explanation of why beginning- and end-game effects should be expected to occur will be presented in the discussion section. The data show that both effects were confined to two game years. On this basis, the behavioral data from the first two and last two game years were omitted from all further analyses. Only years 1973-1978 inclusive were submitted to further examination.

Analysis of Variance Test of the Structure Prediction

The major behavioral prediction was that the structures of the different group systems would be systematically different (i.e., the more abstract the group system, the more abstract the resultant structure).

This hypothesis was first tested using an analysis of variance type I design (Lindquist, 1953) in which all Ss (in this case each group being designated as a subject) receive the A variable while the B variable is different for each group of Ss. The A variable was time (A = 6, game years 1973-1978 inclusive) while the B variable was group system (B = 4). The partitioning of variance is shown in Table 2.

Thus, according to this test the effect of the different group systems (B effect) was significant as was the effect of game years (A effect) while the interaction of the two

Table 2

Analysis of Variance of Structure Data

Source	df	ss	ms	F	p
Betwee Ss	11	552.3			
B	3	389.9	130.0	6.43	.02
Error, B	8	162.4	20.3		
Within Ss	60	391.2			
A	5	79.7	15.9	2.80	.03
AB	15	82.7	5.5	0.97	.50
Error, W	40	228.8	5.7		

(AB effect) was not significant. While significance of the B effect was predicted, significance of the A effect was not. The A effect could be explained in part by considering the cyclical nature of the game market, more particularly the state of "depression." The game year having a mean most noticeably different from the grand mean was 1974. This (as was mentioned previously) was the major year of "depression." It appears that this year had a systematic effect which was strong enough to produce the significant A effect demonstrated above.

Correlational Tests

The yearly scores on each of the six behavioral dimensions for the six year period 1973-1978 inclusive were averaged to give one score for each team on each dimension. These scores were representative of the behavior of the teams during the experiment (with beginning-game and end-game effects removed). The average scores for each team on each of the dimensions were then ranked and these rankings were compared to the predicted rankings on the dimensions. The findings to be presented represent the degree of correlation between the predicted order of teams on each of the six dimensions and the observed order of teams on these dimensions.

Comparisons between predicted and observed orders were made using Kendall's tau coefficient which assumes the existence of an ordinal scale rather than an interval scale. Since there were three groups in each group system, and these groups were composed to be equal in all controllable respects, it was not possible to make differential predictions within a group system. For this reason, the three teams in any one group system were predicted to have equal ranks on all dimensions. For instance, in the case of structure, the prediction was that the more abstract the groups system, the more abstract the structure. Thus, the predicted order was the order of abstractness of the group systems with Group System IV teams each having a predicted rank of 2, Group System III teams a predicted rank of 5 for each, Group System II teams a predicted rank of 8 in each case, and Group System I a predicted rank of 11 for each team. These predicted ranks were then compared with the observed ranks of abstractness on the structure (concrete-abstract) continuum.

For the cases in which two group systems (six teams) were predicted to be equal on the dimension in question (e.g., extent of leadership), all six teams were given the same predicted rank which was then compared with the observed

rank on that dimension. In all instances, the calculation of tau was corrected for ties using the correction formula presented by Siegel (1956).

In the case of decision mechanisms, rank orderings were obtained by averaging the number of times that each team used each mechanism for each year during the six year period and then considering only that mechanism which was used most frequently. Unanimity, which was expected to be (and, in fact, was) used most frequently by every team was excluded. The mechanisms used most frequently by the teams were then ranked according to level of abstractness. For cases in which one team used two mechanisms equally frequently, a rank was given midway between the level of abstractness of each of the tied mechanisms.

Another compound measure was examined upon which predictions had not previously been made. This measure was called constructive cohesiveness. Yearly data on this measure was obtained by subtracting the yearly cohesiveness compound score (cohesiveness represented an average for each year on two scales: extent of an intensity of differences) for each team from the scale score on the cooperation scale for the corresponding years. The residual then represented a willingness to work together over-and-above the

desire to get along and avoid disagreement. It served as a measure of the extent to which groups would tolerate alternative ideas even when such alternatives resulted in conflict. The predictions (had they been made) would have been the same as in the case of game cooperation because the same rationale applies. The order would be roughly the same as their tolerance of diversity with Group System II lowest because of the tendency away from control which might result from the expression of new ideas. Thus, the expected order would have been the same as for game cooperation, with Group Systems IV and III showing equally high amounts of constructive cohesiveness, Group System I somewhat less, and Group System II least.

Table 3 summarizes the behavioral findings. Predicted and observed ranks for each of the teams on each of seven dimensions are displayed along with the tau correlations between predicted and observed ranks on each dimension. As can be seen, the correlations were significant on five of the seven dimensions. However, on one of the non-significant dimensions, extent of leadership, the correlation approached significance ($p = .06$) in the predicted direction. In the case of cohesiveness, the observed order was highly deviant from the expected order and resulted in a negative

Table 3

A Comparison of Predicted and Observed Orders of the Teams on the Behavioral Dimensions
(One is the highest rank; half-ranks have been rounded off; N = 12)

Team	Abstractness of Structure		Abstractness of Decision Mechanism		Extent of Leadership		Autocracy of Leadership		Game Cooperation		Cohesiveness		Constructive Cohesiveness*	
	Pred. Order	Obs. Order	Pred. Order	Obs. Order	Pred. Order	Obs. Order	Pred. Order	Obs. Order	Pred. Order	Obs. Order	Pred. Order	Obs. Order	Pred. Order	Obs. Order
IV_a	2	5	2	6	9	9	11	10	3	6	6	9	3	6
IV_b	2	2	2	1	9	12	11	12	3	2	6	3	3	2
IV_c	2	1	2	1	9	8	11	11	3	1	6	2	3	3
III_a	5	3	5	3	3	3	6	8	3	2	6	1	3	8
III_b	5	4	5	3	3	7	6	5	3	7	6	11	3	1
III_c	5	11	5	11	3	1	6	1	3	4	6	7	3	6
II_a	8	6	8	6	9	11	6	8	11	8	11	6	11	11
II_b	8	8	8	10	9	1	6	3	11	9	11	8	11	9
II_c	8	7	8	6	9	6	6	6	11	12	11	4	11	10
I_a	11	10	11	9	3	3	2	4	8	10	2	10	8	4
I_b	11	11	11	11	3	5	2	2	8	5	2	4	8	11
I_c	11	9	11	6	3	10	2	6	8	11	2	12	8	6
	τ = .66 p = .001**		τ = .53 p = .008		τ = .35 p = .06		τ = .59 p = .004		τ = .61 p = .003		τ = -.20 p = .20		τ = .56 p = .005	

* Predictions made on this scale were post hoc.

** p represents one-tailed probabilities (in all instances).

(insignificant) correlation. As can be seen from the observed order, Group System II teams were considerably more cohesive than predicted while Group System I teams lacked the predicted cohesiveness. Also Group System IV teams were more cohesive than Group System III teams (they had been predicted to be equally cohesive).

Over-all Behavioral Predictability

The over-all level of predictability can be seen by considering Table 4 which displays the extent to which each team satisfied the predictions on each of the dimensions. (The cohesiveness dimension has been omitted because of its over-all lack of fit.) Instances in which the observed rank of the average score of the team on any dimension were in the predicted range are indicated by a plus (+) sign. For instances in which the observed rank was not in the predicted range, the distance in ranks from the observed rank to the predicted rank is indicated.

As can be seen from Table 4, only two teams, Wyoming and New York, deviated considerably from the behavioral predictions, Wyoming behaving like a Group System II team and New York like a Group System I team. Bangor and Maine (and to a lesser extent, Casper) deviated somewhat from the predictions although the fit was better than the cases of

Table 4

Over-all Behavioral Predictability by Teams*

Team	Structure	Extent of Leadership	Type of Leadership	Game Cooperation	Constructive Cohesiveness**	Decision Mechanisms
Group System I						
Bangor	+	+	1	1	3	1
Georgia	+	+	+	2	2	+
Wyoming	1	4	3	2	1	3
Group System II						
Rutland	1	+	+	2	+	+
Maine	+	5	1	1	1	1
Ohio	+	1	+	+	+	+
Group System III						
Athens	1	+	+	+	2	+
Dayton	+	1	+	1	+	+
New York	5	+	3	+	+	5
Group System IV						
Casper	2	+	+	+	+	4
Syracuse	+	+	+	+	+	+
Vermont	+	+	+	+	+	+

* A plus sign (+) indicates that the observed rank fell in the predicted range. When this was not the case, a number indicates the number of ranks that the observed rank deviated from the predicted range.

** Predictions made on this scale were post hoc.

Wyoming and New York. If we accept from Table 4 that eight out of 12 teams were predicted correctly, the probability that this was due to chance was .0024 (determined using a binomial expansion), demonstrating that the theory used for classification yielded significant predictability in the area of group behavior.

Testing of Performance Predictions

Performance predictions were formulated for the five following criteria: information seeking, activity, ability to forecast, sales index tracking, and dividend tracking. To test the predictions on these criteria, the independent variable was treated in two ways: 1) as a fourfold variable with the four group systems ranked on the concrete-abstract continuum in the order IV, III, II, I with Group System IV being most abstract; 2) as a twofold variable with Group Systems IV and III being combined and classified as abstract while Group Systems I and II were combined and classified as concrete. When treated as a fourfold variable, level of abstractness of group system and ranking on performance on each of the performance criteria were compared using Kendall's tau coefficient. When treated as a twofold variable, the comparisons were made using a Mann-Whitney U-test.

End-Game and Beginning-Game Effects

A portion of the data were first examined to see whether beginning-game and end-game effects could be detected as they were in the case of the behavioral data. The two major abstract criteria, information seeking and sales index tracking, were examined for this purpose. Each of these measures will be explained in more detail below. Information seeking represents the number of calls made to an information agency while sales index tracking represents the degree to which the actions of a team in the market parallel the sales indices for the four stocks.

Examination of these two measures over time was accomplished by combining the game years in pairs (1971-72, 1973-74, 1975-76, 1977-78, 1979-80) rather than examining each year independently. The large number of ties in rank on these measures in each individual year made the year-by-year data less meaningful than that of larger units. Furthermore, the narrow range of values on a yearly basis (in the case of sales index tracking the yearly range is 0 - 4) contributed to the large number of ties. Two year units were chosen since the behavioral data indicated beginning-game and end-game effects, each lasting two years. An examination of the data in two year units would demonstrate similar effects if they had occurred.

Numerical values on each of the dimensions for each of the teams was obtained by summing the data for each of the two years in the pair. The scores on each pair were then ranked and these ranks were compared to the predicted ranks using Kendall's tau coefficient. The results are presented in Figure 4. It is observed that the predicted relationships developed over time and then diminished over time, again demonstrating beginning-game and end-game effects, each lasting two years. For this reason data from the first and last two years have been omitted from further analyses. All measures represent the sum of values over the six year period 1973-1978 inclusive.

The Performance Measures

The measure of information seeking was the number of calls made to the Mason-Cox agency in the six year period 1973-1978 inclusive. The teams were ranked on number of calls and this rank was compared to rank level of group system abstractness, the prediction being that the two would be related positively (i.e., more abstract teams making more calls to seek information).

The measure of activity was the number of lots of stock transacted during the six year period. Activity was also expected to be an increasing function of group system level

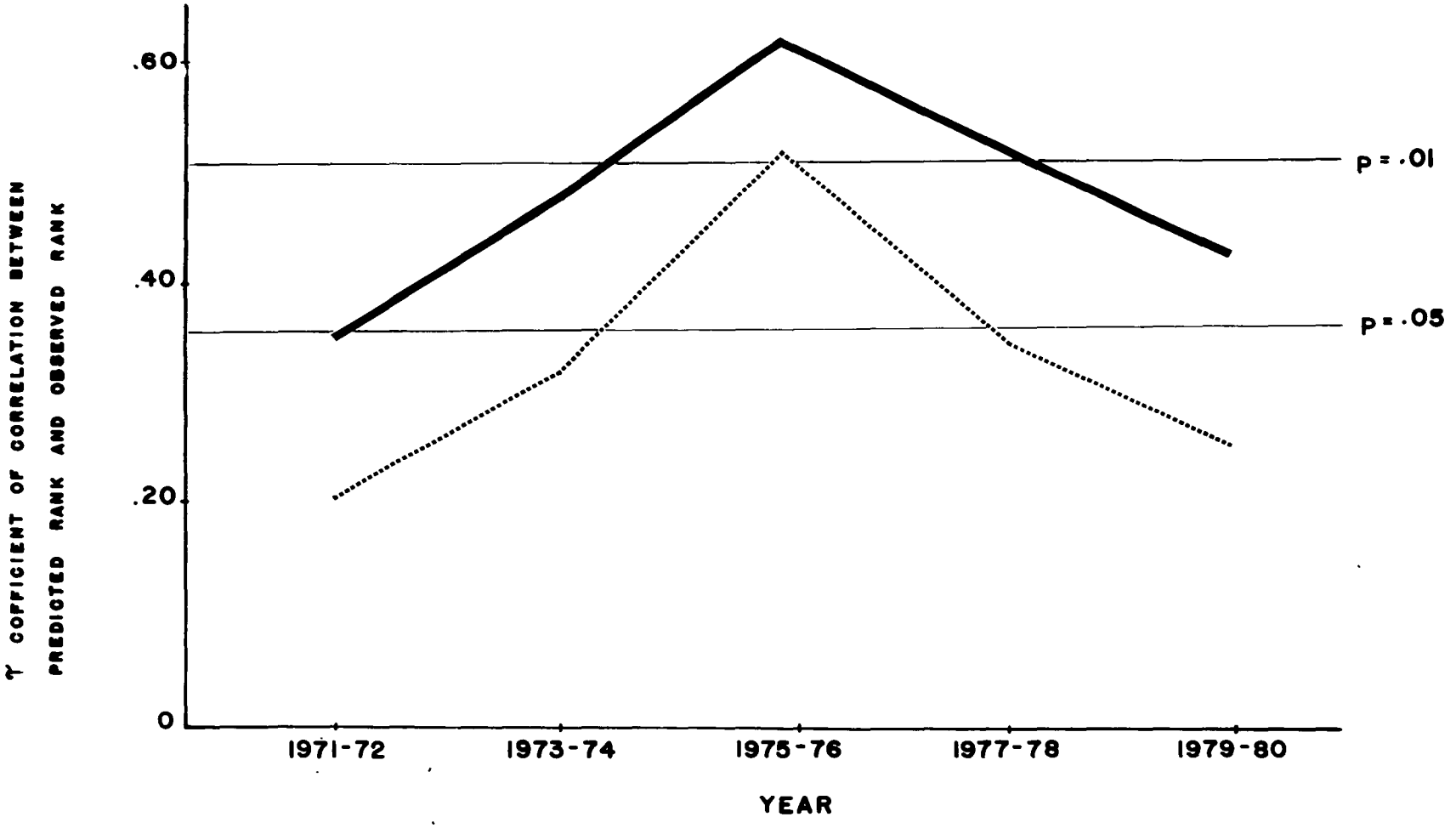

FIGURE 4. CORRELATIONS BETWEEN PREDICTED AND OBSERVED ORDER OF THE TEAMS ON TWO PERFORMANCE DIMENSIONS OVER TIME.

of abstractness.

The ability to forecast measure was obtained by taking the sum of correct predictions of the future state of the market made by a team during the six year period and dividing it by the sum of all scorable predictions of future state by the team during this period. (This data had a reliability of .57.) The resultant ratios for all teams were then ranked and these ranks compared to rank of abstractness of group system, the expectation being that ability to forecast would be an increasing function of group abstractness.

Tracking: The analysis of performance on the two tracking criteria required more detailed considerations of the data than that used in the above cases since simple, direct measures were not available. The stock holdings of each team at the beginning and end of each playing session during the six year period were examined and the concept of significant decision was defined to incorporate this data and make it more meaningful. A significant decision was defined as either of two activities: 1) a change in the holding of any one stock by a team of 15 lots or more during the active playing session; or 2) a constant holding of 35 lots or more of any one stock (constant in the sense of not changing by as many as 15 lots) by a team during the course of an active playing session. The former was termed a significant change and the latter a

significant holding. Thus, the maximum number of significant decisions which a team could make during any one active playing session was four (i.e., one in each stock). Looking at change and holding as "occur-not occur" states rather than considering the absolute amount of change or absolute size of holding was done to eliminate risk-conservatism as a factor. It was assumed that a change of 15 or a holding of 35 indicated a definite trend on the part of the team (rather than merely inconsistency or random activity), and that greater changes or greater holdings would merely reflect the risk-taking tendency of the team. Were absolute sizes of change or holding to be considered, teams would be penalized or rewarded for risk. To avoid this, a minimum magnitude, sizeable enough to show a trend, was used.

Each significant decision made by a team during the six year period was identified as to the year the decision was made, the stock involved, and whether the decision was a change (and if so, in what direction) or a hold. Each decision was then compared to sales index tracking and dividend tracking criteria.

Sales index and dividend rate were examined for each half year during the six year period. For each half year

the sales index was identified as going up, going down, or remaining steady. The significant decisions made by each team were then compared to the sales index in each stock for the half year during which the decision was made. Positive sales index tracking was defined as buying a significant amount (i.e., 15 lots or more) of a stock when its sales index was going up, or selling a significant amount when its sales index was going down. Because of the high variability of sales index, it was assumed that tracking of this variable must involve changes and not holdings. A steady sales index indicated that the future was uncertain, and a team that was tracking sales index would be tracking well if they avoided this stock. If the sales index of a stock was rising, good sales index tracking would necessitate buying more of the stock rather than just holding it regardless of the amount held.

The number of significant decisions made by a team exemplary of positive sales index tracking as defined above were summed over the six year period and divided by total number of significant decisions during this period to give a percentage sales index tracking score. The percentage sales index tracking scores for each of the teams were then ranked, and these ranks were compared to rank of group abstractness with the expectation that degree

of sales index tracking would be an increasing function of group level of abstractness.

For each half year, dividend rate was classified as going up, going down, or remaining steady. The significant decisions made by each team were then compared to the dividend rate in each stock for the half year during which the decision was made. Positive dividend tracking was defined as buying a significant amount (i.e., 15 lots or more) of a stock when its dividend rate was going up, selling a significant amount when it was going down, or holding a significant amount of a stock having a dividend rate which was one of the two highest dividend rates during that half year. This latter qualification emphasized the investment characteristics of dividend tracking.

The number of significant decisions made by a team exemplary of positive dividend tracking as defined above were summed over the six year period and divided by total number of significant decisions to give a percentage dividend tracking score. It was decided that no one decision could be considered a positive instance of both types of tracking. In cases in which one decision satisfied the criteria of both kinds of tracking (a relatively rare occurrence since dividend changes lagged sales index changes and sales index changes occurred often) the

decision was classified as sales index tracking if the team called Mason-Cox to get the sales index on the stock in question prior to making the transactions. This information could be gotten from the game records. If Mason-Cox had been called, it would mean that the team had made the effort to get sales index information and thus was presumably acting on it. This notion produced results which were consistent with the classification of non-overlapping instances, and was thus considered satisfactory.

The percentage dividend tracking scores for each team were ranked and compared to rank abstraction, the prediction being a high negative relation.

A final criterion was examined about which no predictions had been made, namely: over-all amount of tracking. This was determined by dividing the number of decision that satisfied either sales index or dividend tracking requirements by the total number of significant decisions and ranking the resulting ratios. A low percentage of over-all tracking would indicate that much of a team's game-playing behavior was based on no strategy other than faith in the future since speculation (measured by sales index tracking) and investment (measured by dividend tracking) were assumed to be exhaustive of all "pure" strategies.

Had predictions been made concerning this measure, it wouldhave been predicted to be an increasing function of group system level of abstractness since tracking meant attending to and following the environment. Abstract teams were expected to exceed concrete teams in this regard.

Findings

The predicted and observed orders of the teams on each of the six aforementioned measures are displayed in Table 5 along with the tau correlations between predicted and observed orders on each of the measures. Also, Mann-Whitney U values are presented for each measure. These values represent the comparisons of abstract (Group Systems IV and III combined) and concrete (Group Systems I and II combined) teams.

As Table 5 indicates, tau correlations on all measures other than dividend tracking were significant. The same applied to U values except in the case of activity where U was just below significance. Greater predictability was afforded by the fourfold classification scheme (τ values) than by the twofold scheme (U values).

The Over-all Performance Predictability

The over-all level of predictability can be seen by

Table 5

A Comparison of Predicted and Observed Orders of the Teams on the Performance Measures (One is the highest rank; half-ranks have been rounded off; N = 12)

Team	Information Seeking		Activity		Ability to Forecast		Sales Index Tracking		Dividend Tracking		Over-all Tracking*	
	Pred. Order	Obs. Order	Pred. Order	Obs. Order	Pred. Order	Obs. Order	Pred. Order	Obs. Order	Pred. Order	Obs. Order	Pred. Order	Obs. Order
IV_a	2	4	2	1	2	2	2	2	11	7	2	1
IV_b	2	5	2	2	2	2	2	5	11	8	2	4
IV_c	2	1	2	4	2	1	2	1	11	10	2	6
III_a	5	7	5	8	5	4	5	4	8	9	5	5
III_b	5	9	5	11	5	7	5	10	8	2	5	7
III_c	5	2	5	3	5	9	5	6	8	5	5	2
II_a	8	8	8	10	8	7	8	7	5	1	8	3
II_b	8	3	8	6	8	6	8	3	5	11	8	9
II_c	8	10	8	5	8	11	8	8	5	6	8	10
I_a	11	12	11	12	11	10	11	12	2	2	11	11
I_b	11	6	11	7	11	7	11	9	2	4	11	7
I_c	11	11	11	9	11	9	11	11	2	11	11	12
	τ = .54 p = .007**		τ = .54 p = .007		τ = .58 p = .004		τ = .64 p = .002		τ = +.17 p = .22		τ = .59 p = .004	
	U = 7 p = .05		U = 8 p = .07		U = 5 p = .02		U = 7 p = .05		U = 15 p = .35		U = 4 p = .01	

* Predictions made on this measure were post hoc.
** p represents one-tailed probabilities (in all instances).

considering Table 6 which displays the extent to which each team satisfied the predictions on each of the dimensions. The predictions are based on the twofold classification (i.e., concrete, abstract) in this table. A + indicates an instance where the observed rank fell into the predicted range while a number indicates the distance in ranks from the observed rank to the predicted range in the case of a lack of fit.

It can be observed that for only two teams, Maine and Dayton, were the predictions grossly inaccurate. Maine performed as an abstract team while Dayton performed as a concrete team, exactly the reverse of the prediction. The probability of predicting ten out of 12 by chance is below the .001 level.

Interrelation Between Performance Measures

To determine the degree of interrelation between all measures that could be ranked from most abstract to most concrete, a Kendall correlation of concordance was calculated. The measures correlated were level of group system abstractness, information seeking, activity, ability to forecast, sales index tracking, and over-all tracking. The resulting correlation of concordance was .732 ($N = 12$, $k = 6$) which was converted to a x^2 of 48.31 ($df = 11$) which is

Table 6

Over-all Performance Predictability by Team*

Concrete Group Systems I & II	Information Seeking	Activity	Forecast Ability	Sales Index Tracking	Dividend Tracking	Over-all Tracking**
Bangor	+	+	+	+	+	+
Georgia	1	+	3	+	+	+
Wyoming	+	+	+	+	5	+
Rutland	+	+	+	+	+	+
Maine	4	1	1	4	5	4
Ohio	+	2	+	+	+	+
Abstract Group Systems III & IV						
Athens	1	2	+	+	+	+
Dayton	3	5	5	4	4	2
New York	+	+	3	+	2	+
Casper	+	+	+	+	+	+
Syracuse	+	+	+	+	+	+
Vermont	+	+	+	+	+	+

* A plus sign (+) indicates that the observed rank fell in the predicted range. When this was not the case, a number indicates the number of ranks that the observed rank deviated from the predicted range.

** Predictions made on this scale were post hoc.

significant at the .001 level. Thus, the degree of fit between the various performance criteria (excluding dividend tracking) and the group systems was a close one. This was not surprising since it was expected that many of these measures were interrelated.

Analysis of the "Profit" Criterion

An attempt was made to determine in part the basis for the most obvious performance measure, accumulated profit. The prediction was that this measure would not necessarily be related to group system level of abstractness. This hypothesis was tested using rank in profit over the six year period (1973-1978 inclusive). The result was as predicted with $\tau = -.10$ ($p = .33$),[4] indicating an insignificant tendency for concrete teams to outperform abstract teams on the profit measure.

Since profits were not a function of level of abstractness of group system, other functional relations were investigated. This investigation would not bear relevance to the group system hypotheses but might be of interest in an analysis of the stock market game in terms of optimal

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[4]All probabilities reported in this section are one-tailed.

strategies. Rank in profit was compared to rank in dividend tracking ability to determine whether the former was a function of the latter. The relationship was significant ($\tau = .37$, $p = .05$). The next hypothesis, formulated in an attempt to find a factor which would give a higher correlation with profits, was that profits were not merely a function of dividend tracking ability but were based on some combination of both dividend tracking ability and sales index tracking ability, with more importance being placed on the former. To test this notion the ranks on dividend tracking and sales index tracking were combined arbitrarily by multiplying the rank on dividend tracking by 1 1/2 and then adding this to the rank on sales index tracking. The resultant combination rank yielded $\tau = .47$ ($p = .02$) when compared to rank on profit for the six year period. Other combinations of the two tracking ranks (such as a straight sum or 2 times dividend tracking plus sales index tracking) were compared to profit but significance was not obtained. This would appear to indicate that the 1 1/2 to 1 weighting was the best measure of profit and that the strategy of tracking both dividend rate and sales index with more emphasis on the former would result in greatest game profit.

Two additional measures were derived to compare with profit. The first of these measures was called the diversification index (DI) and was a measure of the extent to which a team distributed its holdings across all four stocks as opposed to concentrating in one or two stocks. DI was calculated (for each team) for each year in the period 1973-1978 inclusive using the following formula:

$DI = \frac{2X_1+X_2-X_4}{\Sigma X_i}$ where the Xs represent the holdings in each of the four stocks at the end of the year and $X_1 \geqslant X_2 \geqslant X_3 \geqslant X_4$. Thus, if a team held an equal amount of all four stocks DI would have a minimal value (0.50) whereas if a team held only one stock, DI would have a maximal value (2.00). If a team held only two stocks and these holdings were of an equal amount, DI would equal 1.50. For each team the DI values for each of the six years were averaged and the resultant averages were ranked. These ranks were then compared to rank in profit yielding $\tau = -.45$ ($p = .02$). Thus, the more diversified a team's holdings were, (i.e., the smaller the diversification index value) the greater the profit made by that team. Diversification of holdings was, therefore, a good game strategy.

The second measure derived was risk. Risk had two components: 1) the extent to which a team made a significant

change, and 2) the size of their significant holding. In determining the tracking functions, risk had been purposely eliminated by not considering the absolute size of a change or holding but noting only whether it exceeded a minimal value or not. To calculate risk these absolute values were inspected. It was decided (using much the same reasoning used to arrive at 15 and 35 lots as a minimal indication of a change and a hold respectively) that each 15 lots of change from the holdings at the beginning of a session to those at the end would be scored as one risk unit. A change of 30 lots, for instance, would then be given two risk units, 45 three, etc. In the case of holdings, a holding over the course of a session of 35 lots was assigned one risk unit, 60 lots two risk units, and 80 or more lots three risk units. These values were unitized on the assumption that it was more risky to make a change in holdings than just to retain a constant holding.

The total number of risk units for each team was computed over the six year period and these values were then ranked and compared to rank in profit yielding $\tau = -.45$ ($p = .02$). Thus, the more risk taken by a team the smaller were the accumulated profits obtained by that team. Conservatism was, therefore, a good game strategy.

Because risk and diversification had the same relation to profits, the two were compared and resulted in $\tau = .54$ ($p = .007$), indicating not that risk and diversification were measures of the same thing, but that a team that tended to take a great deal of risk, did so by "putting all their eggs in one basket." Teams that took a lot of chances did not take them equally in all stocks at the same time but tended to select the one or two stocks (generally one) that they perceived to have the best prognosis and to go heavily into this stock or stocks. Those teams that took little risk tended to hold small amounts of all four stocks and not to make radical changes in holdings.

Chapter 5

DISCUSSION

Conclusions

The following conclusions were drawn from the study:

1. The more abstract the homogeneous group members, the more abstract the structure or interpersonal organization adopted by the group; i.e., more abstract groups adopted structures which facilitated information processing and did not limit the diversity that could confront the group.

2. The more abstract the homogeneous group members, the more abstract the mechanisms used for making decisions, i.e., more abstract groups used mechanisms that allowed for more tolerance of diversity.

3. Homogeneous groups of System I and of System III individuals exhibited more leadership than groups of System II individuals or groups of System IV individuals.

4. The leadership in groups of System I individuals was more autocratic than that of groups in the other systems; the leadership in System IV groups was more democratic than that of groups in the other systems.

5. System II groups were least cooperative in the course of game-directed activities while System III groups and System IV

groups were most cooperative in this regard (the latter being somewhat more cooperative than the former).

6. On the dimension of cohesiveness (i.e., the degree of absence of conflict) no systematic differences were found between the groups of different composition. However, on a measure of the degree to which cohesiveness was sacrificed for purposes of cooperation (constructive cohesiveness), it was found that System I groups ranked lowest with System III and System IV groups highest.

7. The more abstract the homogeneous group members, the greater the amount of information seeking, the greater the market activity, the greater the ability to forecast the future state of the market, the greater the degree of sales index tracking, and the greater the degree of over-all tracking. That is, the more abstract the group the greater the environmental sensitivity, the employment of alternative strategies, and the flexibility.

8. Level of group abstractness was unrelated to degree of dividend tracking and unrelated to amount of accumulated profits.

9. Amount of accumulated profits was a function of three variables: degree of dividend tracking, degree of risk taking, and degree of diversification of holdings.

10. Beginning-game and end-game effects, each of roughly two sessions in duration, were observed, during which most of the reported findings did not hold. Only the middle six sessions were included in the analyses.

11. Over-all, it was concluded that there is a constancy between the characteristics of the individual group members and the behavior of the resultant group, and on this basis it was possible to make accurate predictions concerning behavior and performance that could not be accounted for by chance.

A few of the groups deviated from expectations in a rather consistent fashion. Most noticeable of these was New York, a team classified as Group System III. New York displayed behaviors which were characteristic of a far more concrete team, specifically Group System I. They developed a hierarchical structure, used power as the major decision mechanism, and displayed a high degree of leadership which was highly autocratic in nature. New York's game performance was about midway between the ends of the abstract-concrete continuum. After the data had been analyzed, the Sentence Completion Test papers for the members of the New York team were reread by a competent independent observer using an updated manual who found that these individuals were more concrete than had been

estimated originally. However, the New York data was still retained although grounds exist for questioning its inclusion in Group System III data. It is noteworthy that in spite of this data significant results were obtained on all dimensions but two (cohesiveness and dividend tracking).

Wyoming was another deviant in the sphere of interpersonal orientation, displaying noticeably more conflict and lack of structure than was expected of a System I group. It appeared that a great deal of antagonism was generated in this team early in the game which led to a rift that persisted throughout the game. This antagonism could have been the result of what Triandis, Mikesell, and Ewen (1962) termed cognitive dissimilarity or dissimilarity of political (and to a lesser extent, religious) attitudes. The members of the Wyoming team undoubtedly held very different attitudes on the basis of their different backgrounds, i.e., one theologian, one Indian, and one Bostonian of Italian origin. This attitudinal dissimilarity may have served to disrupt the highly structured environment typically developed by System I groups.

Bangor appeared to have suffered from the same difficulties as had Wyoming. Of all 12 teams, these two were highest in the degree of intra-group background dissimilarity. The other ten teams were considerably more homogeneous

in this regard. It would appear that such intra-group heterogeneity of background (and resulting attitudes) was a confounding variable that should have been avoided in this study. Difficulty in obtaining participants for this experiment made control of this variable impossible.

Since the experimental task was relatively unrelated to attitudes, one might ask how attitudinal dissimilarity within a group could be a significant factor. Again referring to the study by Triandis et al. (1962), we see that their tasks were relatively unrelated to attitudes; rather they were tests of "creativity." However, attitudinal differences (labelled cognitive dissimilarity by the authors) served to produce antagonism within the groups unless efforts were made to avoid it. This was not true in cases of cognitive similarity within the group.

We would expect diversity of central attitudes to effect group functioning and structure, but diversity would be handled differently by concrete and abstract teams. Abstract teams would be expected to be able to cope with attitudinal diversity and still perform creatively. Therefore, attitudinal diversity must be considered in interaction with group level of cognitive complexity and would be expected to have more effect in low complexity groups. Bangor and Wyoming

were both low complexity groups (Group System I), and attitudinal diversity must be considered as an important factor, in interaction with level of complexity, producing deviance from the predictions in both of these cases.

To a lesser extent, Maine deviated from expectations, displaying at times a hierarchical structure and more autocratic leadership than was expected from a Group System II team. This team apparently banded together to view the experimenter as the "common enemy" and were often observed expressing hostility toward the experimenter and the experiment. By doing so Maine was reaffirming their independence via an outside source and thus bypassing the necessity to affirm their independence with regard to one another. This enabled them to have reasonably structured interpersonal relations which occurred on the most concrete level. The observer of Maine reported that the "leader" never ordered the team to do anything that the team was not obviously in favor of doing on the basis of previous discussion. Thus, it appeared that Maine attained some structure without sacrificing independence entirely.

It was worthwhile to consider the level of abstractness of the stock market game and to examine various measures in

the light of it. On the whole the stock market game is a fairly concrete game insofar as relatively few alternative approaches are possible and integration is limited. That is, it can be played effectively with fairly concrete strategies. The game afforded two major strategies: speculation and investment. The former required greater environmental sensitivity (i.e., differentiation) since the speculative index, the sales index, was difficult to track. The existence of two alternatives, each of which can be pursued independently, represents the level of abstractness identified as System II. In order for System III level abstractness to be attainable, there would have to exist in the game the possibility of integrating the two strategies. Integration represents something more than speculating at times in some stocks and investing at times in others. Superordinate integration of strategies is not possible in this game. Therefore, the criteria defined as abstract were only relatively abstract. It is more "abstract" to attempt to track the most sensitive game indicators and to use all alternative strategies (i.e., over-all tracking) than to track a relatively inflexible indicator and not use all alternative strategies. However, the former is only a shade more abstract than the latter when the entire concrete-abstract continuum is considered.

This, unfortunately, is a limitation of the game.

We might ask why the abstract groups persisted in tracking sales index when it did not lead to high rank in accumulated profit. The answer to this might be that little information as to what strategy would be successful was available to the teams. It appeared that the abstract teams felt their lack of success was due to the fact that their tracking of sales index was not as sensitive as it could be, not that speculation was an ineffective strategy. Also Figure 4 demonstrated that the relation between group system level of abstractness and degree of sales index tracking appeared to diminish over time. Apparently, the abstract teams were beginning to realize that their strategy was not conducive to success.

Beginning-game and end-game effects were expected and were observed. Beginning-game effects were expected on the basis that individuals had come together for the first time and had to evolve a structure, and that the game was a fairly complex one and time for orientation seemed a necessity before strategies could be formulated. The data demonstrated very definitely that the groups were insignificantly different during the first two game years and predictable interpersonal

characteristics and performance characteristics did not evolve until the third session. This follows from the developmental nature of the theory of Harvey et al. (1961) which views the systems, when open, as stages through which individuals pass. Some development is necessary for differences to emerge.

End-game effects were expected on the basis that group members might react differently toward one another when they know that their "group life" is about to end. Schutz (1958) observed that his developmental postulate about groups did not seem accurate in the final phases of the group's existence. Furthermore, the stock market game is such that specific strategies for the end-game period should be developed. In the end-game, one does not have time to react to the market; rather one should try to anticipate it. The data clearly showed an end-game effect of two years duration in the area of performance. The behavioral data were not as definitive. While type of leadership and game cooperation showed this effect, structure appeared not to. It may be conjectured that the judges, after many sessions of observing the same teams, became less sensitive to changes in structure, the most stable measure of a team's behavior. More frequent rotation of judges may be a solution to this problem.

The behavioral data showed that game year 1974 and to a lesser extent 1977 were somewhat different from the other game years. These years were termed "depression" years as an examination of Figure A3 in the Appendix will reveal. In 1974 and 1977 the two most variable stocks, Atlas Alloys and Sceptre Studios, were both depressed in price, while a third stock, Monarch Machines, was on the verge of decline (in 1974). During no other year in the game was the market as depressed on the average as during these two years. Depression may be considered an instance of stress, and it would have been interesting to measure any systematic effects that such stress had on the teams. However, the relatively small amount of data relating to this point make such an analysis unprofitable. It can be seen from an examination of Figure 3 that during "stress" (1974 and 1977) the teams appear to "look alike" and some of the predicted correlations are below significance. This phenomenon merits closer investigation. (Driver, 1962, found that perceptual complexity, i.e., level of abstractness, was reduced under intense stress.)

Had the data from the two depression years been omitted from the analysis, a higher level of significance would have been obtained. This applies to the behavioral data where a strong "depression effect" was observed. This effect appeared not to influence performance measures.

The problem of "getting along" vs. "working together" was looked at in the light of tolerance and encouragement of diversity. Cooperation and cohesiveness per se did not seem to be systematically different among the teams. Two notions were adopted, namely that cooperation must be examined with reference to game involvement, and that cohesiveness must be examined with reference to cooperation. In the former case, it was argued that the resulting dimension would measure the extent to which members "worked together" on game materials. In the latter case, it was argued that one would be measuring the willingness of the team to bring in diveversity although such diversity would reduce cohesiveness or harmony. Both of these derived dimensions showed systematic differences between group systems whereas their predecessors did not. Such an attempt to sort out the various aspects typically subsumed under the heading of compatibility (cf. Schutz, 1958) appeared to be a fruitful one.

It would appear that the theory of personality structure developed by Harvey et al. (1961) and modified in more recent publications (Schroder and Streufert, 1962; Schroder, Driver, and Streufert, 1963) is a powerful and meaningful way of

classifying individuals, and that it is readily generalizable to groups (at least within the condition of homogeneous group composition). Using the theory, high predictability was obtained on a number of dimensions. Thus the findings of Lawrence (1962) and Driver (1960) were extended and the findings of numerous other researchers (mentioned in the introduction) that groups of differing homogeneous composition behaved differently and such differences were in many cases predictable was replicated. Dispositional factors, hitherto neglected by many group researchers and theorists, appear to be a significant force in affecting group behavior and the interaction of such dispositional factors with controllable situational factors appears to be a profitable next step in the exploration of group phenomena.

Chapter 6

SUMMARY

This study was concerned with topic of group composition in which the behaviors of groups are studied as a function of the types of individuals who make them up. Individuals were classified into one of four of the systems of personality structure varying in integrative complexity according to the theory of Harvey, Hunt, and Schroder (1961; see also Schroder and Harvey, 1963). Groups were then composed so that the members of a group had the same personality structure (homogeneity), and all four systems were represented homogeneously in the total number of groups composed. There were three groups for each of the personality systems. The main question asked was: Are there systematic differences in behavior (i.e., interpersonal relations; group structure) and performance between groups homogenously composed of individuals of varying levels of personality structure, and could these differences be predicted from the theory?

The group composition literature was summarized using method of composition as the main variable of a classificatory scheme. Four such methods of composition were

delineated: 1) composition based on mutual preference, 2) all possible combinations of the same individuals, 3) homogeneity vs. heterogeneity, and 4) homogeneity of different types. This study falls into the latter category. The literature was seen to be confusing and contradictory due to a lack of standardization in individual classificatory schemes, group tasks, and group measures. Only two studies were particularly relevant. Driver (1960) classified individuals on the basis of abstractness of personality structure using the Harvey et al. (1961) theory, and composed homogeneous groups of abstract and concrete individuals. Using an earlier version of the SOBIG stock market game, he found that abstract teams performed slightly better on abstract criteria and concrete teams performed better on concrete criteria. Lawrence (1962), using the same classification and composition scheme as Driver, found that the reactions of abstract teams to feedback in a modified war game were more differentiated and integrated than those of concrete teams.

In this study, four personality systems varying in integrative complexity were used. System I individuals, trained in a unilateral environment, are characterized by maximally concrete structure which, in this system, gene-

rates a minimum of cognitive alternatives in perception. Ambiguity and diversity are threatening. Increasing degrees of freedom provided via the utilization of some inconsistency of rules by the training agent produces a System II structure in which alternate schema for combining dimensions emerge, but the schema are minimally related. Self-delineation is the central anchor. For this system potential control is threatening. Training by exploration and feedback, where the individual is protected from the consequences of his own behavior, leads to System III structure. The individual develops higher order schema for comparing or monitoring differences produced by System II schema. At this level the intentions of others are differentiated and potential rejection is threatening. Learning by exploring and experiencing in feedback-rich environment (interdependent training: Harvey et al., 1961; autotelic environment: Anderson and Moore, 1959) leads to maximally abstract structure. The individual can generate higher order schema for combining and reorganizing lower order schema.

All four systems are information processing systems with different potentials for differentiation and integration of inputs as a function of the level of abstractness of the system.

In this experiment, 12 three-man teams (three teams in each system) played a stock market game in which certain inputs were preprogrammed and others determined by the behavior of the teams. Teams played "against" the market in an effort to outperform their competitors. Trained personnel observed the teams and coded and rated certain of their behaviors. Their performance was also measured along a number of criteria.

Coding and rating scales were found to have reliabilities between .51 and .96 with .67 as an average.

On the basis of the theory described above, predictions were derived for teams of the various systems on a number of dimensions. As predicted, the type of interpersonal organization (i.e., structure) developed by the teams was a function of their level of abstractness. More abstract teams evolved structures that facilitated information processing and brought diversity into the group. More concrete teams evolved structures that limited or eliminated diversity.

As predicted, the above held also for the decision mechanisms used by the teams. The more abstract the team, the more abstract the decision mechanism employed. More abstract mechanisms allowed diversity to come into the decision process while concrete mechanisms eliminated it.

As predicted, System I and System III teams had more direct leadership than II and IV teams; leadership in System I teams being most autocratic while that of System IV teams being most democratic (i.e., interdependent).

As predicted, System III and System IV teams were most game-cooperative, while System II teams were least game-cooperative. Contrary to the prediction, there were no differences in cohesiveness between teams of the different systems. However, on a measure of the extent to which teams sacrificed harmony for the cooperative effort (constructive cohesiveness), System IV and System III teams scored highest and System II teams lowest. Although post hoc, this conformed to the theoretical expectation.

In the performance area, amount of information seeking, ability to predict the future state of the market, market activity, and sales index tracking (a measure of a team's tracking of a complex preprogrammed input), were all positively increasing functions of the level of abstractness of the team. As predicted, more abstract teams were higher in all of the above than concrete teams.

Contrary to expectations, degree of dividend tracking (a measure of a team's tracking of a simple, relatively stable, preprogrammed input) was unrelated to team level

of abstractness. However, degree of over-all tracking (a composite of the two types of tracking) was a positively increasing function of level of abstractness. This finding is in agreement with the theory.

Beginning-game and end-game effects were observed. The first two and last two game sessions did not, on the whole, confirm the predictions; rather there was little correspondence between expected and observed orders on the various dimensions during these periods. Consequently, the above findings apply only to the middle six sessions with the first and last two excluded.

Excluding beginning- and end-game periods, over-all predictability of the groups based on the theory was quite high and well beyond the level expected by chance. It was concluded that the personality structure of members working in a group is a highly significant variable in its effects upon evolving group structure, group functioning, and information processing. The results also supplement certain aspects of the theoretical formulation relating personality structure and group organization as described by Schroder and Harvey (1963).

The criterion of profit was examined and it was found that amount of accumulated profit was an increasing function

of each of the following: 1) degree of dividend tracking, 2) diversification of stock holdings, and 3) degree of conservatism (i.e., absence of risk). A strategy based on investment with holdings roughly equalized across all four stocks and no increases of large magnitude in any stock (i.e., minimum risk) led to game success (i.e., success insofar as the participants were rewarded on the basis of accumulated profit).

Major instances of failure in predicting were explained on the basis of uncontrollable factors or unsatisfactory classification. The profit criterion itself was concluded to be a relatively concrete one in that rather simple strategies were correlated with game success defined in terms of profit accumulation.

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APPENDIX

TEAM OBSERVED_____ GAME YEAR_____

NAME OF OBSERVER_____

CODING-RATING FORM

1. Decision-making mechanism (In absence of differences)
(Rank in order all mechanisms that are used)

Power	Unilateral	Unanimity	Explanation	No mechanism

2. Decision-making mechanism (In presence of differences)
(Rank in order all mechansims that are used)

Exercise of authority by leader	Ignoring (1,2,3)	Withdrawal	Avoidance of issues	Majority	Compromise (give & take)	Pers.	Persuasion leading to conceptual agreement

3. Intensity of Differences

Strong				Weak or absent

4. Motivation

Team has intense game motivation				Team is totally unmotivated

5. Degree to which one member dominates team decision-making

One man does all decision-making		Team members try to counteract one another				Entire team works equally

6. Extent of leadership

Team accepts a definite leader	No leader

7. Type (autocracy) of leadership
(Score only if team has a leader)

Leader rules team and dictates policy	Leader guides team democratically

8. Cooperation

Team members attempt to function independently	Team members attempt to function as a closely-knit group

9. Extent of differences

Team has constant disagreement	Team members never disagree

10. Structure

Hierarchy — Independents — Factions — Individuals holding together — Single organism

11. Conceptual Functioning I
(Score only if team makes predictions)

Team makes predictions	Team makes and supports or discusses predictions

12.

(Score only if team makes predictions)

Team;s predictions are not correct				Team's predictions are correct

13. Conceptual Functioning II

Team's actions aren't consistent with strategy				Team's actions are consistent with strategy

14.

Team has a poor grasp of game concepts				Team has a good grasp of game concepts

15. Team's Strategy

(a) State strategy in words:

(b) Short term vs. long term) CHECK
) ONE OF
(c) Conservative vs. risky) EACH

DECISION MAKING CODING

(In absence of differences)	(In presence of differences)
	EXERCISE OF AUTHORITY:
POWER:	BY LEADER:
	IGNORING:
UNILATERAL:	WITHDRAWAL:
	AVOIDANCE OF ISSUES:
UNANIMITY:	MAJORITY:
	COMPROMISE:
EXPLANATION:	PERSUASION:
	PERSUASION LEADING TO
NO MECHANISM:	CONCEPTUAL AGREEMENT:

PREDICTIONS			
MADE	DISCUSSED	CORRECT	INCORRECT

DEFINITIONS OF CODING CATEGORIES AND SCALE TERMS

decision - the act of transforming a suggestion into an action (or into no action); that activity which enables action to be taken or blocked.

power - one member tells the other members what they will do and it is done; one member declares the team's policy and it is followed; one member authoritatively accepts the suggestion of another which is then enacted; one member authoritatively rejects the suggestion of another which is then tabled.

unilateral - one member takes an action without making a suggestion to the team and seeking their approval - he just goes ahead and does something which has not been discussed; the team discusses and rejects a suggestion and then one member goes ahead on his own and enacts it; somebody makes a suggestion and a member follows by distinctly changing the subject so as to disregard the previous suggestion.

unanimity - a suggestion is made and all members are in immediate agreement as to accept or reject it; no discussion is required; assent is glib and unquestioned.

explanation - one team member makes a suggestion and is called upon by team members to explain why such a suggestion merits enactment - the explanation is given and the explanation is reacted to in terms of its meaninfgulness - the suggestion is then accepted or rejected accordingly.

processing - the team decides upon a manner of processing information and acting upon this information such as who does what and what will we do in the face of such-and-such contingencies; these input-output links are arrived at through discussion - then when an input comes in it is acted upon automatically without requiring any particular formal mechanism for reaching each decision; such a decision made on the basis of a contingency rule is termed processing.

prediction - a forecast of what is going to happen in the market in the future (e.g., Atlas Alloys is going to go up this year). Knowing the direction that sales index and earnings will take, you can determine whether a prediction is correct or incorrect and should be scored as such (you will be given this information before each session).

motivation - how actively do the members play the game; how much attention do they pay to the standings; how often do they talk about how much they want to win; how much of their time do they spend discussing unrelated matters or joking around (1 represents the highest level of motivation or involvement).

Over-all decision making[5] - what is the nature of the interaction during the course of decision making - does one member consistently make all the decisions relegating the other members to a subordinate position (scale point 1) or do the members of the team attampt to work against one another and make purposely contrary decisions to offset the others (scale point 4) or do all three team members participate in the process of decision making to an equal extent where all have an equal voice (scale point 7)?

extent of leadership - to what extent is one member of the group serving as a leader (i.e., a leader in the sense that the group members delegate to him the responsibility of directing the activity of the group either via suggestion or rule)?

type of leadership - is the leader of the team (when a leader exists) a dictator (i.e., does he give the other members orders and dictate team policy) or does he promote equal responsibility for all members in decision making and an equal voice for all? Is he a ruler or an organization leader such as a modern chairman of the board? This scale is not scored when there is no leader.

cooperation - do the members of the team attempt to avoid an open interchange of ideas or do they promote such an interchange? do they attempt to avoid interaction in the working through of ideas and strategy or do they promote such interaction? Are they willing to tolerate each other and each other's point of view or not? Do they work together or not? Conflict is not indicative of a lack of cooperation. If the team uses the conflict for purposes of working through ideas then it represents cooperation.

extent of differences - to what extent do the members disagree with one another (this is distinctly different from how well they work together; rather it is a judgment of how much or little they fight or engage in conflict)?

---

5. This scale was not subjected to analysis in that it appeared redundant.

structure - how do the team members relate to one another? what is their organization? is the relationship based on power with one member having more than the other two (hierarchy) or is it based on a lack of power differences where individuals blend together to process information (single-organism)? is the relationship based on avoidance where each individual becomes a sub-group unto himself by avoiding his teammates or avoiding the game (independents) or are two subgroups formed in the sense of two against one or two without one (factions) or do the players pull together in a serious attempt to have an integrated group (holding together)? do they process information as a unified entity (single-organism)? (See the problem section - behavioral predictions - for a more complete description of structure).

intensity of conflict - what is the intensity of (i.e., how violent are) the disagreements among members; 1 represents no disagreements or disagreements of minimal intensity.

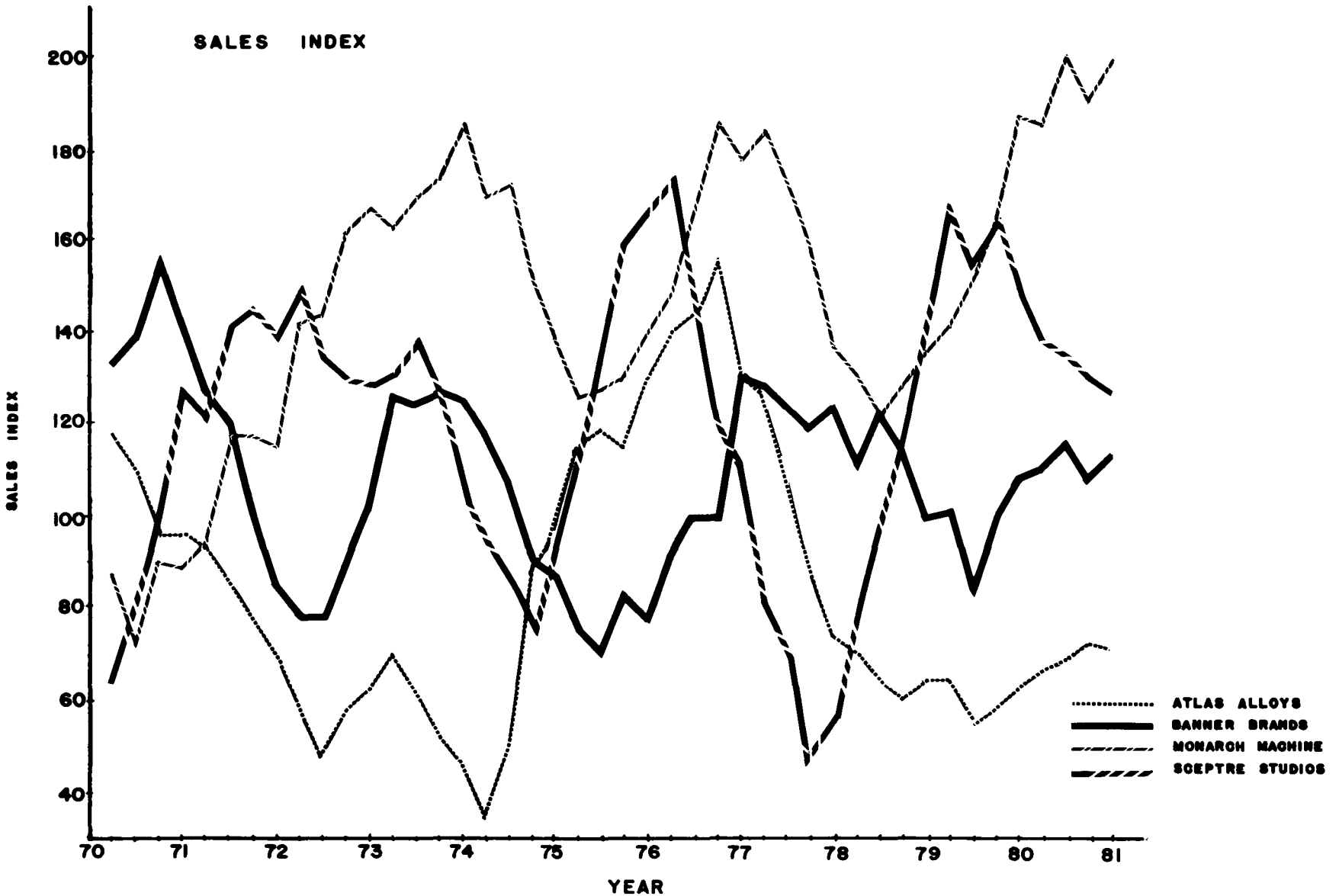
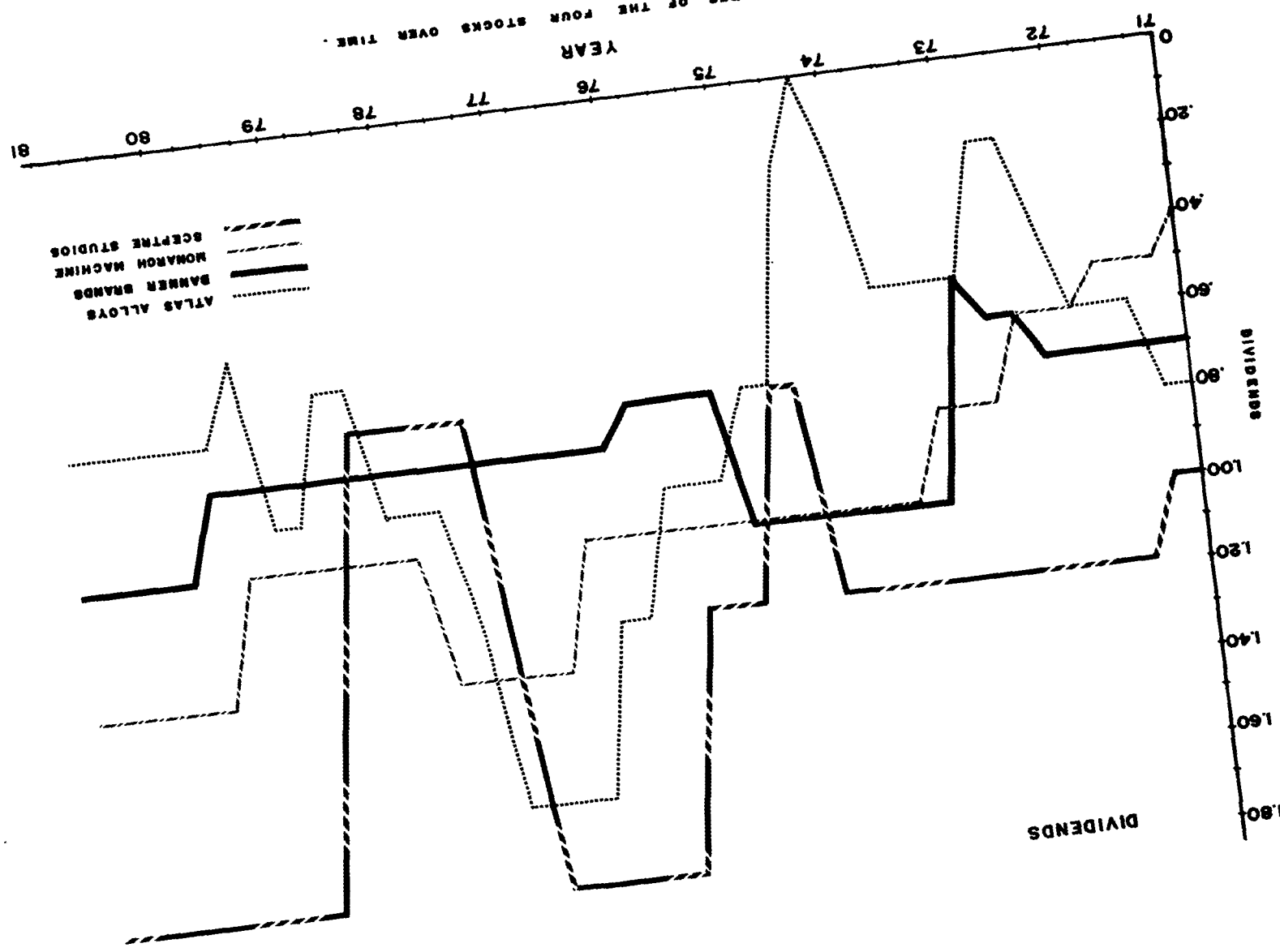


FIGURE A1. SALES INDICES OF THE FOUR STOCKS OVER TIME.

FIGURE A2. DIVIDEND RATES OF THE FOUR STOCKS OVER TIME.



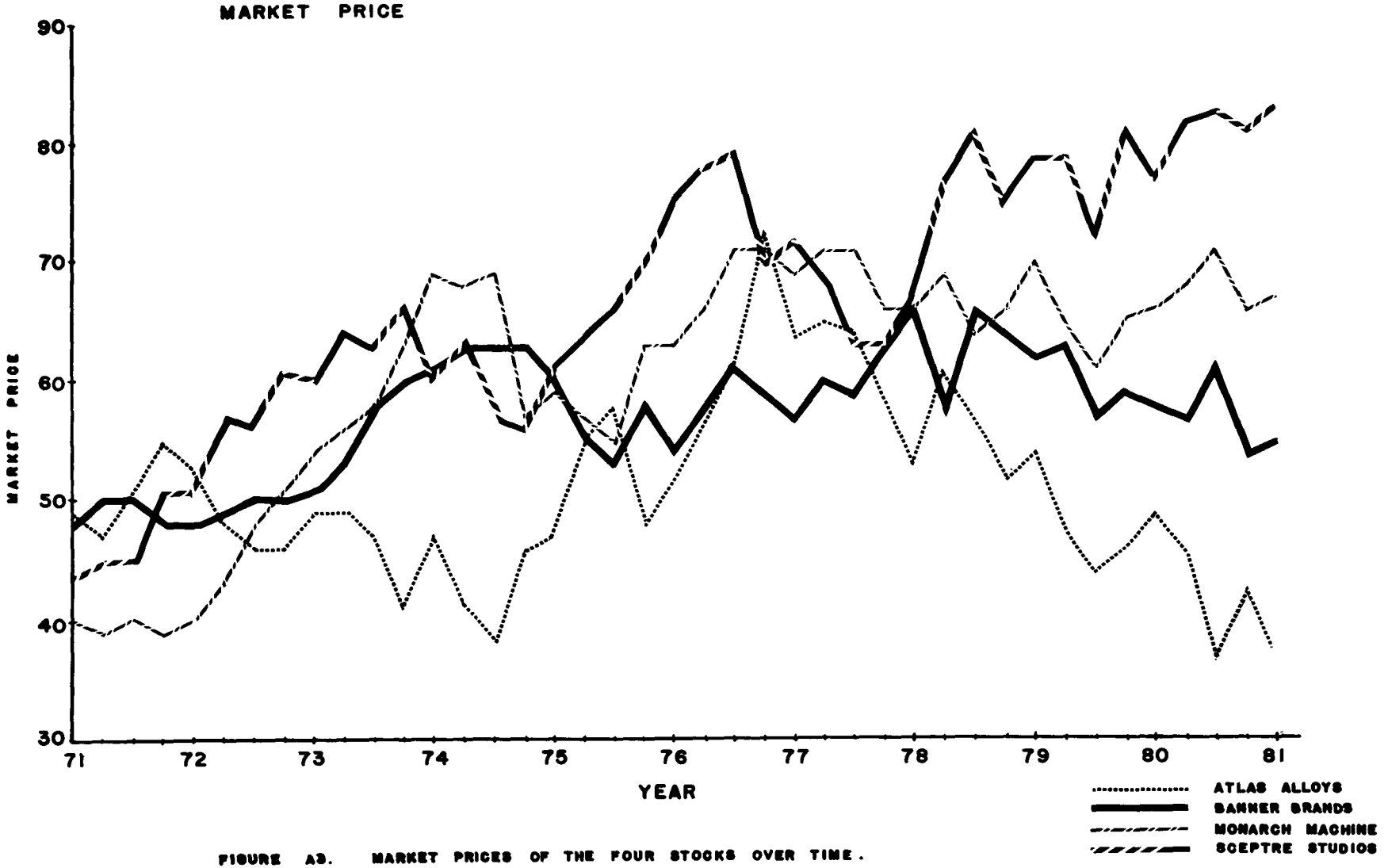


FIGURE A3. MARKET PRICES OF THE FOUR STOCKS OVER TIME.

PLAYERS' MANUAL

PROJECT SOBIG

STOCK MARKET GAME

JUNE 1962

PLAYER'S MANUAL

PROJECT SOBIG STOCK MARKET GAME

The research team of Project SOBIG is engaged in a series of experiments using the technique of operational gaming. In operational gaming a part of reality, such as the world of the stock market, is reconstructed in miniature under the controlled conditions of the laboratory. The situation is realistic so that people find it easy to act naturally and wholeheartedly within this environment. The situation is under experimental control so that researchers can analyze all events occurring during the course of the game. The full and complete reality of the stock market could not fit into any laboratory so alterations must be made which make things easier to control without destroying the essence of the reality. Time is collapsed, allowing a year of game time to pass in an hour or two of real time. Some aspects of the situation are embedded in the model. For example, a good deal of your bookkeeping is supplied to you.

A game is something you win by selecting the right decisions at the right time, beating your opponents to these decisions, and playing within the ground rules given to you. This is a game of buying, selling, and holding of shares in four corporations. The value of each stock fluctuates as a result of activity on the stock exchange and as a result of the characteristics of the stock, such as its dividend rate. This is a rational game and there are general economic principles, such as the law of supply and demand operating within it. If your team can learn the boundaries of this game and the functional relationships by which it works, you will be in a position to make gains. If you can make decisions based on this knowledge which are more judicious and better timed than those of your opponents you will win.

We have set up these teams as investment committees of banks, charged with making profits for the bank by investing its depositors' money on the stock market. This rationale is more a vehicle to hold together the ground rules and procedures of the game than to suggest what role you should play. Role playing won't help in this game. Your best role is one of someone coming into an unfamiliar game who wants to learn his way around the ins and outs of it, and would rather win it than lose it. This manual should help you get started, but only playing will give you the experience you need to develop winning strategies.

One of the basic principles of banking is that in order to pay interest to depositors, a bank in turn must profitably invest the fund entrusted to it by the depositors. Since the bank cannot invest all its funds (because of cash demands and federal reserve requirements) and since it must also meet operating expenses, the bank must obtain a considerably better yield on its investments than it gives to its depositors.

Most of the bank's funds are invested in preferred loans to local businesses and individuals and in government and high grade corporate bonds. These are "safe" investments because the bank knows in advance what return to expect from the investment. Only a very small portion of bank funds is invested in stocks, and then only in very reliable stocks, because stocks are more risky than loans or bonds. A stock market collapse (a big dip in the market price of stocks) could be disasterous for a bank because the bank's liabilities to depositors would remain fixed. On the other hand, stocks represent one of the most attractive means of investing money. Not only is the yield on stocks often better than the interest obtainable from loans or bonds, but the stocks can grow in value whereas loans and bonds cannot.

It has been the decision of your bank to invest a portion of its assets in stocks. The amount has been kept flexible to allow for gradual changes in the bank's affairs, for changes in the loan and bond areas, and also for conditions of the stock market.

You have been selected as your bank's investment committee in stocks. You will have a portfolio of stocks already purchased and a cash account. You will be notified in advance of any anticipated change in the fund available to you. It is your job to invest these funds (your liabilities) in selected stocks in as wise a manner as possible, so as to take advantage of the unique opportunities of the stock market while avoiding undue risk of loss. To help you avoid serious losses, particularly before you gain experience, the bank will issue a Policy Notice, setting certain restrictions upon your activities.

Although it is not the function of your committee to supervise bond investments for your bank, you have been given the option of allocating your funds to 11 month bonds when you think that conditions on the stock market are likely to be unattractive for the year ahead. You will have an opportunity to do this at the beginning of each quarter. Remember, however, that once you have committed a portion of your funds to bonds those funds will be unavailable to you for the succeeding 11 months.

You will be given a Financial Report (based on your last playing session) at the beginning of each session, comparing your total liabilities (funds committed to your account) and your total assets (appraisal value of your portfolio plus your cash balance). The difference between these two figures, youy **NET ACCUMULATED GAIN OR LOSS**, is the best indicator of how well you are doing.

SEQUENCE OF EVENTS

Each team will consist of three members who may organize themselves in any way they find mutually agreeable. They will work together for 10 days of real time, which will comprise 10 years of game time. Each game year will be divided into 2 six month periods. During the first half year, half of the teams will play while the other half will be inactive. During the second six months the situation will be reversed. The market, meanwhile, will be continuous over the entire 12 months. This means that the market values which result from the activities of 6 of the teams will apply to the other 6 teams and vice versa.

A team begins the game with a portfolio of 30 lots (1 lot = 100 shares) in each of the four stocks listed on the SOBIG stock exchange (Atlas Alloys, Banner Brands, Monarch Machine, Sceptre Studios). It also has $50,000 cash and the opportunity of investing additional funds made available by bank policy. While playing, a team may place market orders by phone. Orders must not exceed 10 lots. During the last playing month teams may place limit orders which will apply during the six months they cannot actively trade. A later section describes the method of making limit orders.

There will be three 12 minute trading periods in each quarter. The opening prices of the four listed stocks will be announced over the intercom at the beginning of each trading period. If you wish to make an order, you signal the operator by turning the crank on the side of the field telephone. It is not necessary to turn the handle very far, 1/8 of a turn is sufficient. Wait until the operator answers your call, by saying "Firm, please." To talk to the operator you must push the lever on the inside of the hand grip of the receiver. You can listen to the operator whether the lever is pushed or not. When the operator has answered your call, you should give your order, indicating whether you wish to buy or sell, the number of lots and the name of the stock. When the operator repeats your order you must indicate to her that it has been correctly received. If you fail to confirm the order, you will hear the announcement, "Unconfirmed order will not be transacted." If you wish to place another order immediately, be sure to wait until your transaction is announced before signalling the operator again. This will insure the fact that you have been disconnected from the previous call and that your new signal has registered on the switchboard. If you try to signal the operator while you are still connected to the switchboard from the previous call, the signal will fail to register.

You will learn the price of your transaction over the intercom. The first announcement you hear after placing your order will be the price at which you have just bought or sold. For example, if your

order was to buy 5 lots of Atlas Alloys and the announcement is "Atlas Alloys at 51," you will know that you have bought 5 lots of Atlas Alloys at a price of $51.00 per share, or $5100.00 per lot or at a total cost of $25,500.00. Written confirmation of all orders you make will appear on your quarterly Balance Sheet. However, it should be to your advantage to keep a running account of your stock holdings and cash on hand.

Bonds may be ordered at any time during the first month of each quarter (and will go into effect starting with the following month). Order forms are provided and will be picked up in the mail during the last 2 minutes of January (July) and April (Oct.). All Bonds are in $10,000 units and any number may be purchased. Remember, however, that the money will not be available again until 11 months have elapsed. Interest rates are indicated on the Wall Street Journal.

Between March and April (Sept. and Oct.) the switchboard will be closed for 14 minutes. During this time you may read a book or newspaper. You may be requested to fill out questionnaires.

MASON AND COX

"Mason and Cox" is the SOBIG counterpart of the security analyst who gathers information and makes prognostications about the real stock market. Unlike the real analyst, however, Mason ar. Cox will not advise you what stocks to buy, hold, or sell, because of the project's interest in the ability of your team to make such decisions yourselves.

What Mason and Cox will do is give advance information upon request. During trading only, instead of placing an order, you may ask the operator for Mason and Cox (she will connect you) and then request one item of information about economic conditions or particular stocks. Different information becomes available in each month of the quarter:

MONTH	NEW INFORMATION AVAILABLE
Jan., Apr., July, Oct.	- Trend of the Sales Index of any one of the 4 corporations - Trend of the Consumer Price, Production, or Shipping Index
Feb., May, Aug., Nov.	- The Value of any of the Indices
Mar., June, Sept., Dec.	- The Earnings of any one of the 4 corporations

The Earnings will also appear on the Wall Street Journal. Previous values of the Indices are recorded in the Market Analyst. You may call Mason and Cox as often as you like, but you may not place an order at this time. The fee for each call is $200.00

Mason and Cox will also make a quarterly appraisal of the value of each stock, but this appraisal value will not be available in advance of its appearance on the Wall Street Journal (except at the close of the session when it will be announced over the intercom). The appraisal value will be based on a combination of factors, including market price. In general, it will tend to be a conservative estimate of the worth of the stock, although in rare cases a stock may be appraised at more than its market value. Naturally, you may interpret these appraisals, if you like, as one kind of indication that you should buy, hold, or sell, but you do so at your own risk. The appraisals are not intended as predictions of what will happen to market value of the stocks, but rather as an alternate and more cautious procedure for evaluating portfolios. It is the policy of your bank to use the lower of two values - market value and Mason-Cox appraisal - in computing the value of your portfolio. Thus the Mason and Cox appraisal exerts an important influence on your Net Accumulated Gain.

TIME SCHEDULE

CITIES		STATES
9:30	January — BEGINNING OF WINTER (SUMMER) QUARTER — July MAIL (Received): Financial Report - from your last active session Balance Sheets - for your last active quarter: Spring (Fall) and the two inactive quarters prior to this session Annual Summary of Account - for preceding year Comparative Standings Form Wall Street Journal - for preceding three quarters Market Analyst Policy Notice - for current quarter MAIL (Picked Up): Bond Orders - maturing in December (June)	3:00
9:42	February — NO MAIL — August	3:12
9:54	March — NO MAIL — September	3:24
10:06	SWITCHBOARD IS CLOSED Questionnaires will be distributed	3:36
10:20	April — BEGINNING OF SPRING (FALL) QUARTER — October MAIL (Received): Wall Street Journal - for Winter (Summer) quarter Policy Notice - for current quarter Balance Sheet - for Winter (Summer) quarter MAIL (Picked up): Bond Orders - maturing in March (September)	3:50
10:32	May — NO MAIL — November	4:02
10:44	June — December MAIL (Picked up): Limit Orders	4:14
10:56	Announcement of Closing Mason - Cox Appraisals LEAVE GAME ROOMS	4:26

FACTORS INFLUENCING PROFITS

Your object in this game is to return a profit by wise investment of bank funds. You will find it helpful to bear in mind the various ways in which your total assets can increase or decrease even though your total liabilities remain constant.

1) DIVIDENDS are constant sources of income. Your total dividends are shown annually on your Annual Summary of Account.

2) HOLDING stocks can by itself cause changes in your assets if the stocks you hold go up or down in value. (Financial Report)

3) TRADING stocks can produce either profits or losses, according to how well you can predict the market. (Balance Sheet)

4) FEES It cost you $50 every time you buy or sell a lot (100 shares) of stock. A 10 lot order will be transacted for $500. (Annual Summary of Account)

5) INTEREST ON LIABILITIES To balance its books, the bank must charge your account with its fair portion of the bank's overhead and interest payments to depositors. This will be a percentage of your total liabilities, computed at an annual rate of between 3% and 5%. (Annual Summary of Account)

6) INTEREST NEGATIVE BALANCE If you think that market conditions and stock yields justify it, you may carry a negative cash balance. The bank handles this by borrowing from other accounts and charging you interest (usually between 4% and 8% annually) on your negative cash balance at the end of the quarter. If your negative cash balance exceeds the maximum permitted by the bank, and additional 5% interest will be charged on the entire negative balance. (See your Policy Notice and Annual Summary of Account.) Should a Negative Cash Balance which exceeds the maximum occur inadvertently it must be corrected immediately.

7) BONDS When you are fairly certain that your team will not want to invest available funds in stocks for at least 11 months, it may be advisable to secure what interest you can by investing in bonds instead. Interest rates are indicated on the Wall Street Journal.

EVALUATING STOCKS

How much is a stock worth? Will it increase in value, decrease in value, or remain about the same? Why do some stocks have a variable market price and others not? These are questions to which there are no perfect answers. The following concepts may be useful in deciding which stocks to deal in, but in the last analysis, each committee must decide for itself how much it thinks each particular stock is worth.

BOOK VALUE A share of stock is a part ownership of a corporation. The book value of the stock represents the value of the stock in terms of property - i.e., one share's worth of the corporation's assets less its liabilities.

EARNINGS PER SHARE Corporation profits per share are often considered a better indication of the real worth of a stock than bock value, since the function of a corporation is basically to return a profit on an investment. However, earnings tomorrow will not necessarily be the same as earnings today, and the wise investors must take note of trends in earning power which result from events in the economy affecting a particular industry.

DIVIDENDS PER SHARE Part of the corporation earnings are returned directly to the share-holders in the form of dividends. Corporation policies differ greatly in the proportion of earnings applied to dividends and the proportion applied to increasing book value (by decreasing liabilities or by improving and modernizing assets). While some investors prefer high yielding stocks (yield is the dividend rate per dollar of current market price) other investors are content with smaller yields if they think a stock will rise in market price.

MARKET PRICE This is the price at which a share of stock is currently being bought or sold in competitive bidding on the open market. Consequently it represents the aggregate estimate of both buyers and sellers of the stock regarding the current value of the stock - the price at which the lowest offer and the highest bid coincide. In the SOBIG stock market, the market price of each stock is influenced by the supply and demand created by the committees participating in the game.

SUMMARY Each of the corporations on our exchange earns profits which vary as a result of the changing conditions prevailing in the economy (see the economic indicators on the Wall Street Journal). According to corporation policy, earnings are divided between dividends to stock-holders and an increase in the book-value of the stock. The value of a stock is not absolute but

really a matter of opinion. These opinions may be based on book value, earnings, and dividends and based also on predictions of the economy and of the future of a particular industry. The consensus among the participating committees is reflected by the current market value of a stock. If a particular committee disagrees with this consensus, it is free to sell the stock that it thinks is overpriced and buy the stock that it thinks is underpriced. Experience will be the best guide in helping a committee formulate valid opinions.

LIMIT ORDERS

The stock exchange is essentially a place where people trade stocks without being physically present themselves. Their orders are handled for them by agents (brokers, members of the exchange, specialists) who have agreed to get the best price possible for their customers. The market price of any stock is simply the price at which the lowest offer and the highest bid coincide. Sometimes, when supply and demand change rapidly, the market price may fluctuate considerably, and a customer who has placed a market order may find that he pays more (or receives less) for a certain stock than he anticipated.

The limit order arose historically as a partial solution to the problem of price fluctuations. Since the customer could not be present himself, he simply instructed his agent to bid on a stock up to a certain limit, but no higher (or to offer to sell down to a certain limit, but no lower). If the market stayed above the customer's limit for buying (or below his limit for selling) then the limit order would not be transacted but would remain on the order books of the stock exchange either until it could be transacted or until the customer cancelled it.

Limit orders will serve a similar but slightly different function in the SOBIG stock exchange game. The committees playing in the game will be divided into two shifts. While one shift is in the players' rooms with full access to the stock exchange by telephone, the other shift will not be actively playing. Both shifts will be trading on the exchange, however, the "playing" shift by means of limit orders submitted in writing during the last playing month (i.e., for the Cities: June; for the States: December). (These limit orders will be picked up promptly at the end of the month.) Thus, every committee will be competing in the bidding on the exchange at all times - alternately through market orders or through lim orders.

1) Limit orders must be placed in writing during the last playing month. (Any orders not in the mailbox by the end of this

month (i.e., the end of the session) will not be accepted. Buy and sell order cards will be provided and must be carefully filled out with regard to (a) the firm's name, (b) the trading half year in which the orders will apply, (c) the name or initials of the stock, (d) the number of lots, and (e) the limit price.

2) Each order must not exceed 10 lots. A committee may place as many as five orders in a stock (but not more than 5) if it is in a position to do so, either at the same price or at different prices. (The maximum number of limit orders allowed is 20; 5 per stock for each of 4 stocks.) It is not required that a committee place limit orders in every stock - or in any stock at all - if it does not wish to do so. If, inadvertently, more than 5 limit orders are submitted for one stock, the most extreme ones will be discarded in order to reduce the number to 5.

3) Limit orders (or market orders) to sell should not exceed a committee's holdings in the stock. If diversification requirements (see Policy Notice) are broken as a result of limit order transactions, the committee can re-establish its required holdings during its first quarter of active trading without penality. Should the committee fail to meet the diversification requirements at the end of either active quarters, the bank will purchase the necessary number of lots at the closing price of that quarter.

4) There are no restrictions on the number of limit orders to buy which a committee may place, other than the rule that total limit orders per stock (buy and sell) may not exceed 5; however, it should bear in mind that a higher rate of interest is charged on negative balances than on liabilities (see Policy Notice) and that an additional 5% interest is charged on the entire negative balance when it inadvertently exceeds the maximum permitted by the bank. Excessive negative balances must be corrected by the end of the first trading quarter. No Buy order (either limit orders or market orders) will be honored until the condition has been corrected.

5) A committee will receive confirmation of transacted limit orders at the start of their next session. Orders not transacted will be automatically cancelled since they are valid for only half a year.

6) The Stock Exchange will give priority to limit orders as follows:

   (a) highest bids and lowest asking prices will be given first priority.

   (b) when prices are identical, the larger order will be given priority.

   (c) when the size is the same, random priority will be assigned.

7) Limit orders should not be confused with stop-loss orders; which are not permitted on the SOBIG exchange, i.e., a team may not place an order to sell if and when the market price drops below some specified value.

QUESTIONS

Written questions must be in such a form that they may be answered by "True" or "False." If the question is ambiguous, it will be returned with an answer such as "Mainly True," "Mainly False," or "Ambiguous Question." The team submitting the question will receive the answer as early as possible. Other teams will receive both the question and answer after half a game year has elapsed.

GAME FORMS AND MATERIALS

Official game forms (Balance Sheets, Financial Reports, Annual Summaries of Account, etc.) must not be mutilated, destroyed or removed from the game rooms. Blank Balance Sheets, Financial Report forms, and scrap paper are provided to aid you in keeping your own records. The file folders should enable you to store all relevant material.

APPENDIX

TO

PLAYERS' MANUAL

FINANCIAL REPORT FORM

You will be given a Financial Report comparing your Total Liabilities (funds committed by the bank to your account) and Cash Balance). The difference between these two figures (your Net Accumulated Gain or Loss) is the best estimate of how well you are doing at a given time. You will receive this form at the start of each session. The data on the form represents your last active session (6 months).

Line 1 - the number of lots of Atlas Alloys you hold (from your Balance Sheet), the Appraisal Value of Atlas Alloys (the lower of the Closing Prince and the Mason-Cox Appraisal from the Wall Stree Journal) and the current Appraisal Value of your holdings in Atlas Alloys, i.e., Lots held X Appraisal per share X 100.

Line 2-4 - the same information for the remaining 3 stocks as indicated.

Line 5 - the number of bonds you hold (from your last Balance Sheet) and their current Appraisal Value, i.e., number of Bonds held X 10,000.

Line 6 - the total of lines 1 - 5. This figure represents the current Appraisal Value of your Total Holdings.

Line 7 - the Cash on Hand figure (from your last Balance Sheet).

Line 8 - the sum of lines 6 and 7. This figure represents your Total Assets.

Line 9 - your Total Liabilities.

Line 10-11 - Line 8 minus Line 9. If the result is positive (Net Accumulated Gain) it will appear on Line 10. However, if the result is negative (Net Accumulated Loss) it will appear on Line 11.

FINANCIAL REPORT

BANK_____

YEAR_____

HOLDINGS IN EACH STOCK	LOTS	APPRAISAL PER SHARE		PORTFOLIO APPRAISAL	
ATLAS ALLOYS			x100=		(1)
BANNER BRANDS			x100=		(2)
MONARCH MACHINE			x100=		(3)
SCEPTRE STUDIOS			x100=		(4)
OUTSTANDING BONDS	#	10,000			(5)

TOTAL PORTFOLIO APPRAISAL_____ (6)

CASH ON HAND_____ (7)

TOTAL ASSETS_____ (8)

TOTAL LIABILITIES_____ (9)

NET ACCUMULATED GAIN (if assets exceed liabilities)		(10)
NET ACCUMULATED LOSS (if liabilities exceed assets)		(11)

SIGNED:_____

_____

_____

BALANCE SHEET

You will receive a quarterly Balance Sheet, covering your activity during the trading periods of each quarter. At the start of each session you will receive three Balance Sheets: one covering your last active quarter - Spring (Fall), and one for each of the two preceding quarters during which you were inactive. At the start of your second active quarter - April (Oct.), you will receive a Balance Sheet covering the quarter you have just completed.

BALANCE SHEET

BANK_____

YEAR_____QUARTER_____

STOCKS HELD LAST QUARTER

A.A.	B.B.	M.M.	S.S.	BONDS

CASH ON HAND
CARRIED FROM
LAST QUARTER_____

AA	BB	MM	SS	AA	BB	MM	SS

PRICE	DEBIT	CREDIT	BALANCE

ADJUSTMENT OF ACCOUNT_____

BALANCE_____

____ BONDS MATURING END OF THE QUARTER _____

STOCKS HELD THIS QUARTER

A.A.	B.B.	M.M.	S.S.	BONDS

CASH ON HAND _____

ANNUAL SUMMARY OF ACCOUNT

You will receive this report each year (at the start of the session) covering the preceding complete year. It credits your account with quarterly dividends and subtracts quarterly interest charges and fees.

Line A contains the Total Dividends received during the year.

Line B contains the Cash On Hand figure from your Fall Balance Sheet.

Line C contains the Total Interest charges for the year, i.e., the sum of interest on Liabilities and negative Cash Balances.

Line D contains the Total Fees, computed on the basis of the volume of your trading and the number of calls to Mason and Cox. You are charged $50.00 for each lot transacted and $200.00 for every call to Mason and Cox.

Line E contains your new Cash Balance. It is the Total Dividends (Line A) + the December Cash On Hand (Line B) - Total Interest (Line C) - Total Fees (Line D). This figure will appear on the top of the Balance Sheet for the Winter quarter of the following year.

ANNUAL SUMMARY OF ACCOUNT

BANK_____ YEAR_____

DIVIDENDS

	HOLDINGS				DIVIDENDS			
	A.A.	B.B.	M.M.	S.S.	A.A.	B.B.	M.M.	S.S.
WINTER								
SPRING								
SUMMER								
FALL								

ANNUAL DIVIDENDS _____

TOTAL DIVIDENDS_____(A)

DECEMBER CASH ON HAND _____(B)

INTEREST CHARGES

INTEREST ON LIABILITIES

	LIABILITIES		
WINTER	_____	____%	_____
SPRING	_____	____%	_____
SUMMER	_____	____%	_____
FALL	_____	____%	_____

INTEREST ON NEGATIVE CASH BALANCE

WINTER	_____	____%	_____
SPRING	_____	____%	_____
SUMMER	_____	____%	_____
FALL	_____	____%	_____

TOTAL INTEREST_____(C)

FEES

_____ LOTS TRANSACTED ($50.00 PER LOT)

TRANSACTION FEES_____

_____ CALLS TO MASON AND COX ($200.00 PER CALL)

SERVICE FEE _____

TOTAL FEES _____ (D)

NEW CASH BALANCE_____(E)

A+B-C-D

POLICY NOTICE

This notice will be received at the beginning of the first Trading Period in each quarter. The bank issues this notice setting certain restrictions upon your activities. The bank will lend you funds, at an interest rate, to cover a negative Cash Balance. The restrictions on diversification are limitations which the bank feels are necessary and should not be regarded as suggestions.

The current interest rates, on Liabilities and negative Cash Balances, are listed in the notice.

If the bank feels that an adjustment of your account is necessary, this notice will advise you of the amount of such an adjustment. The amount shown will be added to or subtracted from your Cash Balance at the end of the quarter indicated on the notice.

POLICY NOTICE

BANK_____

YEAR_____ QUARTER_____

In the interest of minimizing the risk to the bank's stockholders and investors, the following restrictions are hereby imposed upon the trading policy of the bank's investment committee:

1) CREDIT A maximum of $_____ negative balance shall not be exceeded at any time between quarters or during trading.

2) DIVERSIFICATION A minimum of _____lots in each of three stocks and _____ lots in a fourth stock shall be maintained at all times.

The above restrictions shall be construed as outside limitations upon the committee's policy and not as recommendations. The committee is expected to use its own discretion in determining the policy best suited to current economic conditions and market expectations.

This notice automatically supersedes any previous Policy Notices in the committee's files. If an adjustment in portfolio is necessitated by the new restrictions, it must be effected by the end of the current quarter.

Due to current policy and available funds, you are hereby notified that

$_____ will be deposited to / withdrawn from

your account as of the end of the current quarter. This appears as a change in Total Liabilities on the Financial Report form. It will also appear as an item contributing to the Cash Balance on your quarterly Balance Sheet.

The following interest rates have been set by the bank for the coming quarter:

Interest on Liabilities _____% quarterly

Interest on Negative Balance _____% quarterly

WALL STREET JOURNAL

The Journal will be mailed to you at the beginning of each quarter. At the start of the session you will also receive Wall Street Journals for each of the two preceding quarters during which you were inactive. It contains a report on the Book Value, Earnings, Earnings Ratio, Dividend, and Yield of each stock. The Earnings Ratio equals the Market Value divided by 4 x quarterly Earnings; the Yield equals 4 x quarterly Dividend divided by the Market Value.

The Market Information gives the Opening, High, Low, and Closing Prices for the quarter. It also gives the amount by which the Closing Prices differ from those of the preceding quarter. The Mason-Cox Appraisal is a usually conservative, independent evaluation of each stock by an analysis firm using the same basic information available to you through the quarterly reports and business indicators. A SOBIG Average is computed and listed below the 4 corporations.

WALL STREET JOURNAL

YEAR _____ QUARTER_____

QUARTERLY REPORTS FOR LISTED CORPORATIONS

	BOOK VALUE	EARNINGS PER SHARE	EARNINGS RATIO*	DIVIDEND PER SHARE	YIELD*
ATLAS ALLOYS					
BANNER BRANDS					
MONARCH MACHINE					
SCEPTRE STUDIOS					

* Based upon Feb./May/Aug./Nov/ Closing Prices

MARKET INFORMATION

	OPEN-ING PRICE	HIGH PRICE	LOW PRICE	CLOSING PRICE	NET CHANGE	MASON-COX APPRAISAL
ATLAS ALLOYS						
BANNER BRANDS						
MONARCH MACHINE						
SCEPTRE STUDIOS						
SOBIG AVERAGE						

YIELD ON 11 MONTH BONDS_____

COMPARATIVE STANDINGS FORM

You will receive this form at the beginning of each year.

Topeka and Kansas are other teams participating in the same market and operating under the same restrictions as the "player" teams.

Year's Gain - is the difference between your Net Accumulated Gain of the current year and the Net Accumulated Gain of the preceding year. It is the amount by which your Net Accumulated Gain has increased (or decreased) during the year.

Net Accumulated Gain - is the figure computed on your Financial Report. It is the difference between your Assets and Liabilities.

Rank (in Net Accumulated Gain) - The 14 committees will be ranked according to the Net Accumulated Gain figure.

COMPARATIVE STANDINGS

YEAR_____

	YEAR'S GAIN	NET ACCUMULATED GAIN	RANK
ATHENS			
BANGOR			
CASPER			
DAYTON			
RUTLAND			
SYRACUSE			
TOPEKA			
GEORGIA			
MAINE			
WYOMING			
OHIO			
VERMONT			
NEW YORK			
KANSAS			

BOND ORDER FORM

These forms are available on your boards.

Be sure to fill in the right year and quarter when filling out the Bond Order form. For example, in the first year of the game a Cities team would have 2 opportunities to place Bond orders:

1st Trading Period (January 1971) for Bonds maturing in December 1971.

4th Trading Period (April 1971) for Bonds maturing in March 1972.

The Interest Rate on the current Wall Street Journal is the appropriate one (Fall, Winter for Cities; Spring, Summer for States). The Interest Rate will also be announced over the intercom.

To insure the execution of your order it is important that you check all entries on the form including the <u>full</u> name of the bank and the signatures of all committee members present.

These forms will be picked up during the last 2 minutes of the appropriate months.

BOND ORDER FORM

CURRENT YEAR _____

TRADING PERIOD

CITIES { JANUARY_____ / APRIL_____ } STATES { JULY_____ / OCTOBER____ }

_____ BUYS _____ $10,000 BOND(S)
BANK (NUMBER)

[ ] December 31st
[ ] March 31st
} CITIES

MATURING
(CHECK MONTH)

19_____ WITH_____% INTEREST

[ ] June 30th
[ ] September 30th
} STATES

SIGNED: _____

_____

_____

INITIAL FORMS AND MATERIALS

Players' Manual

Economic Histories - describe the Book Value, Earnings Dividends, and Closing Prices of the 4 listed corporations for the 10 years preceding the opening of play. An additional economic history shows various business indicators for the same period. The Wall Street Journal will supply you with this information as play progresses.

Wall Street Journal - for the quarter preceding opening, i.e., Fall, 1970.

Financial Report Form - for the year preceding opening, showing initial holdings and computation of Liabilities - labelled "Sample."

Policy Notice - giving the bank's initial restrictions on Credit and Diversification and current Interest Rates.

Request Forms - to be filled in and put in the mail box, if you have need for additional supplies.

Question Forms - to be filled in and put in the mail box, if you have a question about the game or procedures.

Balance Sheets - for your convenience in keeping your own records.

Limit Order Cards - to be filled out and put in the mail box in the last month of your "playing" half year.

Market Analyst - contains past histories of Business Indicators and a general preview of existing conditions as well as evaluations of past and possible future developments.