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An examination of the decisive decision style in tasks using accounting information

Craft, Clifford Justin, III, Ph.D.

University of Southern California, 1984

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AN EXAMINATION OF THE DECISIVE DECISION STYLE IN TASKS USING ACCOUNTING INFORMATION

by

Clifford Justin Craft, III

A Dissertation Presented to the
FACULTY OF THE GRADUATE SCHOOL
UNIVERSITY OF SOUTHERN CALIFORNIA
In Partial Fulfillment of the
Requirements for the Degree

DOCTOR OF PHILOSOPHY
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DOCTOR OF PHILOSOPHY

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Dedicated

to

Theodore J. Mock, Ph.D.

Arthur Anderson Professor of Accounting

and

Alan J. Rowe, Ph.D.

Professor of Management

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To some persons this idea did not seem to be in the mainstream of accounting research and I had some difficulty initially in obtaining support for this research. Fortunately, however, the Chairman of my Dissertation Committee, Dr. Theodore J. Mock, had pioneered in the use of a computerized multi-period simulation exercise (known as the Information Structure Experiments), and he suggested that I attempt to formulate an experiment along this line. Another member of my committee, Dr. Alan J. Rowe (whom I have known since 1954 and who encouraged me to take my first course at U.S.C. in 1967) had directed a

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number of recent Ph.D. dissertations which had successfully used his own Decision Style Inventory to categorize financial planners as analytic decision makers. With this combination of support, I proposed to my dissertation committee in March 1983 to piggyback upon the Information Structure Experiment being performed during the Spring, 1983 semester by Dr. William Ryan as part of his own Ph.D. dissertation. With the concurrence of Drs. Mock and Rowe, along with the other members of my committee: Dr. Clinton J. Ancker (whom I have known since our days of working together at the System Development Corporation in 1966-67) and Dr. Paul R. Watkins (another pioneer in the field of cognitive style research), I proceeded to work with Dr. Ryan in what has been the most synergistic and truly interactive project I have ever been involved in. Without the on-going interaction with and the unfailing support of these six persons (Driver, Mock, Rowe, Ancker, Watkins, and Ryan) this project would never have been completed. Many of the good ideas of this project are clearly a reflection of the creativity of these persons.

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typist and long-standing friend, Susan Fredrickson, who has now helped my through two books. While she swore that the first book would be her last, my dissertation was a wonderful opportunity to try out her new word processor so she willingly jumped in for a second time around.

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PREFACE

Much has been written about decision making and the role of the manager in the decision making process. If there is one word that characterizes a common type of decision style, it is the term "decisive" (Driver, 1979). Such a decision maker typically makes decisions quickly and "decisively" using a limited amount of data, that is, just enough to generate one answer which is then firmly adhered to. Decisives also are known to be very concerned with speed, efficiency, and consistency. Dwight Eisenhower was well known as a "decisive" decision maker who even made his subordinates summarize all information needed for a particular decision on a single piece of paper. It is the purpose of this proposed research project to examine the performance characteristics of "decisive" decision makers in their use of accounting information in decision making.

Decision style may be defined as "crystallized preferences or attitudes which determine a person's typical modes of perceiving, remembering, thinking and problem solving" (Watkins, 1980). A wide variety of psychological instruments (tests) have been developed to measure various personality constructs. This research project focused on the Rowe Decision Style Inventory (DSI) to categorize the subjects and to select the "decisive" decision makers used in the simulation experiment described herein. Based on a business game simulation, the performance characteristics of the "decisive" decision makers are evaluated relative to the performance characteristics of decision makers

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in a control group.(1) The performance measures and cognitive style attributes of the decisive subjects are also examined relative to the alternative cognitive styles identified by Rowe's DSI along with a number of other decision style tests. (In particular, the subjects also were categorized by the decision styles indicated by: 1) Driver's IST Exercise; 2) Myers-Briggs Type Indicator; 3) Witkin Embedded Figures Test; 4) Rotter Internal/External Locus of Control Test; and 5) Purdue-Rutgers Prior Experience Test. Accordingly, this research brings together in one experiment, a variety of the "style" measures that have been used in a wide range of previous studies. In so doing, this study examines the simultaneous relationships between different decision style constructs and the performance of decisive decision makers in a highly standardized task of processing accounting information: the multi-period simulation exercise (known as the Information Structure Experiments) used by Mock in his original human information processing (HIP) research (1969, 1972 and 1975).

---

(1) The control group used was the group of all other decision makers (subjects) in this experiment. In other words, the decisive decision style was compared with a composite of all other decision styles.

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Chapter 1

Background, Decision Style Model, and Proposed Research Approach

Background

A persistent belief in human information processing (HIP) research is that a manager's style of decision making should be evaluated as one of the significant determinants of managerial performance. One author even contends that the concept of decision styles and the matching of particular styles to specific organizations portends a whole new dimension in understanding decision making and in helping to achieve more effective managerial performance (Rowe, 1981). This belief appears, however, to be in sharp contrast with some of the research literature on decision (cognitive) styles that shows at best mixed results (Savich, 1977). One recent paper (Huber, 1982) even concluded that:

> "...the currently available literature on cognitive style is an unsatisfactory basis for deriving operational design guidelines, and further cognitive style research is unlikely to provide a satisfactory body of knowledge from which to derive such guidelines."

Clearly, this is a disappointing conclusion for what intuitively appears to be an important ingredient of managerial decision making.

To most observers of the management process there appear to be significant differences in the manner by which individual decision makers seek, aquire, evaluate, integrate and use information in the process of making a decision. Furthermore, the complexity of a decision maker's information processing behavior is determined not only by the complexity of the job environment but also by the cognitive style of the decision

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maker. "Cognitive style" is defined as the degree of "thinking" complexity of the individual in assimilating, interpreting, and reacting to informational environmental stimuli. It is an index of the total personality system and its functioning and development. According to one approach to cognitive style research (Driver and Mock, 1975) there are four basic cognitive styles of decision making: 1) decisive, 2) flexible, 3) hierarchic, and 4) integrative. (See Appendix A for a detailed description of the Driver/Mock decision style model.) An alternative decision style model has been developed by Rowe (1982). He similarly identifies four basic decision styles: 1) analytic, 2) behavioral, 3) conceptual, and 4) directive. (See Appendix B for a detailed description of the Rowe managerial decision styles.) As will be discussed later, a recently completed dissertation by Mann (1982) shows a strong correlation between the decision styles of financial planners and Rowe's analytic style as opposed to corporate planners who are more generally conceptual. Since the experiment used herein involves measuring performance of financial planning tasks, we used Rowe's Decision Style Inventory (DSI) test as the primary instrument for measuring the four basic decision styles. The other five instruments also used will be compared and correlated with the results using Rowe's instrument.

One possible defect in the cognitive style research up to now has been the usual focus on all the various decision styles involved in a particular taxonomy as opposed to examining only one style (e.g., just the "decisive" style). This alternative approach to decision style research appears to have emerged initially in the area of human factors research

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(Firth, 1973). A recent novel Ph.D. dissertation research project at the University of Southern California (Meshkati, 1983) involved a decision-making experiment in which (1) the participants were categorized according to their decision style based upon the Driver decision style instrument (test) designed to measure unconscious style (Driver, 1979); and (2) cardiac arrhythmia was measured as a function of mental load (Meshkati, 1982). As Meshkati hypothesized, the research demonstrated that Driver's IST decision style test did discriminate between different (unique) styles of decision making. Interestingly, Meshkati discovered that Driver's decisive and hierarchic decision styles in particular are associated with a significant change in characteristic cardiac arrhythmia as a function of mental workload. Savich (1977, p. 650) also discovered that decisives process less data than hierarchics and integratives. Meshkati argued that the reasons for the similar performance of decisives and hierarchics in his research are: (1) the uni-focus (vs. multi-focus) nature of the task involved in his experiment; and (2) the ability of Driver's decisive and hierarchic decision styles to deal with the single alternative form of outcome.

Decision Style Models

In recent years a number of alternative decision style taxomonies (models) have emerged. One approach models the heuristics that a decision maker uses in making a choice (Newell and Simon, 1972). A second approach deals with cognitive complexity within an individual's conceptual system (Schroder, Driver & Streufert, 1967). A third approach emphasizes the dual nature of the decision process: that is, the analytic

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or systematic approach vs. the unsystematic or intuitive process (McKenney, 1974). A fourth approach that is emerging (as a result of the current interest in left-brain vs. right-brain thinking) points to the existence of two types of minds within each person depending upon which hemisphere of the brain is dominant and/or is processing the information involved in decision making (Bogen, 1969). Still another (fifth) model is the learning style theory of Kolb (1974) which focuses on the four-stage process involved in learning. While Kolb also formulates a four-cell matrix, his primary emphasis appears to be that people can be categorized along bipolar learning dimensions (active-to-reflective orientations and/or concrete-to-abstract orientations).

Even Jung's theory of personality identifies two primary dimensions of the cognitive process: 1)perception (gathering information) in which perception is achieved by either sensation (S) or intuition (N); and 2)judgment which is made by either thinking (T) or feeling (F). The Myers-Briggs decision model implements Jung's theory (Myers, 1967) by expressing Jung's four styles in terms of: 1) personal focus of attention, 2) method of handling things, 3) tendency to become aware, and 4) expression of abilities. (A more detailed discussion of the Jungian model is included in Appendix C.)

Proposed Research Approach

One author (Taggart, 1981) has noted that there is a common theme that appears to cut across all these decision style taxonomies: an underlying tendency for each model under increasing environmental load to degenerate into a single focus along one of the bipolar dimensions.

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For example, there appear to be the dominant relationships of: (1) uni-focus vs. multi-focus; (2) analytic vs. heuristic; (3) left-brain thinking vs. right-brain thinking; and (4) abstractness vs. concreteness. This tendency of the cognitive process to move toward a bipolar (two-dimensional) relationship suggests that a fruitful approach to decision style research would be to focus on only one of the bipolar relationships in a selected decision style model particularly given the noise and mixed results in previous studies. In other words, in the light of the mixed results in previous studies, it is being argued here that research ought to focus only upon the performance of one particular cognitive style (e.g., decisives vs. all other decision makers) in the handling (processing) of information in a highly-structured task involving: (1) a single alternative form of outcome (uni-focus); and (2) an increasing environmental load (i.e., increasing amounts of information and/or reduced time available for decision making). In this fashion, it would be possible to determine whether there are some unique decision making performance characteristics for a particular cognitive style (e.g., the decisive style) and, more importantly, whether such a decision making style is significant or unique enough to be an important consideration in the design of accounting information systems.

In this research project the Rowe decision style model has been selected. (See Appendix B for a detailed discussion of Rowe's decision style model.) The unique approach in this study is to focus on the performance characteristics of one particular decision style (as catergorized by Rowe's Decision Style Inventory) versus the performance

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characteristics of all other styles under conditions of increasing environmental load in a setting similar to recent HIP research involving simulated accounting information systems. With this particular approach, some significant results were obtained. Moreover, they tend to provide a basis for better understanding some of the conflicting results of earlier research where, on the one hand, the results "provided little support for the notion that personality variables explain a significant portion of the variance in human information processing behavior" (McGhee et al.,1978) as opposed to some more encouraging findings that "indicate that the psychological type of the decision maker is an important factor in determining what type of information systems to provide the decision maker" (Bensasat and Dexter, 1973).

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Chapter 2

Review of the Literature on Decision Style Models and Measuring Instruments

Review of the Literature

There clearly has been an upsurge in interest in cognitive styles in HIP research since the publication of the study by Mock, Estrin and Vasarhelyi (1972) in which "analytics" outperformed "heuristics" in terms of both overall performance (i.e., profits achieved in a simulation exercise) and decision time. In that study Mock et al. identified the "heuristic" decision maker as one who solves problems by "trial and error" based upon his intuitive feelings; in other words, he uses satisficing behavior and emphasizes workable solutions to solve problems. In contrast, an "analytic" decision maker is one who emphasizes mathematical analysis and optimization; that is, he reduces a problem to a set of causal relationships and seeks to find an optimal solution by using formulas and models.

This dichotomous heuristic vs. analytic (H/A) cognitive style framework is based upon earlier work by Huysmans (1970) in which he used a test battery consisting of two mathematical puzzles (coin-and-pitcher tests) along with a decision-making problem to split his subjects into the heuristic and analytic categories. In a later study Vasarhelyi (1977) used a slightly modified version of Huysmans' coin-and-pitcher test, along with the Myers-Briggs test and a

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self-evaluation H/A Questionnaire. Vasarhelyi did find some support for his H/A model; however, the correlations derived were not impressive. Vasarhelyi suggested that the various instruments do not seem to be measuring the same concepts, and he advocated the adoption of a more discriminating cognitive style framework.

Huysmans' dichotomous taxonomy is similar to the systematic vs. intuition types of McKenney and Keen (1974). Mason and Mitroff (1973) proposed another dichotomous framework based upon the Myers-Briggs Type Indicator which evaluates a decision maker according to his perception of objects versus his evaluation of objects. Keen and Scott Morton (1978) claim they found the Myers-Briggs model "to be a very valuable and very reliable instrument" although Benbasat and Taylor (1978) reports that there does not appear to be any close mapping between the Myers-Briggs and the McKenney and Keen models.

In 1977 Libby and Lewis surveyed the state of the art of HIP research in accounting, and they reviewed six state-of-the-art studies described in Table 2-1. Their findings regarding decision style and intolerance of ambiguity can be summarized as follows:

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Study	Decision Style	Intolernace for Ambiguity
Mock et. al (1972)	Affected performance. No effect on learning or decision time.	N. A.
Dermer (1973)	N. A.	Affected information that was perceived as important.
Driver and Mock (1975)	Paired comparisons showed significant differences. Style affected decision speed.	N. A.
Mock and Vasarhelyi (1976)	Correlation between style and decision approach.	N. A.
San Miguel (1976)	Intellectual efficiency affected performance.	N. A.
McGhee et al. (1977)	No effect.	No effect.

Clearly these results are mixed and not consistent. In one case, decision style affected decision time and in another case it had no effect. Similarly, the effect of decision style on performance is not always significant or consistent. This is the state of affairs that led Vasarhelyi (1977) to recommend a more discriminating cognitive style framework.

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Table 2-1

Summary of Cognitive Style Studies

(Ref.: Libby and Lewis, 1977)

Study	Type decision maker	Task	Variables of interest	Results
Mock et al. (1972)	25 Businessmen and 47 students	Make production and advertising decisions in business game, based on price and demand factors.	Cognitive stucture Accuracy Speed Stability Realiability (random error)	Decision approach affected performance, but neither decision approach nor information structure affected learning or decision time.
Dermer (1973)	44 Oil company sales personnel	Sort job aspects as to degree of importance of role.	Cognitive stucture Subjective cue usage	Level of intolerance of ambiguity affected amount and nature of information perceived to be important.
Driver & Mock (1975)	54 MBA students	Cf. Mock et al.(1972) subjects could purchase additional information.	Cognitive structure Speed Subjective cue usage	All subjects purchased less infomation over time: decision style had no overall effect on purchase behavior, but paired comparisons showed significant differences. Decision style did affect decision speed.
Mock & Vasarhelyi (1976)	130 Graduate students	Cf. Mock et al.(1972)	Cognitive stucture Accuracy	Neither decision style nor approach had effect on performance. Information structure significantly affects performance.
	97 MBA Students	Investment decisions in hybrid stock market game.	Cognitive structure Subjct cue usage Accuracy Level of measurement	Decision style and approach had minor effect on perceived need and perceived use of information. Significant correlation between constructs decision style and decision approach.
San Miguel (1976)	73 students from upper division undergraduate accounting course	Choose level of operations in plant of of multiple-goal firm under varying levels of environmental complexity.	Cognitive structure Accuracy Subjective cue usage Perceptions of characteristics of information set.	Level of environmental complexity affects level of processing.Intellectual efficiency affects performance but not level of processing. Flexibility does not affect performance or level of processing.
McGhee et al. (1977)	24 MBA Students	Rate firms for consideration for inclusion in investment portifolio.	Cognitive structure Cue usage Subjective cue usage Perceived decision quality	Neither decision style nor level of intolerance of ambiguity signifcantly affected judgments, confidence, information use or range of alternatives considered.

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A number of very interesting but often conflicting studies have been published since the Libby and Lewis survey. On the one hand, there have been a number of studies where the decision style is a significant factor influencing performance, such as in the following studies:

- o Savich (1977) concluded that his experiment did not substantiate the decision style theory of Driver and Mock (1975) and possibly other attributes might be used to better differentiate decision styles.

- o Vasarhelyi (1977) found some support for the heuristic vs. analytic model (based on tests similar to Huysmans' tests); but the correlations were weak and there was no clear relationship between this model and Myers-Briggs test scores.

- o Huber (1982) did a rather extensive survey of the work of 60 principal authors (and 48 co-authors) in the field of cognitive style research, and he drew the following two conclusions: 1) The currently available literature on cognitive styles is an unsatisfactory basis for deriving operational guidelines for MIS or DSS designs; and 2) Further cognitive style research is unlikely to lead to operational guidelines for MIS and DSS designs. This conclusion parallels Vasarhelyi's earlier conclusion (1977) that the results of his (man-machine planning system) study provided some support for relating design to decision, but

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little can be said of a general nature; and moreover, the costs of doing so may exceed the benefits of improved performance.

Clearly, if the above findings were all that we had to go on, the future of cognitive style research would not look like a very promising avenue to pursue. Interestingly, however, there are a number of more recent studies that appear to show that decision style is an important ingredient of personal and organizational performance. These encouraging results have appeared in such recently published studies as:

- o Hughes and Downs (1976) examined the performance of 25 graduate students majoring in finance in a computerized stock market exercise. The subjects were categorized using five personality variables including Rotter's Internal/External Locus of Control Test and the Jackson Personality Review Form which measures tolerance for ambiguity. The study demonstrated that the subjects' sensitivity for new information was influenced by their risk taking propensity, fatalism (Rotter test), need for certainty (Jackson test), and self-confidence. The author concluded that the subjects responded differently to identical information due to individual differences in their personality and prior probabilities.

- o Benbasat and Taylor (1979) used the dichotomous low- versus high-analytic dimension (which has gained much attention in some of the recent experimental research) to categorize the 48

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subjects (24 accounting majors, 20 faculty, and 4 professional accountants) who participated in a multi-period computerized simulation exercise that had two modes of operation: 1) a data base inquiry mode simulating the "events" approach to accounting which emphasized less aggregation in reports; and 2) a structured reporting mode simulating the "value" approach which emphasized greater aggregation in reports. The authors concluded that "the results of this study on the comparison of the 'value' and 'events' approaches to providing accounting information contribute additional evidence to support the findings of previous research that the psychological type of the decision maker has an impact on information system design.

o Mann (1982) in a recently completed Ph.D. dissertation at the University of Southern California used both the Rowe Decision Style Inventory and the Myers-Briggs test to categorize corporate and financial planners. (See Appendix C for a detailed discussion of the Myers-Briggs Type Indicator test.) The results of Mann's research clearly showed a distinction in decision styles between corporate planners ("conceptual") and financial planners ("analytic"). The study also showed a good mapping between Rowe's decision styles and the Myers-Briggs model. The following Figures 2-1, 2-2, and 2-3 illustrate the cross-mapping between the Rowe, Driver/Mock and Myers-Briggs models growing out of Mann's study. This cross-mapping is also

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summarized below:

Some of the Common Attributes of Style	Rowe	Driver/Mock	Myers-Briggs
Tolerance for ambiguity. Uni-focus. High-information.	Analytic	Hierarchic	Sensation-Thinking
Multi-focus. Intuitive. High information. Cognitive complex.	Conceptual	Integrative	Intuition-Thinking
Low information. Multi-focus. People/organ. focus.	Behavioral	Flexible	Intuition-Feeling
Low information. Uni-focus. Need for structure.	Directive	Decisive	Sensation-Feeling

Figure 2-1
Driver/Mock Model (See Appendix A.)

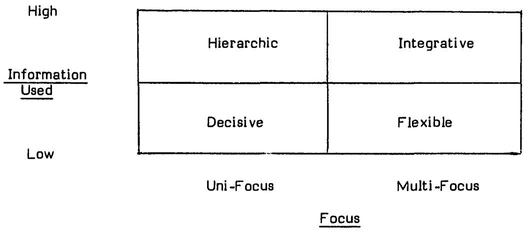

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Figure 2-2
Rowe's Model (See Appendix B.)

Cognitive Complexity	Left-Brain Orientation (analytic)	Right-Brain Orientation (intuitive)
Tolerance for Ambiguity	Analytic	Conceptual
Need for Structure	Directive	Behavioral
	Task/Technical	People/Organizational

Environmental Complexity

Figure 2-3
Myers-Briggs Model (See Appendix C.)

Judging	Left-Brain Orientation	Right-Brain Orientation
Thinking(T)	Sensation Thinking (ST)	Intuition-Thinking (NT)
Feeling(F)	Sensation-Feeling (SF)	Intuition-Feeling (NF)
	Sensing(S)	Intuition(N)

Perceiving

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- Lusk (1975) used the Embedded Figures Test to place 87 graduate students and 34 financial executives into two categories: 1) field independent (high-analytic) subjects versus 2) field-dependent (low-analytic) subjects. His research showed that field-independent subjects prefer "high-analytic" annual reports containing detailed statistics, graphs of historical trends, and other "analytic" information; whereas field-dependent subjects prefer "low-analytic" reports.

- Chesley (1977) used the Embedded Figures Test in screening subjects regarding their ability to perform effectively in eliciting subjective probabilities, and he discovered that field independent subjects (higher analytical reasoning ability) performed best in eliciting subjective probabilities.

Pincus (1982) also looked at the overall problem of cognitive style and behavior prediction and concluded that clearly the relationship between cognitive style and information processing is complex. Vasarhelyi (1977) also noted that the various measurements of cognitive style may not be measuring the same feature; instead they may be measuring interrelated concepts that are operationally defined by the test itself. This problem of complexity and possible interrelateness has been examined experimentally by a number psychologists who have found that the various elements of cognitive style are independent of each other (e.g., Gardner et al., 1959; Vannoy, 1965; and Morgan, 1972). For this reasons and others, this research project used a battery of psychological tests in order to obtain a wider range of cognitive style elements than have been utilized in earlier studies, with the expectation that the performance in

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this experiment would be more highly correlatable with more than one of the cognitive style elements, and more importantly, that there would be some demonstratable mapping between one or more of the decision style models (similar to the relationship between the Rowe Decision Style Inventory and the Myers-Briggs test discovered by Mann in his 1982 dissertation).

Decision Style Tests

A number of measuring instruments have been used by researchers in the HIP field. Some of these tests have been widely used and validated by standard procedures acceptable to practitioners in the field (Bariff, 1977). Other tests have been used only by a limited number of researchers, and serious questions exist relative to their cross-validation with other (proven) tests in the field (Huber, 1982). The decision style tests which have been selected for use in this experiment are the following:

1. Rowe Decision Style Inventory (DSI).
2. Driver Decision Style Exercise (IST).
3. Rotter Internal/External Locus of Control (I/E) test.
4. Myers-Briggs Type Indicator (MBTI).
5. Purdue-Rutgers Prior-Experience or General Incongruity Adaptation Level (GIAL) test.
6. Witkin Embedded Figures Test (EFT).

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Rowe Decision Style Inventory (DSI)

The primary measure of decision style in this experiment is the Rowe Decision Style Inventory (DSI). (A discussion of Rowe's Cognitive-Contingency Model of decision styles is included in Appendix B.) The subjects in this experiment were categorized into Rowe's four basic decision style groups and the performance of each particular style was examined relative to the collective performance of the (remaining) subjects in the other three categories. One reason Rowe's DSI was used was so that the results could be compared with the results of other research that is emerging based upon the styles measured by Rowe's DSI (Mann, 1982). Another reason was to provide a basis for a comparison with Driver's decision model.

Driver Decision Style Exercise (IST)

The second measure of decision style used in this experiment is Driver's Decision Style Exercise (IST) based upon the decision style model described in Appendix A. The subjects in this experiment were categorized according to the cognitive styles determined by Driver's IST test, and, as with Rowe's DSI test, the performance of each style was compared with the composite performance of the (remaining) subjects. One reason for using the IST test is that similar to Rowe's DSI, it also has a unique scale for selecting "decisive" and "analytical" subjects. Thus, the characteristics of Driver's individual styles (e.g., the Decisive and Hierarchic styles) could be compared with comparable styles using Rowe's DSI (e.g., Directive and Analytical styles) as well as with

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comparable styles measured by other researchers in the field (e.g., Witkin's "field independent" style, etc.). In addition, the results using Rowe's and Driver's tests are compared with the published results of recent HIP research based upon the more-widely used Myers-Briggs and the Witkin tests discussed below.

Myers-Briggs Type Indicator (MBTI)

The main reason for selecting the Myers-Briggs Type Indicator (MBTI) in addition to Rowe's and Driver's tests is that it is the most widely used decision style test whose reliability and validity have been thoroughly tested by numerous researchers. (See Appendix C for a thorough discussion of the reliability and validity of the Myers-Briggs Type Indicator test.) Some of the most recent research based upon the Myers-Briggs Type Indicator are:

1. McKenney and Kenn (1974) report that "The most striking result of our experiment was that, while the scores on the Myers-Briggs scales showed virtually no correlation with absolute performance on our tests, there was a relationship between cognitive style and those scales."

2. Mason and Mitroff (1973) proposed a two-dimensional model based on the Myers-Briggs Type Indicator (Educational Testing Service, 1962) to evaluate a decision-maker according to his perception of objects and his evaluation of objects.

3. Keen (1978) noted that "The (cognitive style) research suffers from a lack of simple, reliable devices for measuring individual

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styles, although the Myers-Briggs Type Indicator...has been found to be a valuable and very reliable instrument...."

4. Henderson and Nutt (1980) found cognitive styles measured by the Myers-Briggs indicator to be an important factor in the decision to adopt particular capital expansion projects and their assessment of the risk of those projects.

5. Mann (1982) found a strong relation between certain attributes of the analytic and conceptual styles measured by Rowe's Decision Style Inventory and various positions in strategic planning (versus other positions in financial planning). He also found a relation between Rowe's model and the cognitive styles measured by the MBTI test.

Purdue-Rutgers Prior Experience Test

The reason for using the Purdue-Rutgers Prior Experience test is that several studies have shown a strong correlation between job satisfaction and a person's tolerance for ambiguity (Lee, 1974). Further, a number of studies relate tolerance for ambiguity and a person's information processing (Hughes, 1976; and Dermer, 1973). Perceived uncertainty also has been related to job satisfaction in a number of studies in the accounting profession (Ferris, 1977). Interestingly, Watkins (1980) also proposed to "bring together, in one study, some of the 'styles' constructs used in isolation in previous studies, e.g., tolerance for ambiguity test used by Dermer (1973) and McGhee et al.(1978); and the Myers-Briggs Type Indicator used by Keen...."

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Rotter Internal/External Locus of Control Test

The Rotter Internal/External Locus of Control Test was used because this instrument is a simple but effective measure of a subject's locus of control (which is somewhat similar to introversion and extraversion as measured by the MBTI test). In several pilot studies the author measured a relationship between scores on the Rotter Locus of Control test and the Purdue-Rutgers tolerance of ambiguity test. A similar relationship between these tests and performance in this experiment will be examined below. Hughes (Hughes, 1976) also has observed a relationship between scores on the Rotter test and the subjects' sensitivity to new information.

Witkin Embedded Figures Test

The Witkin Embedded Figures Test (EFT) was used because it relates to the early work of Vasarhelyi (1977) which validated the heuristic vs. analytic classification technique developed by Huysmans (1970). The EFT test is widely used to distinquish low-analytic individuals from high-analytic individuals. It was used most recently by Benbasat et al (1979) to show that "...low-analytic subjects both prefer and perform better with disaggregated reports." (A more detailed discussion of the EFT test appears in Appendix D.)

Summary

Recent research has shown a strong relation between Rowe's decision styles and performance in financial planning tasks (Mann, 1982).

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Since this experiment utilizes a management simulation exercise involving a fairly complex set of financial planning and analysis tasks prior to the decision making steps, the Rowe Decision Style Indicator was selected as the primary instrument for measuring decision styles. The Witkin Embedded Figures Test was also used to segregate the high-analytic (field-independent) subjects from the low-analytic (field-dependent) subjects. In the following Chapter 3 the actual experiment will be described, and the proposed hypotheses are developed along the lines of the expected performance of the high-analytic decisive (directive) style versus the low-analytic directive style. Additional hypotheses are also developed to test whether there are any significant differences between the decisive style and Rowe's analytic style, as well as the decision times of each of the styles.

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Chapter 3

The Experiment and the Hypotheses to be Tested

The Experiment

The computer simulation exercise used in this experiment is the version of Mock's Information Structure Experiment (ISE) which was modified by Ryan and used in his dissertation research (1983). A synopsis of this version of Mock's multi-period simulation exercise is included in Appendix G. The subjects used in this experiment were the 110 students enrolled in Ryan's three managerial accounting classes during the Spring, 1983 semester at the University of Southern Califonia.

The actual experiment will consist of the following phases:

Phase	Objective
1.	The Experiment Distributed case to 110 subjects week prior to ISE exercise. Each subject projected an income statement based on his/her own operating decisions. In-class time devoted to brifing subjects on additional details regarding the ISE exercise. Assigned them to the four treatments on a random basis. Conducted the exercise and collected individual data (i.e., data used, decisions made, time involved, and results obtained) for each of the 110 subjects.
2.	Post-Test #1 Administered the distribution of the six decision (cognitive) style tests to the 110 subjects (along with a biographical data questionnaire for Professor Ryan) and categorized the 66 subjects who completed the tests into the basic categories for each of the decision style models described above.
3.	Post-Test #2 Administered the Witkin EFT test to 41 subjects who agreed to take the test and categorized the subjects into the high-analytic (field-independent) category vs. the low-analytic (heuristic or field-dependent) category.

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4. Preliminary Analysis of the Data
   Analyzed the data for each of Ryan's four treatments without regard for the decision styles of the individual subjects in each of the treatment categories. (My analysis of Ryan's data without regard for the decision styles involved is described in the following chapter.) Eliminated same outliers that were eliminated by Ryan.

5. Re-Analysis of the Data
   Re-analyzed the data for each of the four treatments utilizing only those subjects that fit into the various decision style categories specified in the hypothesis testing outlined below. (These results are discussed in detail in Chapters 5 and 6.)

Phase 1: The Experiment

Ryan used a modified version of the ISE that was used in the original Mock/Driver studies (1975). (See Appendix G for a detailed description of Mock's multi-period decision-making simulation exercise.) By using Mock's ISE exercise, the results of Ryan's study and my analysis of his data are relatable to the findings in Mock's earlier study, as well as to the more recent studies of Mock and Vasarhelyi (1976 and 1983) and Benbasat and Dexter (1979). In the later study there was a significant difference in performance between the high-analytic vs. low-analytic subjects in a similar multi-period decision-making simulation exercise.

Research Design

In the modified version of Mock's ISE developed by Ryan, there are four treatments based upon the types of feedback provided to the participants. Each participant submits predictions of certain key

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micro-economic variables: industry demand index, material prices, and labor prices. Each subject received back "actual" outcome feedback based on their decisions. Additional feedback, however, is structured as follows:

	Treatment Group			
Feedback Type	1	2	3	4
A. "Ex-Post Optimal" outcome based upon an optimal decision rule and actual economic conditions (Perfect information).	Yes	No	Yes	No
B. "Would have been" outcome based upon the optimal decision rule and subject's economic predictions.	No	Yes	Yes	No
C. Actual outcome.	Yes	Yes	Yes	Yes

The 110 subjects were randomly assigned to the four treatment groups. Performance differences between "actual" and "optimal" outcomes (results) indicate whether the decision maker had trouble with the prediction phase or with the action-choice phase of the decision process. However, differences between the "would have been" outcomes, based on the subject's predictions and the optimal decision rule versus the "optimal" results, provide an indicator of prediction errors. Similarly, differences between "actual" results and the "would have been" outcomes, based on the subject's predictions and an optimal decision rule, provide an indicator of errors in the decision rule. This can be

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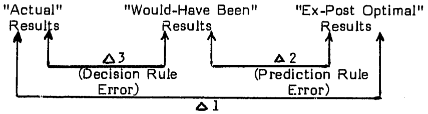
summarized as follows:



Δ 1: Performance differences measure overall ability to achieve optimal results based upon optimal predictions and optimal decisions.

Δ 2: Differences in outcomes reflect prediction errors (less than optimal predictions.

Δ 3: Differences reflect errors in the decision rule (less than optimal decisions).

An alternative and superior method for measuring the decision error is to determine the difference between the "budget" and the "ex-ante optimal" outcomes. In this case we compare the difference in the results between the actual action choices versus the optimal "ex-ante" choices , using in both cases subject's predictions. This is the method that was used in this experiment. Treatment Group 1 was provided with this type of feedback as a measure of decision rule errors.

The ability of the four treatment groups to detect less-than-optimal outcomes due to prediction errors versus less-than-optimal decisions is as follows:

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	Treatment Groups 1	2	3	4
A. Ability to detect prediction errors	Yes	No	Yes	No
B. Ability to detect less-than-optimal decisions	No	Yes	Yes	No
C. Reports given:	Would Have Been vs. Ex-Post Optimal and Actual Results	Budget vs. Ex-Ante Optimal and Actual Results	All Reports	Only Actual Results

The only variables controlled by Ryan were the micro-economic and macro-economic variables and fixed costs. The independent variables in this experiment were the choices the subjects submitted for their own production quantities, advertising units, and material input factor. The dependent variables included unit cost for material and labor combined (C), selling price (P), average production costs (C/Q), profits (N), and decision times. Rates of improvement in these variables were used to measure whether or not there was any evidence of learning for each of these dependent variables.

Phase 2: Post-Test #1

In the Phase 2 Testing Session, the 110 subjects, were given the battery of six decision styles tests described above. (This testing was done after the experiment so as not to disturb Ryan's experiment.) The primary objective of this phase of the testing was to categorize the subjects into the four basic decision styles identified by Rowe's Decision

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Style Inventory (DSI): the Analytic, Behavioral, Conceptual, and Directive; however, it is clear from an analysis of the attributes of the Directive style (as outlined in Appendix B) that is identical, for example, with Driver's decisive style (as described in Appendix A). Accordingly, we will use the term "directive" to be synonymous with "decisive" throughout the rest of this dissertation.

Rowe's DSI generates for each subject four raw scores· one for each of the four scales on the DSI. Sixty-five subjects completed the DSI and the distribution of the scores for the four scales were as follows:

DSI Scales	Mean Score	Standard Distribution
Analytic	88.4	13.8
Behavioral	60.3	12.0
Conceptual	77.1	15.0
Directive	73.8	12.4
Total	299.6	

There are twenty questions on the DSI and each subject must rank his choice of four possible answers to each question by selecting the weights "8" for most likely answer; "4" next most likely choice; "2" for the third likely choice; and "1" for the least likely answer. Accordingly, the maximum possible score for each decision style is 160 (20 questions times 8 points for the most likely answers) and 300 points overall (=20 questions times 15 points for the four possible answers of 8,4,2, and 1 for each question).

These raw scores were normalized by calculating Z scores based on the individual means and standard deviations for each scale as shown

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for the analytic scale·

$$RAN = (RA - 88.4) / 13.8$$

where RAN = Z score for Analytic scale;
RA = Raw score for the Analytic scale;
88.4 = Mean of the raw scores for the Analytic scale; and
13.8 = Standard deviation of the raw scores for the Analytic scale.

Then, each subject's primary style was determined simply by selecting the style with the highest Z score, as shown (again) for the analytic scale:

IF (RAN > RBN and RAN > RCN and RAN > RDN), THEN RDS=1

where RAN = Z score for the Analytic scale;
RBN = Z score for the Behavioral scale;
RCN = Z score for the Conceptual scale;
RDN = Z score for the Directive scale; and
RDS = Rowe Decision Style.

The results of these calculations produced the following distribution of 65 styles from the original sample of 66 subjects (one person did not complete Rowe's DSI).

Variable	Style	No.	Percent
RDS = 1	Analytic	13	20%
RDS = 2	Behavioral	19	29%
RDS = 3	Conceptual	17	26%
RDS = 4	Directive	16	25%
		65	100%

Unfortunately, (as will be discussed in the next chapter), eight of these 65 subjects had to be eliminated from the experiment because they were outliers (either they had too low a score or they took too long to perform the experiment). As a result, the final distribution of styles was reduced as follows:

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	No.	Percent
Analytic	12	21%
Behavioral	17	30%
Conceptual	15	26%
Directive	13	23%
	57	100%

Since my principal focus is on the performance of the Directive Style, it was particularly disappointing to lose the 3 directives from my analysis (38% of the rejects). Moreover, it is also probably significant that the Directives seemed to the predominant style that took much longer than the allowed one-hour in an attempt to improve their performance. The characteristics of the eight outliers relative to the overall mean scores are as follows·

	Rowe's Decision Style	ID	INC	DERR	PERR	PTS	
			Variables *				
1.	Analytic	324	137	43.7	1.7	179	
2.	Behavioral	101	182	4.0	3.1	185	
3.	Behavioral	104	-351	317.5	26.7	112	
4.	Conceptual	320	81	100.9	11.5	·147	Individual
5.	Conceptual	338	115	60.7	8.3	117	Scores
6.	Directive	142	95	91.5	5.3	185	
7.	Directive	202	140	15.0	23.5	147	
8.	Directive	328	134	64.4	38.7	153	
Nos. 1 through 8 above:			66.6	87.2	14.9	153.1	
Omitting No. 3 above:			126.3	54.3	13.2	159.0	Mean
Directives only(Nos.6-8):			123.0	57.0	22.5	161.7	Scores
Total Sample (N=66):			119.3	54.7	14.1	151.6	

* See Appendix K for the Glossary of Terms. A brief definition of these variables is:

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Variable	Definition
ID	ID Number
INC	Average Income over Last 6 Periods
DERR	Average Decision Error over Last 6 Periods
PERR	Average Prediction Error over Last 6 Periods
PTS	Points Achieved in Class

For obvious reasons, the exclusion of the eight subjects listed above was a real loss (disappointment), and the reasons for the exclusion are discussed in Chapter5. Clearly, however, the performance and grade points of the excluded subjects (except for subject ID = 104 with the very low six-period average income, INC = -$351,000) were comparable, if not better, than the performance of the total sample of 66 subjects.

Phase 3: Post Test #2

Following the completion of the decision style tests, the subjects were asked to also take the Witkin Embedded Figure Test. This test was used so that the subjects could be further categorized into high-analytic vs. low-analytic categories. A low Witkin EFT score (a field-dependent subject) is considered to be a low-analytic subject, and a subject with a high Witkin EFT score is a field-independent or high-analytic subject. By means of this further categorization, the results could be compared with the recent study by Benbasat and Dexter (1979).

In the Benbasat and Dexter study (1979) the main focus was on methods of information generation (i.e., a data base inquiry capability or an "events" approach versus structured aggregate reports or "value" approach), and the findings were that the structured/aggregate reports are better suited for high analytics, while a data base inquiry system is

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better suited for low analytics. Ryan's modifications of Mock's ISE produced aggregate reports comparable to the "value" type report used by Benbasat and Dexter (1979), and accordingly in Chapter 6 we will make a comparison of the results of this research with the findings in the Benbasat and Dexter study.

The unfortunate results from this Phase 3 testing was that only 41 subjects were willing to take the Witkin EFT test. The characteristics of this subset of 41 subjects versus the original sample of 66 subjects and the reduced sample of 58 subjects is shown in Table 3-1. As can be seen, the reduced sample of 41 subjects is not significantly different from the sample of 58 subjects. While they appear to have a slightly lower overall performance from the sample of 58 subjects, the 41 subjects do appear to be close in overall average performance to the original total sample of 66 subjects.

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Table 3-1

Comparison of Performance of Subjects Who Took Witkin EFT Test and Total Sample (N-66 Subjects)

	N = 41 Sample		N = 66 Sample		N = 58 Sample	
Variable*	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Income	119.8	(54.5)	119.3	(74.9)	126.6	(48.4)
Decision Error	56.2	(54.1)	54.7	(56.6)	50.2	(47.8)
Prediction Error	15.1	(15.5)	14.1	(13.4)	14.0	(13.5)
Grade Points	153.5	(30.4)	151.6	(31.2)	151.4	(31.8)

* Definition of Variables:

Income	Average income over last six periods of ISE experiment.
Decision Error	Average decision error over last six periods.
Prediction Error	Average prediction error over last six periods.
Grade Points	Grade points achieved in class.

The overall average Witkin EFT score was 18.9 with a Standard Deviation = 5.4. The actual range of scores for each of the 40 subjects in the N=41 sample who also took Rowe's DSI test and accordingly could be categorized into Rowe's four basic styles are summarized in Table 3-2.

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Table 3-2
Summary of Detailed Scores of Subjects Who Took Witkin EFT Test Categorized by Rowe's Four Basic Decision Styles

Analytic (RDS =1)	Behavioral (RDS = 2)	Conceptual (RDS = 3)	Directive (RDS = 4)
3.0	6.0	15.0	8.0
13.0	15.0	19.0	11.0
18.0	17.0	20.0	11.0
19.0	20.0	21.0	13.0
20.0	20.0	22.0	16.0
21.0	22.0	23.0	17.0
21.0	22.0	24.0	18.0
23.0	22.0	24.0	24.0
23.0	22.0		24.0
	23.0		24.0
	25.0		
	25.0		
	25.0		

	Analytic	Behavioral	Conceptual	Directive	Total
N	9.0	13.0	8.0	10.0	40.0
High	23.0	25.0	24.0	24.0	25.0
Low	3.0	6.0	15.0	8.0	3.0
Mean	17.9	20.3	21.0	16.6	18.9
Std.D.	6.4	5.2	3.0	5.9	5.4
Median	20.0	22.0	21.5	17.5	20.0

Based upon the results obtained by Mock and Vasarhelyi (1976), I anticipated the following numbers of analytics and directives in the final reduced sample of 57 which took Rowe's DSI test:

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	Directives	Analytics	Others	Total
High-Analytics	5 (8.3%)	6 (10.4%)	17 (29.2%)	28 (47.9%)
Low-Analytics	9(15.6%)	2 (4.2%)	18 (32.3%)	29(52 .1%)
	14(23.9%)	8 (14.6%)	35 (61.5%)	57(100.0%)

Since only 40 of 41 subjects who completed the Witkin FT test also completed Rowe's DSI test, what I actually found was diminished, as follows:

	Directives	Analytics	Others	Total
High-Analytics	4 (10.0%)	7 (17.5%)	17 (42.5%)	38 (70.0%)
Low-Analytics	6(15.0%)	2 (5.0%)	4 (10.5%)	12(30 .0%)
	10(25.0%)	9 (22.5%)	21 (32.5%)	40(100.0%)

From an overall point of view, this group of 40 subjects is a highly-analytic group (70% vs. 30%), whereas the Directives as a particular sub-group are definitly a low-analytic group (only 40% of the 10 Directives are high-analytic). Also, it should be noted that the distribution of Rowe's four styles in the sample of 40 is remarkably close to the distribution in the larger sample of 57 subjects, as follows:

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Rowe Decision Style	Sample N=57	Sample N=40
Analytic	12 (21%)	9 (22.5%)
Be[illegible]	17 (30%)	13 (32.5%)
Co[illegible]	15 (26%)	8 (20.0%)
Directive	13 (23%)	10 (25.0%)
	57 (100%)	40 (100%)

Thus, we can draw the following conclusions from the Witkin EFT results:

1. The distribution of Rowe's four styles in the sample of 40 subjects who took both tests (Rowe's DSI and Witkin's EFT) is practically the same as the distribution of Rowe's styles in the larger N = 57 sample.

2. The sample of 40 is clearly a predominantly field-independent or highly analytic group (70% are field-independent versus only 47.9% in Mock's and Vasarhelyi's sample).

3. The Analytic style is 78% (7 of 9 subjects) field-independent or highly-analytic versus the Directive style which is only 40% (4 of 10 subjects) field-independent or highly-analytic.

4. As a group, the overall performance of the sample of 41 subjects who took the Witkin EFT test appear to be slightly poorer performers than the sample of 58 subjects (the final group selected after the outliers were removed) and closer to the original sample of 66 subjects. However, it appears reasonable to assume that the Witkin results are fairly representative of the total universe of the 110 subjects in Ryan's experiment.

5. It appears that my original objective of obtaining 20 Directives from the 110 subjects would have been met had all 110 subjects taken all the tests (as orginally planned). But the voluntary nature of the tests and my administering them after Ryan's experiment obviously cut down on the response, and some of the original mathematical tests which I planned to do had to be discarded because of the greatly reduced degrees of freedom with only 10 or 13 Directives depending on which sample (N=40 or N=57) is used.

The subjects with the Analytic style were also categorized into a

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high-analytic and low-analytic group. According to Meshkati (1982), subjects with the Analytic style perform similar to Directives because of their uni-focus style; and in this experiment we will examine whether, in fact, the Analytic style group performs similarly to the Directive style group.

Phase 4: Preliminary Analysis of the Data

Each subject was given the ISE case problem to take home to study. Before beginning the experiment, each subject worked out an income statement based on the prior management's decisions and made decisions for the first operating period of the business game.

Decisions were then made for the seven subsequent decision periods. The first period was considered a training period, thereby leaving six sets of data to be analyzed.

As subjects participated in the experiment, the computer stored their prediction and action-choices, along with the resultant dependent variables. The data were analyzed using the standard SPSS two-way analysis of variance (ANOVA) programs along with appropriate covariance routines. Learning was also analyzed by Ryan by calculating the slope of each treatment group's averages for each dependent variable for each period. The slopes were compared using a Z-Test as explained in Friedman (1981).

Personal information was also obtained using questionnaire forms to be filled out by each subject. This information included age, sex, grade point average, major, year in school, and part-time or full-time student. This data was tested to see if personal characteristics explain

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any significant proportions of variances, but according to Ryan's analysis the results were not significant.

Hypotheses Tested by Professor Ryan

The main points demonstrated in his research are:

1. Information systems can be designed to highlight sources of errors in previous decisions;

2. Information system designers can influence the decision processes of users; and

3. Information systems affect learning in their function as a feedback mechanism.

The first point of this research, to determine whether information systems can assist in determining where decisions went wrong, was tested by analyzing the performances of treatment groups using different information feedback systems. In the null form, the hypothesis is:

Ho1: The performance levels achieved by subjects will not be significantly different, regardless of which of four feedback information systems is available.

Five dependent variables were used as measures for performance. They are price, standard variable production costs, unit production costs, profits, and decision times. The first four were analyzed in terms of their percentage difference from the optimal for that variable while decision times were left in their original form.

The data also was analyzed to determine if the one information system that provides an indication of the effect of prediction errors (Treatment Group No. 3) actually helped the subjects to improve on their predictions. In the null form, the hypothesis is:

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Ho2: The performance levels achieved by subjects who are able to determine prediction errors will not be significantly different than the performance levels of subjects not able to determine prediction error.

The dependent variables of price, unit material-labor costs, unit production costs, profits, and decision times were used in the same manner as indicated above. All subjects received feedback as to their "actual" results, while only half received information as to the optimal results as well. Thus, this hypothesis was tested under two feedback systems.

The third point of this research, that information feedback systems affect learning, was tested by measuring rates of improvement for all four treatment groups over the six decision periods. In the null form, the hypothesis is:

Ho3: Rates of improvement for treatment groups will not be significantly different.

Again, the percentage differences from optimal levels of price, unit material-labor costs, unit production costs, and profits were used along with observed decision times. Rates of improvement were measured in terms of the slopes of regression lines across the averages for each treatment group over the last five decision periods.

Ryan's Findings

Ryan's findings examined the relationships between the four different information feedback systems in the ISE and the effect that these information systems had on prediction and decision performances. Appendix G includes Ryan's findings and his conclusions. There follows

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below a brief summary of Ryan's test of the above three hypotheses.

Ryan's first hypothesis related the prediction oriented information feedback system to the criteria for prediction performance (i.e., net income, price, total variable production cost per unit and standard variable production cost). His findings were that prediction-oriented information did in fact have a significant impact on prediction performance (with the exception of price performance). Ryan's second hypothesis related the decision oriented information feedback system to the criteria for decision effectiveness. His findings in this case showed that decision-oriented information had a significant impact on decision effectiveness (again with the exception of price performance). In each case, he found that the prediction-oriented information did not affect prediction performance.

Regarding rates of improvement in prediction or decision performance, Ryan found practically no learning effects. The decision information feedback system did not aid the learning of the selection process for setting decision variables. Similarly, the prediction information feedback system did not aid the learning of the process for making predictions. Moreover, while the prediction treatment did not aid prediction effectiveness, it actually hindered decision effectiveness. In summary, Ryan concludes that learning was absent and the only significant impact of the feedback reports on learning was to lessen the performance trends on the performance criteria the feedback reports were not intended to help, thereby reflecting a "distraction effect" of the "attention directing" aspect of the reports.

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Phase5: Re-Analysis of Data

This experiment was in every sense a "double-blind" experiment. The subjects in the experiment were assigned randomly by Ryan to the four treatment groups without any regard for the particular decision styles of the subjects. Since this study was based on the premise that decision styles are a significant determinant of performance, it was my contention that the performance results of Ryan's experiment were confounded because of the distribution (mix) of decision styles amoung the subjects in each of his four treatment categories and that some of the performance results would be more fully explained by taking into consideration the decision styles of the subjects. When the data were re-analyzed using selected subsets of particular decision styles, performance differences between the treatment groups did appear and some of the results were consistent with the original hypotheses proposed for the directive and analytic decision styles.

Independent Variables

In addition to the feedback treatments in Ryan's experiment that were discussed above,the added independent variables in this experiment were the subset of the 57 subjects categorized according to the styles as measured by the Rowe DSI decision style test. Primarily, the results of the DSI test were used to categorize the subjects as follows:

X_1 Subjects with a Directive decision style as measured by the Rowe DSI test.

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X_2 Subjects with an Analytic decision style as measured by the Rowe DSI test.

X_3 Subjects in the control group.

X_4 Directive subjects in subset X_1 above who are field-independent(FI) as determined by the Witkin EFT test.

X_5 Directive subjects in subset X_1 who are field-dependent (FD) as determined by the Witkin EFT test. (Note that $X_4 + X_5 = X_1$ where all X_1 subjects are tested using the EFT test.)

X_6 Analytic subjects in X_2 above who are FI.

X_7 Analytic subjects in X_1 above who are FD. (Note that $X_6 + X_7 = X_2$)

X_8 Subjects in Control Group X_3 above who are FI.

X_9 Subjects in Control Group X_3 who are FD. (Note that $X_8 + X_9 = X_3$)

The subjects in each of the above categories also were given the other decision style tests, namely:

1) Driver's IST test;
2) Rotter I/E test;
3) GIAL test; and
4) Myers-Briggs Type Indicator test.

It was expected that there would be close mapping of the directive and analytic decision styles as measured by Rowe's DSI test with the decisive and hierarchic styles measured by Driver's IST instrument; but as will be shown later, this expected cross-mapping does not exist.

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The categories defined above can be summarized as follows:

Independent Variable	High-Analytic (Field Independent)	No. of Subjects	Low-Analytic (Field Dependent)	No. of Subjects	Total	No. of Subject
Directives(X1)	X_4	4	X_5	6	$X_1=X_4+X_5$	10
Analytics(X2)	X_6	7	X_7	2	$X_2=X_6+X_7$	9
Control(X3)	X_8	17	X_5	4	$X_3=X_8+X_9$	21
		28		12		40

Dependent Variables

The dependent variables in this experiment included unit cost, material and labor combined, selling price, average productionoss, profits, and decision times. Professor Ryan also used rates of improvement to measure learning for each of these dependent variables.

Prior Experimental Results

As Mock and Driver noted (1975) in their own landmark study, many of the experimental expectations in that study were more of the nature of "priors" based upon past research rather than well-developd hypotheses. Moreover, their "priors" were based upon earlier studies that used Driver's decision style model with its Hierarchic, Integrative, Flexible, Decisive and Complex decision styles. In order to develop our own "priors" we assumed in this experiment the same similarity between Driver's and Rowe's styles as determined by Mann (1982) in his study:

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Driver's Styles	Rowe's Styles
Hierarchic	Analytic
Flexible	Behavioral
Integrative	Conceptual
Decisive	Directive

Accordingly, the "priors" herein have been based upon the above explicit extension from the earlier work, and as a result, one requirement of this approach will be to test the validity of this assumed relationship between Rowe's and Driver's models.

Taking this approach, then, our priors are as follows:

1. Analytic subjects(X_2) can handle more complex feedback than the less complex directive subjects(X_1) especially under overload conditions.

2. Complex subjects like analytics(X_2) can handle more complex inputs than less complex subjects like decisives(x_1) expecially under overload conditions.

3. Complex subjects like analytics (X_2) will utilize more data under overload (prefer more complete feedback) than less complex subjects like decisives(X_1).

4. Under conditions of low environmental load the directive style(X_1) is significantly faster than some of the more complex styles. (The actual relation to analytics is unknown.)

5. Analytics(X_1) require more decision time in contrast to directives.

6. Information seeking of all types in all conditions declines from very high levels under low environmental load to very low levels under high load. Thus, Total Times taken by analytics should be greater than for less Complex Directives.

7. Directives(X_1) initially are high information users, but rapidly settle into a low information posture, whereas analytics(X_2) show a steady gradual shift toward less information as opposed to the abrupt shift of the decisive.

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8. Under overload conditions (e.g., a very structured complex task) the directives(X_1) lose their normal speed, and they move slowly with little data.

9. The normally fast directives(X_1) are more easily overloaded by a complex structured game than are analytics(X_2), and when overloaded directives(X_1) become quite deliberate (i.e., slow) and low data using.

10. Analytics(X_2), in very structured tasks, will be high data users, and will process data at very high speeds compared with directives(X_1). (In less-structured environments speed would be less noticeable.)

11. Analytics(X_2) prefer and effectively use moderately complete feedback.

The added dimension of this study is the use of the Witkin EFT test to achieve a finer categorization of Rowe's directives into low-analytic vs. high-analytic (field-dependent vs. field-independent) directives. Rowe's analytic decision style is subdivided into the low-analytic vs. high-analytic categories. This provides us with a finer distinction in the performance of directives and analytics, such as:

1. The high-analytic Directives(X_4) should not become overloaded or "deliberate" as quickly as the low-analytic Directives(X_5).

2. The high-analytic Analytics(X_6) should continue to perfer moderately complex feedback even under overload conditions (e.g., the very structured complex tasks of ISE).

3. The high-analytic Directives(X_4) also should continue to prefer moderately complex feedback even under overload conditions.

Hypotheses To Be Tested

As we have noted elsewhere, the strategy of this research is to use an Information Structure Experiment (ISE) similar to the one reported on by Mock et al. (1975). The ISE is based on a computerized business game modeled after a manufacturing firm. The feedback reports designed

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by Ryan as a modification of Mock's ISE include more aggregated data (similar to the "events" approach as opposed to disaggregated data (the "value" approach) used in the Benbasat and Dexter study (1979). This change will enable a closer comparison of this study with the results of their experiment. In that study, performance in a similar business game showed that the analytic subjects (versus low-analytic subjects) preferred structured (aggregate) reports.

Based upon the results of the Benbasat and Dexter study (1979), along with the additional dimension of the high-analytic versus low-analytic styles made possible by the Witkin EFT results, the hypotheses that will be tested in this experiment are as follows:

1. Directive Style

   It is to be expected that high-analytic Directives will be better able to handle the complex feedback reports developed by Ryan and thereby will perform better than low-analytic Directives. Stated in the form of a null hypothesis we have:

   Ho1: Under conditions of a highly structured exercise, the Directives with the high-analytic (field-independent) style(X_4) will not handle complex data better (and thereby will not perform significantly differently) from the Directives with a low-analytic style(X_5).

2. Analytic Style

   In contrast with the Directive Style it is expected that Analytics will handle the complex feedback reports better than the Directives and thereby will perform better than even the high-analytic Directives. Stated in the form of a null hypothesis, we have:

   Ho2: Under conditions of a highly structured exercise, Analytics (X_9) will not handle complex data better and thereby will not perform significantly different from Directives with a high-analytic or a low-analytic style (X_4 or X_5).

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3. Low-Analytic (vs. High-Analytic) Style
   In the extreme case of high environmental load (i.e., very structured tasks) Directives with a low-analytic style(X_5) will be the first group of subjects to lose their normal (faster) speed. They will "decide" more slowly and with little data; and therefore, they will in all likelihood take longer to complete the exercise than all the other groups. Stated in the form of a null hypothesis, we have:

   Ho3: Under conditions of a highly structured exercise, Directives with a low-analytic style (X_5) will not take a significantly different length of time to finish the exercise compared with the total times for any of the other decision styles.

Summary

In an attempt to sharpen the performance differences between the various possible decision style categories, this study focuses on only one of the bi-polar dimensions of Rowe's decision style model: the directive versus the analytic style. Rowe suggests that these two particular styles have a left-brain orientation and they are uni-focused and task-oriented, with the directive style seeking structure and a low-level of ambiguity versus the analytic style coping more effectively with high-levels of complexity and ambiguity. To sharpen the potential differences between subjects to an even greater degree, the Witkin EFT test is used to further categorize subjects into field-independent (highly-analytic) decision makers versus field-dependent (low-analytic) decision makers. In so doing, we then would expect to find the sharpest differences existing between the highly-analytic (field-independent) analytics and the low-analytic (field-dependent) directives. Accordingly, the hypotheses tested are based on the expectations that:

- High-analytic directives will perform better than low-analytic directives because they are better able to

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process the complex feedback reports developed by Ryan than are the low-analytic directives.

- Analytics will perform better than even the highly-analytic directives because they are better able to process the complex feedback reports used in this exercise.

- Generally, directives are significantly faster in their decision making whereas analytics usually require more decision time; however when overloaded, directives become deliberate (i.e., slow) and low data using.

This line of reasoning then leads one to the expectation that Ryan's experiment will enable us to reject the three null hypotheses:

Ho1: High-analytic directives will not perform significantly better than low-analytic directives.

Ho2: Analytics will not perform significantly better than directives even with a high-analytic (field-independent) style.

Ho3: Directives with a low-analytic style will not differ significantly in the time taken to complete the exercise.

In Chapter 4 we will describe how Ryan's data were re-analyzed to test these three hypotheses, and in Chapter 5 the results of this analysis and the actual test of these hypotheses will be discussed.

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CHAPTER 4

Preliminary Analysis of Data from the Experiment

Background

For a number of years I have suggested the idea of a "double-blind" experiment on cognitive styles much like those done in critical medical experiments on humans. I also have suggested that the attributes of a particular style should be examined in detail relative to the rest of the population as a control group. Toward this end, I proposed to test these ideas in conjunction with the experiment performed by Ryan during the Spring, 1983 semester. It was hypothesized that some of the treatment effects that Ryan expected to obtain would be explained more completely by the differences in the cognitive styles of the subjects.*

Organization of Testing Materials

Ryan's experiment was scheduled for the week of March 21-25, 1983. Following the meeting with my Dissertation Committee, 110 packets of material were put together for distribution to the subjects in Ryan's experiment. A sample packet is included in Appendix H. Each packet included a letter explaining that the purpose of the research was

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*This ideas was formalized into a dissertation proposal on "An Examination of the Decisive Decision Style in Tasks Using Accounting Information" presented to my Dissertation Committee on March 16, 1983. This proposal to examine the decisive style was approved by the Committee with a recommendation that the other decision styles also be examined since the data would be available.

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to study "the relationship between the decision style of accountants and their use of accounting information." The packet given to each student included the following instruments:

1. Decision Style Inventory by Professor Alan J. Rowe
2. Decision Style Exercise by Professor Michael J. Driver and its scoring sheet.
3. Purdue-Rutgers Prior Experience Inventory and Scantron Sheet Form 882N.
4. I-E Scale and Scantron Sheet Form 882.
5. Myers-Briggs Type Indicator test and its scoring sheet.
6. Personal Values and Ethics Questionnaire.
7. Student Information Sheet.

It was noted in the covering letter that if for any reason a student could not complete all seven instruments, the most important was Rowe's and Driver's decision style instruments and the Myers-Briggs test. The reason for this emphasis was to provide, as a minimum, some basis for comparing Rowe's and Driver's decision style models. The tests were even arranged in the packet in a way to minimize the frustration of taking so many tests and to ensure the subjects completing the desired tests first.

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Meeting the Class

The primary objective of this research experiment was to superimpose the measurement of the cognitive styles of the subjects of Ryan's information systems experiment in such a way that it would not introduce any artifact into his study. Accordingly, I agreed that all psychological testing would be done after Ryan conducted his computer simulation experiment on March 22, 1983, and arrangements were made to meet with Ryan's subjects (students in his three sections of Managerial Accounting) during the classes scheduled the week following the experiment. Since that week also was the week before Easter, it was thought that during the recess, the students would have the (spare) time needed to take the entire battery of tests included in the packet. It was estimated that each student would require approximately ninety minutes to complete all the instruments. It was further stressed in my verbal briefing of the students that Rowe's instruments was the most important test, and as a minimum, I hoped to get these back from each person.

So as to not relate my study to Ryan's experiment (which he himself guised as just another computer exercise in the syllabus of his Managerial Accounting classes), the students were told that my experiment was designed to study the relationships between the different instruments used to measure cognitive styles. As a further inducement, each student was offered ten dollars if all the tests were taken and promptly returned the week following Easter recess. Unfortunately, a large number of students did not attend the two classes prior to Easter,

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so I also had to meet with the students the week following the Easter recess. In all, over 100 packets of material were distributed during these meetings. As a further inducement, Ryan offered the students extra grade points if the tests were turned in. Disappointedly, however, only 66 packets were returned even with this considerable amount of prodding and encouragement from Ryan and myself.

The 66 responses were received and tabulated as shown in Exhibit ~~G~~ J-1 in Appendix ~~G~~ J. It should be noted that there is some missing data since certain tests were not taken by individual students. The missing data is as follows:

- o Rowe's Test - Not taken by ID #128.
- o Driver's Test - Not taken by ID #301.
- o Rotter's Test - Not taken by ID #128, 301, 310.
- o GIAL Test - Not taken by ID #128, 304.
- o Myers-Briggs Test - Not taken by ID #131, 143.
- o Witkin EFT Test - Not taken by twenty students.

The two biggest disappointments with the number of responses were: 1) The large number of students (40%) who were not motivated enough by the $10.00 to complete all the tests, and 2) The additional 20% of the students who did not complete the Witkin EFT Test. Even with this poor response for the Witkin EFT Test, some significant results were obtainable as will be shown later in Chapter 5.

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Scoring the Results

The decision style data were manually scored, except for Driver's instrument which was scored by Driver's student assistant using the computer program resident in the USC Testing Center. The overall results were at the same time both gratifying and disappointing. First of all, the 66 responses from the universe of 110 subjects in Ryan's experiment is clearly a good-sized sample (60%), and one would logically expect a good-sized sample like 60% to be fairly representative of the total population. Unfortunately, however, there appears to be a definite bias in the sample, as will be shown below.

Ryan eliminated eleven subjects from his total group of 110 subjects because nine took materially longer than the one-hour allowed for the experiment and two performed so poorly that their results had to be ignored. Table 4-1 compares the key attributes of the sample of 66 subjects with those of the 99 subjects finally selected by Ryan for his analysis. When I also eliminated the same subjects who took more than one hour as well as those who performed very poorly, my final sample was reduced to 58 usable subjects. With this reduction of 8 subjects, the final sample of 58 subjects (a 58% sample) as shown in Exhibit 4-2 is a significantly better performing group on the average compared with Ryan's group of 99 cases. It appears that a greater proportion of the better students completed the psychological tests. Their overall average score over six periods of the exercise was $126,603 for the 58 subjects versus $115,869 in Ryan's total group of 99 subjects. To test the

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significance of the differences between the 58 subjects in my sample vs. the remaining 41 subjects in Ryan's experiment who did not fill in the psychological tests, I performed the standard set of t-tests included in SPSS. This comparison is shown in Table 4-2.

As it can be seen in Table 4-2, the 41 subjects not included in the reduced sample of 58 subjects were significantly poorer performers. Their average income over six periods was only $100,683 versus $126,603 for my sample of 58 subjects. The significant lower average prediction error $14,026 in the 58-subject sample (vs. $20,975 for the 41 subjects not included) is an important consideration below when I decide to eliminate one of Ryan's treatments - the one dealing with the feedback on prediction errors.

Table 4-1

Comparison of Reduced Sample of 58 Subjects with Original Sample of 66 Subjects and Ryan's Sample of 99 Subjects

	N= 99 cases		N= 66 cases		N= 58 cases	
Variable*	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
INC	115.9	56.1	119.3	74.9	126.6	48.4
DERR	55.7	46.1	54.7	56.6	50.2	47.8
PERR	16.9	18.1	14.1	13.4	14.0	13.5
ST	132.8	31.8	139.2	31.7	136.9	32.2
TT	72.0	17.8	79.9	26.4	73.3	18.9
PTS	148.0	29.7	151.6	31.2	151.4	31.8

*Variable	Definition
INC	Average income over the last six periods.
DERR	Average decision error over the last six periods.
PERR	Average prediction error over the last six periods.
ST	Starting time
TT	Total time
PTS	Points achieved in class

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Table 4-2

Comparison of 58 Subjects with the 41 Subjects Excluded from Sample (Because They Did Not Complete the Decision Style Tests)

Variable*	No. of Cases	Mean	Std. Dev.	Std. Dev.	F Value	2-Tail. Prob.	T Value	2-Tail Prob.
Income								
	41	100.7	63.1	9.9	1.70	0.07	-2.31	0.02
	58	126.6	48.4	6.4				
Decision Error								
	41	63.5	42.9	6.7	1.24	0.48	1.42	0.16
	58	50.2	47.8	6.3				
Prediction Error								
	41	21.0	26.1	3.5	2.78	0.00	1.91	0.06
	58	14.0	13.6	1.8				
Grade Points								
	41	143.1	26.1	4.1	1.48	0.19	-1.37	0.17
	58	151.4	31.8	4.2				

*Variable	Definition
Income	Average income over last six periods
Decision Error	Average decision error over last six periods
Prediction Error	Average prediction error over last six periods
Grade Points	Points achieved in class

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Simplifying the Data

Ryan's experiment consisted of three treatments:

1. Information feedback on decision errors,
2. Information feedback on prediction errors, and
3. Economic environment (three versions).

Ryan's 2x2x3 research design presented me with some serious statistical analysis problems in terms of the low number of degrees of freedom available with the (small) 58-subject sample. The average number of subjects per cell was equal to 4 to 5 subjects (=58 subjects/12 cells). Then, when either Rowe's cognitive style model is superimposed upon Ryan's 2x2x3 research design, the results were, as one might logically expect, very poor because of the greatly reduced number of subjects in each cell.

Ryan introduced three different economies into his experiment in order to cut down on the possibility of cheating which had been evident in his earlier pilot experiment. By having what appeared to be a variety of exercises, it was hoped that students would not know which economy they were going to encounter, and the value of any feedback of information from students who completed the computer exercise earlier in the day would be greatly minimized. (Even with this precaution, however, there still appears to have been some feedback effect between subjects, and accordingly the time of day the exercise was taken is a significant covariate.) Even with the three different economies, however, Ryan did not find any significant treatment effects between groups. This

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was true in the 58-subject sample as well. Table 4-3 summarizes some of the key statistics on the three economies. There were no significant differences between these three economies as shown in Table 4-4. In Table 4-4 the first two ANOVA runs compare Ryan's sample of 99 subjects with my sample of 58 subjects. Ryan clearly showed that the economies were not a significant treatment effect, and with my sample of 58 subjects the economy treatment were even less significant in all cases but one (i.e., for Average 6-period income, it was 0.719 versus 0.737).

Table 4-3

Comparison of Statistics by Economy for the Sample of 58 Subjects Versus the 41 Subjects no in N=58 Sample

	#1	#2	#3	Total	#1	#2	#3	Total	Total
INC	132.3	129.9	117.9	126.6	95.4	106.9	101.0	100.7	115.9
DERR	41.7	44.3	64.2	50.2	6.6	57.6	66.5	63.5	55.7
PERR	16.9	15.9	9.4	14.0	26.8	19.8	12.8	21.0	16.9
PTS	154.4	140.8	157.2	151.4	144.6	143.8	139.6	143.1	148.0

Variable	Definition
INC	Average income over last 6 periods
DERR	Average decision error feedback over last 6 periods
PERR	Average prediction error feedback over last 6 periods
PTS	Points achieved in class

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Table 4-4
Comparison of ANOVA Runs Analyzing Treatment Effects for Craft's Sample 58 Subjects Versus Ryan's Sample of 99 Subjects

	Treatment	N=99(1)	N=58(2)	N=58(3)	N=58(4)	N=58(5)
1. Income..........	Dec.	.007	.074	.056	----	
	Pred.	.230	.963	.976	.780	
	Econ.	.737	.719	----	----	----
2. Decision Error.	Dec.	.005	.054	.032	.027	----
	Pred.	.722	.922	.811	----	.609
	Econ.	.318	.445	----	----	----
3. Dec. Error.......	Dec.	.005	.058	.035	.028	----
Impact on	Pred.	.736	.874	.755	----	.562
Income	Econ.	.197	.372	----	----	----
4. Dec. Error.......	Dec.	.082	.549	.470	.404	----
Impact on	Pred.	.449	.534	.468	----	.402
Price	Econ.	.537	.853	----	----	----
5. Dec. Error.......	Dec.	.015	.048	.027	.020	----
Impact on	Pred.	.977	.569	.474	----	.327
Unit Cost	Econ.	.087	.521	----	----	----
6. Dec. Error.......	Dec.	.027	.066	.076	.073	----
Impact on	Pred.	.323	.764	.816	----	.999
Var. Cost	Econ.	.297	.691	----	----	----
7. Dec. Error.......	Dec.	.009	.074	.054	.047	----
Impact on Act.	Pred.	.241	.945	.884	----	.692
vs. Opt. Inc.	Econ.	.571	.714	----	----	----
8. Prediction.......	Dec.	.843	.280	.161	.112	----
Error	Pred.	.015	.166	.104	----	.074
	Econ.	.035	.340	----	----	----
9. Pred. Error......	Dec.	.621	.253	.143	.098	----
Impact on	Pred.	.019	.132	.079	----	.056
Income	Econ.	.035	.487	----	----	----
10. Pred. Error......	Dec.	.620	.387	.320	.269	----
Impact on	Pred.	.130	.495	.476	----	.393
Price	Econ.	.258	.682	----	----	----
11. Pred. Error......	Dec.	.886	.260	.166	.122	----
Impact on	Pred.	.042	.247	.195	----	.142
Unit Cost	Econ.	.057	.607	----	----	----
12. Pred. Error......	Dec.	.699	.356	.187	.135	----
Impact on	Pred.	.006	.188	.114	----	.084
Var. Cost	Econ.	.007	.045	----	----	----

ANOVA Run#1 All three treatments; Ryan's sample: 99 subjects.
ANOVA Run#2 All three treatments; Craft's sample: 58 subjects.
ANOVA Run#3 Only the feedback reports (ignoring economies).
ANOVA Run#4 Decision error feedback reports only.
ANOVA Run#5 Prediction error feedback reports only.

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Because of the limited degrees of freedom available with the 58-subject sample, and because the economy treatment was not a significant treatment effect, Ryan's experiment could be reduced to a 2X2 research design based only upon the two alternative feedback systems: one for the feedback on decision errors; and the second for feedback on prediction errors. Even with this reduction in the size of the research design, the resulting improvement in treatment effects in the 58-subject sample for the prediction treatment were not as significant as the decision treatment effect. As Table 4-4 shows, a comparison of the significant treatment effects clearly indicates that the decision error feedback treatment effects were, in general, two or three times more significant than the prediction error treatment effects. The most significant F-values from the ANOVA runs presented in Table 4-4 are summarized below:

Variable	Decision Error Feedback Reports	Prediction Error Feedback Reports	Economy
Income	.050	.716	.719
Decision Error	.027	.609	.445
Dec. Error Impact on Income	.028	.562	.372
Prediction Error	.112	.074	.340
Pred. Error Impact on Income	.098	.056	.487

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From this summary, it is clear that at the 5% level of significance, the decision error feedback reports had a significant impact on income and decision error, whereas the prediction error feedback reports did not have a significant impact below the 5% significance level. Further, as in the case of Ryan's study, the Economy treatment had no significant effect whatsoever.

The difference in significance between the impact of the decision error feedback reports versus the prediction error feedback reports was one of the major differences between Ryan's results and the results of my analysis. This result was due in large part to the elimination of the "poorer" performers as noted above in the analysis of the N=58 sample versus the 41 subjects not included because they did not take the decision style test.

Preliminary Analysis of the Data

As noted above, the first step in analyzing the usable data from the 58-subject sample was to examine the decision style data in terms of Ryan's 2X2 research design. Rowe's decision style data (which were available for 57 subjects) can be presented in terms of Ryan's 2X2 research design as shown in Table 4-5.

Based upon Ryan's treatment model, (i.e., 2X2X3 model before Economy is dropped) there were no significant results when only one style at a time was examined. Using the data from Table 4-5, the directive style is presented in Figure 4-1 in terms in Ryan's 2X2 model

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Table 4-5

Distribution of 57 Subjects Categorized by Decision Styles in the Four Treatment Groups in Ryan's Experiment

No Decision Error Feedback, and No Prediction Error Feedback

Analytic N=4			Conceptual N=2		
ID	INC		ID	INC	
106	96	INC=113	107	171	INC=162
204	178	S=54.86	304	153	S=17.73
306	130				
310	48				

Directive N=1			Behavioral N=5		
ID	INC		ID	INC	
205	172	INC=172	108	179	INC=127.0
		S=0	201	182	S=68.2
			209	150	
			301	18	
			308	106	

With Decision Error Feedback, but No Prediction Error Feedback

Analytic N=2			Conceptual N=6		
ID	INC		ID	INC	
227	120	INC=137	129	103	INC=135.0
326	154	S=24.0	130	122	S=26.53
			132	131	
			133	183	
			223	137	
			331	134	

Directive N=4			Behavioral N=4		
ID	INC		ID	INC	
124	65	INC=106	123	163	INC=146.0
131	159	S=44.8	127	106	S=28.67
230	127		232	145	
231	73		333	170	

No Decision Error Feedback, but With Prediction Error Feedback

Analytic N=3			Conceptual N=3		
ID	INC		ID	INC	
217	115	INC=23.0	222	63	INC=129
313	56	S=112.20	314	160	S=57.2
318	-102		315	164	

Directive N=3			Behavioral N=6		
ID	INC		ID	INC	
121	150	INC=138.3	113	103	INC=114.5
214	111	S=23.76	115	110	S=30.92
216	154		117	87	
			219	94	
			319	120	
			321	173	

With Decision Error Feedback, and With Prediction Error Feedback

Analytic N=3			Conceptual N=4		
ID	INC		ID	INC	
139	173	INC=146.0	138	154	INC=159.3
243	106	S=35.34	141	156	S=10.6
343	159		236	152	
			337	175	

Directive N=5			Behavioral N=2		
ID	INC		ID	INC	
143	173	INC=142.4	135	101	INC=115
335	132	S=17	240	129	S=19.8
336	124				
340	147				
341	136				

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(after the Economy treatment is dropped). Using this 2x2 design, a two-way ANOVA was run for each of Rowe's styles, and again as shown in Table 4-6 there were no significant treatment effects for any of Rowe's styles. This result is due in large part to the very low number of subjects in each cell using Ryan's 2X2 model (e.g., N=1, 4, 3, and 5 for the four cells for the 13 subjects with the directive style. As will be shown in Chapter 5, the Directive subjects are at best only average performers, and the only two styles of Rowe that show any significant treatment (style) effects are the Analytic and Conceptual styles. The results of numerous ANOVA runs are summarized in Table 4-6. It will be noted in Table 4-6 that there were no significant treatment effects even for the Analytic and Conceptual styles.

Figure 4-1
Directive Decision Style in
N=58 Sample Broken Down by Ryan's 2X2 Model

PRED \ DEC	0	1
0	N= 1 subject INC= 172.0 S= 0.0	N= 4 subjects INC= 106.0 S= 44.0
1	N= 3 subjects INC= 138.3 S= 23.8	N= 5 subjects INC= 142.9 S= 17.3

(N=13)
INC= 132.5
S= 33.6

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Table 4-6

Three-Way and Two-Way ANOVA Runs Using Ryan's 2X2X3 & 2X2 Models

Variables*		Ryan's N=99	Craft's Sample N=58	Analytic Style N=12		Conceptual N=15	
				Run#1	Run #2	Run #1	Run#2
INC	DEC	.007	.074	.362	.307	.330	.426
	PRED	.230	.963	.571	.538	.456	.359
	ECON	.737	.719	.985	----	.545	----
DERR	DEC	.005	.054	.556	.492	.413	.321
	PRED	.722	.992	.549	.501	.516	.755
	ECON	.318	.445	.945	----	.146	----
PERR	DEC	.843	.280	.206	.169	.680	.265
	PRED	.015	.166	.597	.494	.888	.552
	ECON	.035	.340	.770	----	.334	----
Degree of Freedom		98	57	11	11	14	14

Variable	Definition
INC	Average income over last 6 periods
DERR	Average decision error over last 6 periods
PERR	Average prediction error over last 6 periods
DEC	Decision error feedback treatment effect
PRED	Prediction error feedback treatment effect
ECON	Economy treatment effect
Run #1	Two-way ANOVA using all three treatments
Run #2	Two-way ANOVA using only DEC and PRED treatments

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Subsequent Analysis of the Data

As we noted earlier, the prediction error feedback effect was not significant for the N=58 sample. Accordingly, in order to obtain a higher number of subjects in each cell, and thereby achieve a higher value for the available degrees of freedom, it was decided to drop the prediction treatment and to utilize an alternative 2x2 research design based upon Ryan's decision error feedback treatment versus the selected decision style. For Rowe's directive style, this alternative research design becomes the 2x2 model shown in Figure 4-2.

Figure 4-2

Craft's 2X2 Model Based Upon the Decision Error Feedback and the Directive Decision Style Versus the Rest of the Sample

	Decision Error Feedback Treatments	
	No Decision Error Feedback (DEC = 0)	Decision Error Feedback (DEC = 1)
Selected Decision Style Directive Style (X = 1)	N = 4 subjects Income = 146.8 Decision Error = 22.1	N = 9 subejcts Income = 126.2 Decision Error = 49.0
Rest of Sample (Excluded Selected Decision Style) (X = 0)	N = 23 subjects Income = 110.0 Decision Error = 68.3	N = 21 subjects Income = 141.6 Decision Error = 35.0

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The results from using this alternative 2X2 research design were truly dramatic. The levels of significance for certain selected decision styles suddenly became very significant. As noted earlier, the Directive style did not perform in a manner that was significantly different from the overall average level of performance for all 57 subjects who took Rowe's DSI test, except in regards to total decision times. (In this regard, some Directives required significantly longer decision times.) The only two styles that displayed exceptional performance were the analytic and conceptual styles, and Table 4-7 shows the results for a two-way ANOVA for Rowe's analytic and conceptual styles. Several signficant conclusions can be drawn from the results of this analysis:

- The significance of the decision error feedback is increased when Ryan's model is simplified by dropping the prediciton error feedback treatment (e.g., significance increased from .032 to .027 for the average decision error over the six last periods).

- The significance of the decision error fedback effect is decreased only slightly when the model is expanded again to breakout decision style (i.e., from 0.027 to 0.036 for the average six-period decision error for the Analytic style and to .055 for the Conceptual).

- The significance of the difference for the decision error feedback style and the rest of the N=58 sample is a very significant .004 for the average six-period decision error for the Analytic style and .104 for the average six-period decision error for the Conceptual style.

Deterioration of Treatment Effect with Reduction in Sample Size

One of the most difficult problems of this research project has been the reduction in treatment effects from what Ryan observed in his research down to the treatment effects achievable with the reduced

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Table 4-7

Comparison of Treatment Effects for Analytic and Conceptual Styles using the Craft 2X2 Model Compared with Ryan's 2X2 Model

Variable*	Treat.	Ryan's 2X2 Model N=58	Decision Treatment Only N=58	Craft's 2X2 Decision Style Model: Analytic N=12	Treatment	Conceptual N=15
INC	Dec.	.056	.050	.061	DEC	.089
	Pred.	.963	----	.007	X	.139
DERR	Dec.	.032	.027	.036	DEC	.055
	Pred.	.811	----	.004	X	.104
AYDR6	Dec.	.035	.028	.036	DEC	.056
	Pred.	.755	----	.003	X	.101
APDR6	Dec.	.470	.404	.521	DEC	.535
	Pred.	.468	----	.039	X	.419
AEQDR6	Dec.	.027	.020	.024	DEC	.037
	Pred.	.474	----	.012	X	.100
ACDR6	Dec.	.076	.073	.109	DEC	.160
	Pred.	.816	----	.234	X	.043
AOR6	Dec.	.054	.047	.055	DEC	.082
	Pred.	.884	----	.003	X	.141
PERR	Dec.	.143	----	.161	Pred	.165
	Pred.	.079	.074	.584	X	.741
AYPR6	Dec.	.320	----	.120	Pred	.129
	Pred.	.476	.056	.584	X	.741
APRY6	Dec.	.166	----	.508	Pred	.492
	Pred.	.195	.393	.914	X	.598
AEQPR6	Dec.	.187	----	.244	Pred	.251
	Pred.	.114	.142	.872	X	.947
ACPR6	Dec.	.161	----	.161	Pred	.165
	Pred.	.104	.074	.584	X	.741

*Variable	Definition
INC	Average Income over last 6 periods
DERR	Average Decision Error over last 6 periods
AYDR6	Average Relative Impact of Decision Errors on Income
APDR6	Average Relative Impact of Decision Errors on Price
AEQDR6	Average Relative Impact of Decision Errors on Unit Cost
ACDR6	Average Relative Impact of Decision Errors on Variable Cost
AOR6	Average Relative Impact of Dec. Error Act. vs. Op. Income
PERR	Average Prediction Error over last 6 periods
AYPR6	Average Relative Impact of Prediction Errors on Income
APPR6	Average Relative Impact of Prediction Errors on Price
AEQPR6	Average Relative Impact of Prediction Errors on Unit Cost
ACPR6	Average Relative Impact of Prediction Errors on Variable Cost

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sample size of 58 subjects, as well as the further reductions in treatment effects resulting from the elimination of: (1) one subject who did not complete Rowe's DSI test; and (2) the possible elimination of another subject who had a very low (negative) income. The analysis in Table 4-8 is designed to illustrate this problem with the reduction in treatment effects as the sample size is reduced from 99 subjects down to the 57 subjects who took Rowe's DSI test, along with the further reduction that would result if the subject with the negative income is also eliminated.

As can be seen in Table 4-8, the decision feedback treatment effects are reduced dramatically when the sample size is reduced from Ryan's sample of 99 subjects down to the sample size used for testing Rowe's DSI (57 subjects). The characteristics of the one subject which has influenced this reduction in the treatment effects is presented in Table 4-9. As can be seen, this person is a poor performer with a low six-period average income and much higher than average decision and prediction errors. Clearly this subject is an "outlier", and it appears that much of the reduction in treatment effect which I realized with the N=58 sample is due in fact from the outliers or extremes in Ryan's N=99 sample who were not included in my N=58 sample. This fact can be illustrated by the further elimination of the one remaining subject with the negative six-period average income. The statistics on this particular subject are also shown in Table 4-9. The elimination of this subject had a significant reduction in treatment effects as shown in the last column for the N=56 sample (which excludes both the subject who did not take

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Table 4-8
Summary of Reduction of the Significance in Treatment Effets with the Reduction in Sample Size from Ryan's 99 Subjects Down to the 57 Subjects Who Took Rowe's Decision Style Test

	Ryan's Experiment (N=99)			Craft's Experiment			
				N=99(1)	N=58(2)	N=57(3)	N=56(3)
INC	DEC	PRED	ECON	DEC	DEC	DEC	DEC
INC	----	----	----	.008	.050	.052	.115
DERR	----	----	----	.005	.027	.029	.055
AYDR6	.005	.736	.197	.005	.027	.029	.053
APDR6	.082	.449	.537	.094	.428	.445	.986
AEQDR6	.015	.977	.087	.017	.019	.018	.036
ACDR6	.027	.323	.297	.034	.079	.093	.113
AOR6	.009	.241	.571	.010	.032	.045	.091
				(5)	(6)	(7)	(8)
				PRED	PRED	PRED	PRED
AYPR6	.621	.019	.035	.023	.056	.116	.090
APPR6	.620	.130	.258	.139	.393	.506	.368
AEQPR6	.886	.042	.057	.045	.142	.244	.173
ACPR6	.699	.006	.007	.010	.084	.151	.174

*Variable	Definition
INC	Average Income over last 6 periods
DERR	Average Decision Error over last 6 periods
AYDR6	Average Relative Impact of Decision Errors on Income
APDR6	Average Relative Impact of Decision Errors on Price
AEQDR6	Average Relative Impact of Decision Errors on Unit Cost
ACDR6	Average Relative Impact of Decision Errors on Variable Cost
AOR6	Average Relative Impact of Dec. Error Act. vs. Op. Income
PERR	Average Prediction Error over last 6 periods
AYPR6	Average Relative Impact of Prediction Errors on Income
APPR6	Average Relative Impact of Prediction Errors on Price
AEQPR6	Average Relative Impact of Prediction Errors on Unit Cost
ACPR6	Average Relative Impact of Prediction Errors on Variable Cost

Condition

1) Ryan's Sample of 99 subjects with Decision Error Feedback Treatment only.
2) Craft's Sample of 58 subjects with Decision Error Feedback Treatment only.
3) Craft's Sample (2) above reduced by one subject who did not take the Rowe DSI test.
4) Craft's sample (3) above reduced fruther by subject with negative income.
5) Ryan's sample of 99 subjects with Prediction Error Feedback Treatment only.
6) Craft's sample of 58 subjects with Prediction Error Feedback Treatment only.
7) Craft's sample (6) above reduced by one subject who did not take Rowe's DSI test.
8) Craft's sample (7) above reduced further by subject with negative income.

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Table 4-9

Characteristics of Subject Omitted from N=58 Sample Because of Failure to Take DSI Test along with Subject in N=57 Sample with Very Poor Score

Variable*	Subject Who Did Not take DSI test	Subject in N=58 Sample with Negative	N=58 Subjects
INC	$93,000	-$102,000	$126,603
DERR	69,405	294,805	50,206
PERR	56,329	15,178	14,025
PTS	92	162	151.4
WFT	15	13	18.8
AYDR6	1.54	5.82	1.0
APDR6	0.63	4.50	1.0
AEQDR6	1.83	4.20	1.0
ACDR6	0.51	1.96	1.0
AOR6	1.63	5.48	1.0
AYPR6	3.70	1.51	1.0
APPR6	1.86	1.83	1.0
AEQPR6	2.37	1.60	1.0
ACPR6	3.94	0.02	1.0

*Variable	Definition
INC	Average Income over last 6 periods
DERR	Average Decision Error over last 6 periods
PERR	Average Prediction Error over last 6 periods
PTS	Points achieved in class
WFT	Witkin Embedded Figures Test
AYDR6	Average Relative Impact of Decision Errors on Income
APDR6	Average Relative Impact of Decision Errors on Price
AEQDR6	Average Relative Impact of Decision Errors on Unit Cost
ACDR6	Average Relative Impact of Decision Errors on Variable Cost
AOR6	Average Relative Impact of Dec. Error Act. vs. Op. Income
PERR	Average Prediction Error over last 6 periods
AYPR6	Average Relative Impact of Prediction Errors on Income
APPR6	Average Relative Impact of Prediction Errors on Price
AEQPR6	Average Relative Impact of Prediction Errors on Unit Cost
ACPR6	Average Relative Impact of Prediction Errors on Variable Cost

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Rowe's DSI test as well as the subject with the six-period average negative income of -$102,000). The prediction error feedback treatment effects are no longer significant at all, and the decision error feedback treatment effects are only marginally significant. This seems to indicate that much of the treatment effect reported on by Ryan was due to the performance of the poorer performers contrasting with the better performers included in my sample. It is evident that the reduced sample of 56 subjects does not show very significant treatment effects, and only when the decision style treatment is included do any significant treatment effects reappear.

Summary

This chapter dealt with the very difficult statistical analysis problem which I encountered in attempting to superimpose Rowe's 2X2 decision style model on top of Ryan's 2X2X3 model. As was true in Ryan's experiment with 99 subjects, there also were no significant economy treatment effects in my reduced sample of 58 subjects. However, even with the subsequent reduction to a 2X2 model, there still were not enough subjects in each of the 4 remaining cells when one decision style at a time was examined. For example, for the directive style we only had 1,4,3 and 5 subjects in each of the four cells, and as we saw in Table 4-6, there were no significant treatment effects for any of Rowe's four styles. This obviously was due to the degrees of freedom problem that results from so few subjects (e.g., only 13 subjects with the

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directive style) spread across a 2X2 treatment model.

In order to proceed it was observed that the prediction error feedback treatment had no significant treatment effect. Ryan's results were due in large part to the poorer performers in his experiment who were eliminated in my sample of 58 subjects.* This fact was highlighted in Table 4-9 when the one remaining subject in my sample with a negative income was eliminated (reducing the sample to 56 subjects). In this case, the prediction feedback treatment effects were not significant at all, and even more surprisingly the decision error feedback treatment effects were only marginally significant.

Recognizing the insignificance of the prediction feedback treatment effect for my reduced sample of 58 subjects, I simplified Ryan's model by eliminating the prediction error feedback treatment and substituting in its place the decision style treatment as illustrated below for the Decisive Style model.

---

*This is what would be expected granted that the poorer (less motivated) subjects were eliminated from my sample. The corrective feedback in Ryan's experiment is more valuable to the poorer performers, and is of less value to the "rational" optimizers.

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Ryan's Model

Subjects who had:	Subjects who had:
o No decision error feedback, and o No prediction error feedback.	o Decision error feedback, and o No prediction error feedback.

Subjects who had:	Subjects who had:
o No decision error feedback, and o Had prediction error feedback	o Decision error feedback, and o Prediction error feedback

Decision Style Model

Subjects who had:	Subjects who had:
o No decision error feedback, and o Selected decision style.	o Decision error feedback, and o Selected decision style.

Subjects who had:	Subjects who had:
o No decision error feedback, and o Remaining subjects in this treatment group.	o Decision error feedback, and o Remaining subjects in in this treatment group.

With this change from Ryan's 2X2 model to the Decision Style 2X2 model shown above, very significant treatment effects were obtained as will be described in Chapter 5.

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CHAPTER 5

Experimental Results and Comparison of Decision Styles

Introduction

As we showed in Chapter 4, the first step in the data reduction process was the selection of those subjects to be included in the final analysis. A total of 66 students responded to my offer to be paid ten dollars to complete the decision style instruments. From this original group of 66 subjects, eight (8) subjects were removed for the same reasons Ryan removed some of the outliers from his total group of 107 subjects. Seven of the subjects took significantly longer to complete the exercise than the allotted one hour, and the eighth subject performed so poorly that his results were ignored. (This last subject's six-period average income was -$351,000 vs. the overall average of $119,300.) The effect on the various sample statistics by removing these eight subjects is shown in Table 5-1. The analysis in Chapter 4 clearly showed that the final reduced sample of 58 subjects excluded 41 subjects who were generally the poorer performers in Ryan's experiment. The differences between the 58 subjects in my sample and the 41 subjects not included were significant as shown by the t-tests described in Chapter 4.*

---

*This probably reflects a significant motivational difference between the two groups. Undoubtedly, my sample of 58 subjects is made up of subjects who did not mind spending the time to take psychological tests and/or who wanted to make the ten dollars offered to compensate them for the time spent. Apparently these kinds of subjects are also the better performers on the average.

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Table 5-1

Comparison of Key Statistics of Ryan's Sample of 99 Subjects Versus Craft's Reduced Sample of 58 Subjects

Variable*	Ryan'sSample (N=99)		Craft'sOriginal Sample (N=66)		Craft'sReduced Sample(N=58)		SubjectsExcluded In Sample (N=41)	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
INC	115.9	56.1	119.3	74.9	126.6	48.4	100.7	63.1
DERR	55.7	46.1	54.7	56.6	50.2	47.8	63.5	42.9
PERR	16.9	18.1	14.1	13.4	14.0	13.5	21.0	26.1
PTS	148.6	29.7	151.6	31.2	151.4	31.8	143.1	26.1
TT	72.0	17.8	79.9	26.4	73.3	18.9	70.2	16.2
RD			73.8	12.4	72.8	11.2		
RA			88.4	13.8	89.7	13.4		
RC			77.1	15.0	76.4	13.8		
RB			60.3	12.0	60.6	12.0		
IE			13.0	4.3	12.9	4.4		
GIAL			55.4	9.4	55.6	9.1		

*Variable	Definition
INC	Average Income over last six periods
DERR	Average Decision Error over last six periods
PERR	Average Prediction Error over last six periods
PTS	Points achieved in class
TT	Total time
RD	Rowe's Directive
RA	Rowe's Analytic
RC	Rowe's Conceptual
RB	Rowe's Behavioral
IE	Internal/External Locus of Control
GIAL	General Incongruity Adaptation Level test

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From an examination of the statistics in Table 5-1, it is clear that there is a significant improvement in the mean six-period average income and a reduction in the mean six-period average decision error as a result of eliminating the one subject with the six-period average income of -$351,000. The average total time taken by the subjects (TT) also was reduced by eliminating those subjects that took longer than the allotted one-hour of time. However, the various cognitive style attributes (e.g, Rowe's raw scores for the DSI) and the subjects' class grade points did not change significantly. There is an obvious loss in the available degrees of freedom with the reduction in sample size from 66 to 58, but comparability with Ryan's results was considered to be a more desirable objective.

The second step in the data reduction phase was the decision to consider Ryan's prediction feedback treatment separate from the decision feedback treatment. As was shown in the detailed analysis in Chapter 4, the prediction treatment effects were weak in Ryan's experiment and considerably weaker with my 66-subject sample. This can be seen by referring back to Table 4-4. Also, as noted in the summary for Chapter 4, there is a clear indication that the prediction treatment effects which Ryan obtained were due in large part to the impact of subjects with negative income* which were eliminated in my reduced

*One might speculate that the poorer performers (eliminated from my sample presumably because they were less motivated persons and/or were unwilling to take the decision style tests) are the types of subjects that would benefit from the prediction error feedback included in Ryan's experiment.

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sample of 58 subejcts.

Two Approaches

As we noted above, Ryan's experiment is treated as two separate experiments: (1) the first experiment involved feedback on the results from the decisions made by the subjects with the two alternatives "No Decision Error Feedback" versus "Decision Error Feedback"; and (2) the second experiment with its two alternatives "No Prediction Error Feedback" versus "Prediction Error Feedback". Table 5-2 presents the sample of 58 subjects broken down into the two treatment groups: "No Decision Error Feedback versus "Decision Error Feedback".

An analysis of these two treatment groups shows the obvious improvement in average six-period income of $116,333 for the group that received no decision error feedback up to $135,548 for the group that received decision error feedback. The average six-period decision error for the two decision error feedback groups reduced accordingly from $61,459 down to $40,404 for the group that received decision error feedback.The increase in average six-period prediction error for the two treatments (from 10.8 to 16.8) is also a typical result in Ryan's experiment.As the subjects concentrated on improving their income performance (using the decision error feedback), they generally did poorer in terms of their prediction performance. This "distraction" effect was observed repeatedly by both Ryan and myself where the "attention-getting" features of the decision error feedback reports seemed to distract attention away from the prediction process.

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Table 5-2
Comparison of Key Attributes for the Two Groups of
58 Subjects Broken Down by the Two Decision Error Treatments

Decision Error Treatment

No Decision Error Feedback (N = 27)			Decision Error Feedback (N = 31)	
Mean	Std.Dev.	Variable*	Mean	Std.Dev.
116.3	62.4	INC	135.5	29.8
61.5	63.1	DERR	40.4	25.9
10.8	6.7	PERR	16.8	17.1
141.7	30.8	ST	132.8	33.7
74.5	17.2	TT	72.2	20.5
154.1	29.2	PTS	149.1	34.2
73.8	9.1	RD	72.0	13.0
89.5	15.9	RA	90.0	11.0
72.7	12.7	RC	79.7	14.1
63.4	11.6	RB	58.2	12.0
13.0	4.7	IE	12.9	4.2
56.3	10.6	GIAL	55.0	7.7
17.6	6.6	WFT	19.9	3.9

*Variable	Definition
INC	Average Income over last six periods
DERR	Average Decision Error over last six periods
PERR	Average Prediction Error over last six periods
PTS	Points achieved in class
ST	Starting time
TT	Total time
RD	Rowe's Directive scale raw score
RA	Rowe's Analytic scale raw score
RC	Rowe's Conceptual scale raw score
RB	Rowe's Behavioral scale raw score
IE	Internal/External Locus of Control score
GIAL	General Incongruity Adaptation Level test score
WFT	Witkin Embedded Figures test score

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The reduction in class grade points from 154.1 for the "No Decision Error Feedback" group to 149.1 for the "Decision Error Feedback" group is actually in a direction opposite to the generally observed direct (positive) relationship between class grade points and average income. Since the ANOVA analysis used class grade points as one of the two covariates (along with starting time), the inverse relationship noted above for grade points will be compensated for (taken into account) in the ANOVA analysis.

All the other attributes of the two treatment groups are within a half a standard deviation of one another with the exception of the Witkin Embedded Figures Test (WFT) results. The "Decision Error Feedback" group has an average WFT score of 19.95 vs. 17.63 for the "No Decision Error Feedback" group. WFT scores are strongly related with analytical (vs. heuristic) skills, and this difference will be examined later in the analysis of the performance of Rowe's analytic and conceptual styles. Since the WFT scores are related strongly with the average six-period income scores, the analysis of Rowe's styles also will be done using WFT as a covariate.

The 58 subjects also can be broken down by the two prediction error feedback treatment groups, and a comparison of the two prediction treatment groups similarly shows no significant differences, as shown in Table 5-3.

As noted above, when the subjects concentrated on improving their prediction performance (based upon the prediction error feedback) their

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Table 5-3

Comparison of Key Attributes for the Two Groups of 58 subjects Broken Down by the Two Prediction Error Treatments

Prediction Error Treatment				
PRED=0 No Prediction Error Feedback (N=29)			PRED=1 Prediction Error Feedback (N=29)	
Mean	Std.Dev.	Variable*	Mean	Std.Dev.
129.9	42.3	INC	123.3	54.2
44.6	36.6	DERR	55.8	56.9
17.2	17.7	PERR	10.9	6.2
143.1	31.9	ST	130.8	31.9
69.1	18.3	TT	77.5	18.8
149.4	35.1	PTS	153.41	28.5
69.9	10.0	RD	75.7	11.8
93.3	12.1	RA	86.2	13.9
75.8	14.1	RC	77.0	13.7
60.7	13.7	RB	60.6	10.3
12.6	3.8	IE	13.2	4.8
55.9	10.3	GIAL	55.4	8.1
19.0	5.7	WFT	18.7	5.2

*Variable	Definition
INC	Average Income over last six periods
DER	Average Decision Error over last six periods
PERR	Average Prediction Error over last six periods
PTS	Points achieved in class
ST	Starting time
TT	Total time
RD	Rowe's Directive scale raw score
RA	Rowe's Analytic scale raw score
RC	Rowe's Conceptual scale raw score
RB	Rowe's Behavioral scale raw score
IE	Internal/External Locus of Control score
GIAL	General Incongruity Adaptation Level test score
WFT	Witkin Embedded Figures test score

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decision (income) performance deteriorated. Accordingly, average six-period income was down in the "Prediction Error Feedback" group; however, as one would expect the average six-period prediciton error (PERR) also was lower (improved).

With the above separation of the prediction error feedback treatment from the decision error feedback treatment, we are now in a position to analyze the data in terms of an alternative 2x2 research design involving decision style versus each of the treatments separately, as shown in Figure 5-1.

As will be seen, these two separate models significantly improved the available degrees of freedom and accordingly the resultant levels of significance of the treatment effects. As might be expected, we also begin to see decision style effects which were masked by the larger research design (2x2x2 = 8) and the low degrees of freedom (58-1 = 57) which often resulted in only 1 subject with a selected decision style in certain cells. This will be shown convincingly when the results developed later in this chapter (Table 5-10 and 5-11) are compared with the total absence of any significant treatment effects which we noted in Chapter 4.

Rowe's Model

As it turned out, only 57 subjects in the final sample of 58 subjects completed Rowe's Decision Style Inventory (DSI). This has a slight but not significant impact upon the attributes of Rowe's sample as shown in Table 5-4. This reduction in sample size to 57 subjects for Rowe's

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Figure 5-1

Alternative 2X2 Treatment Models Based Upon One of the Feedback Treatments and the Decision Style Treatment

Decision Error Feedback

		DEC = 0 No Feedback	DEC = 1 Feedback
Decision Style (X)	Balance of Sample	DEC = 0 X = 0	DEC = 1 X = 1
	Selected Style	DEC = 0 X = 1	DEC = 1 X = 1

Prediction Error Feedback

		PRED = 0 No Feedback	PRED = 1 Feedback
Decision Style (X)	Balance of Sample	PRED = 0 X = 0	PRED = 1 X = 0
	Selected Style	PRED = 0 X = 1	PRED = 1 X = 1

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Table 5-4

Comparison of Key Attributes for the Final Selected Sample of 58 Subjects Versus the 57 Subjects Who Took Rowe's DSI Test

Final Selected Sample (N= 58 subjects)			Rowe's DSI Sample (N=57 subjects)	
Mean	Std.Dev.	Variable*	Mean	Std.Dev.
126.6	48.3	INC	127.2	48.6
50.2	47.8	DERR	49.9	48.1
14.0	13.5	PERR	13.3	12.4
136.9	32.3	ST	137.8	31.8
73.3	18.8	TT	73.7	18.8
151.4	31.8	PTS	152.4	31.0
72.8	11.2	RD	72.8	11.2
89.7	13.4	RA	89.7	13.4
76.4	13.8	RC	76.4	12.0
60.6	12.0	RB	60.6	12.0
12.9	4.4	IE	13.0	4.4
55.6	9.1	GIAL	55.6	9.1

*Variable	Definition
INC	Average Income over last six periods
DERR	Average Decision Error over last six periods
PERR	Average Prediction Error over last six periods
PTS	Points achieved in class
ST	Starting time
TT	Total time
RD	Rowe's Directive scale raw score
RA	Rowe's Analytic scale raw score
RC	Rowe's Conceptual scale raw score
RB	Rowe's Behavioral scale raw score
IE	Internal/External Locus of Control
GIAL	General Incongruity Adaptation Level test

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decision styles also impacts slightly on the statistics for the two treatment groups, as shown in Table 5-5.

For the management simulation exercise used in Ryan's experiment, the average of the optimal (maximum) attainable incomes for the six periods was $185,773. Thus, the average six-period income for the 57 subjects of $127,200 was about 68.5% of the optimal level with a standard deviation of $48,600 (or about 38.2% of the income figure). The actual range of income figures was from -$102,000 up to $183,000, with 33 of the 57 subjects doing better than the average. The actual distribution of scores clearly shows a skewed distribution on the downside, as shown below:

Distribution of 57 Subject Sample	No. of Subjects
$175,800 to $185,773 (maximum score)	4 (7%)
$127,200 to $175,800 (plus 1 std. dev.)	29 (51%)
$78,600 (minus 1 std. dev.) to $127,200	17 (30%)
$30,000 (minus 2 std. dev.) to $78,600	5 (9%)
$30,000 to -$102,000	2 (3%)
Total	57

Ryan's sample of 99 subjects had a lower mean six-period average income of $115,869 with a larger standard deviation of $56,130. The actual range in his case was from -$167,000 up to $184,000, clearly an even more skewed distribution than in the case of the 57-subjects sample, as shown below:

Distribution of 99 Subject Sample	No. of Subjects
$171,999 to $184,000	10 (10%)
$115,869 to $171,999 (plus 1 std. dev.)	49 (50%)
$59,739 (less 1 std. dev.) to $115,869	31 (31%)
$3,609 (less 2 std. dev.) to $59,739	5 (5%)
$3,609 to -$167,000	4 (4%)
Total	99

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Table 5-5

Comparison of Key Attributes of Treatment Groups Showing
Impact of Exclusion of the One Subject Who Did Not Take Rowe's DSI Test

NO DECISION FEEDBACK (DEC=0)	WITH DECISION FEEDBACK (DEC=1)	
N = 27	N = 30	N=31*
INC = $116,333(S=$62,441)	INC = $136,967(S=$29,234)	INC = $135,548(S=$29,801)
DERR = $61,459(S=$63,096)	DERR = $39,437(S=$25,771)	DERR = $40,404(S=$25,904)
PERR = $10.801(S=$6,722)	PERR = $15,518(S=$15,676)	PERR = $16,835(S=$17,067)
PTS = 154.1 (S=29.2)	PTS = 151.0(S=33.1)	PTS = 149.1(S=34.2)

NO PREDICTION FEEDBACK (PRED=0)		WITH PREDICTION FEEDBACK (PRED=1)
N = 29*	N = 28	N=29
INC = $129,931(S=$42,389)	INC = $131,250(S=$42,556)	INC = $123,276(S=$54,249)
DERR = $44,607(S=$36,634	DERR = $43,721(S=$36,989)	DERR = $55,804(S=$56,895)
PERR = $17,179(S=$17,722)	PERR = $15,781(S=$16,337)	PERR = $10,872(S=$6,177)
PTS = 149.4(S=35.1)	PTS = 151.4(S=33.9)	PTS = 153.4(S=28.5)

* Note: This group includes one subject that did not take Rowe's DSI test, and it is presented to provide a basis for a comparison with group that excluded this subject.

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A comparison of the impact on prediction and decision errors on income for Ryan's sample of 99 subjects versus my sample of 57 subjects reflects the greater skewness in Ryan's sample, as follows:

	Ryan's 99 Subjects		Craft's 57 Subjects	
	Six-period Average	Std. Dev.	Six-period Average	Std. Dev.
Income	$115,869	$56,130	$127,200	$48,600
Impact on Income:				
Prediction Errors	16,904	18,052	13,300	12,400
Decision Errors	55,708	46,063	49,900	48,100

The $13,300 figure for the impact of prediction errors on income in my sample means that if a subject had an optimal decision rule, the predictions could have led to an optimal income that averaged only $13,300 less than the theoretical optimum figure of $185,773. Thus, prediction errors in my 57-subject sample were likely responsible for an even smaller portion of the difference between actual and optimal incomes than in Ryan's sample of 99 subjects (where the average prediction error was $16,904).

In contrast with the small average prediction error, decision errors had an average impact on incomes of $49,900 (with a standard deviation of $48,100). These much larger figures reflect the fact that outcomes are directly influenced by the subject's decisions and that determining the best values for the decisions in the exercise (quantity produced, advertising, and material inputs) is clearly more difficult than the

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prediction process.

In summary, then, the prediction process is easier than the decision process and it leads to a smaller gain than the decision process. As a matter of fact, for my sample of 57 subjects, the prediction errors were all lower for each of the four treatment groups when compared with the same treatment group in Ryan's sample. More strikingly, however, the lowest prediction error was for the control group which received no prediction or decision error feedback. A comparison of the treatment effects for my 57-subject sample vs. Ryan's 99-subject sample is presented in Table 5-6. Note that the control group also had the second lowest mean decision error. As with Ryan's sample, there was a tendency for the group receiving only prediction error treatment to do worse than than the control group on their operating decisions (decision error equal to $76,005 versus $43,227), and for the group receiving the decision error treatment to do worse than the control group on their predictions (prediction error equal to $20,433 versus $9,579). On the other hand, in sharp contrast to Ryan's experiment, the treatment groups receiving prediction error information only ranked 2 and 3 (versus 1 and 2 in Ryan's Sample). Also, the treatment groups receiving the decision error information ranked 1 and 3 (again versus 1 and 2 in Ryan's Experiment). Clearly, the subjects in my sample found the prediction process easier than did the 41 subjects excluded from my sample; and because the 57 subjects were better performers, the decision errors were smaller than in Ryan's sample with the control group actually performing second best. This fact is why only the two-way ANOVA for the decision error

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Table 5-6

Overview of the Treatment Effects

Six-Period Average Impacts of Prediction Errors by Treatment Group	Ryan's 99-Subject Sample	Craft's 57-Subject Sample	Ranking
Control	$19,995	$ 9,579	1
Prediction	13,915	11,778	3
Decision	21,400	20,433	4
Pred. & Dec.	11,803	9,902	2

Six-Period Average Impacts of Decision Errors by Treatment Group	Ryan's 99-Subject Sample	Craft's 57-Subject Sample	Ranking
Control	$60,903	$43,277	2
Prediction	72,214	76,005	4
Decision	46,770	44,055	3
Pred. & Dec.	38,775	34,160	1

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feedback treatment is significant, whereas it is not significant for the prediction error feedback treatment, as can be seen below:

	Decision Error Feedback Treatment			Prediction Error Feedback Treatment		
Variable	No Feedback	Feedback	Sig.*	No Feedback	Feedback	Sig.*
Income	$116,300	$137,000	.052	$131,300	$123,300	.778
Decision Error	61,500	39,400	.029	43,700	55,800	.643
Prediction Error	10,800	15,500	.143	15,800	10,900	.150

*SIG Significance of Treatment Effect

Determination of Primary Rowe Decision Style

Based upon the actual statistical distributions for each of the four raw scores from Rowe's DSI, each subject's individual scores were normalized based upon the mean and standard deviation for each of the four decision styles. Then, each subject was categorized based upon the simple algorithm of selecting the highest relative score, as shown in Figure 5-2. An alternative algorithm suggested by Rowe categorizes subjects in terms of primary styles (normalized scores in excess of 0.5 times the standards deviation) and back-up styles (positive scores less than 0.5 standard deviation). When this alternative algorithm was used, the end results did not change significantly. Using the selected algorithm shown in Figure 5-2, the sample of 57 subjects were categorized as shown in Table 5-7. This resulted in the following distribution of decision

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Figure 5-2

Algorithm Used for Normalizing Rowe's DSI Scores

```
COMPUTE RAN = (RA-89.6667) / 13.4102
COMPUTE RBN = (RB-60.6491) / 11.9829
COMPUTE RCN = (RC-76.3860) / 13.8057
COMPUTE RDN = (RD-72.8421) / 11.2421

IF (RAN GT RBN AND RAN GT RCN AND RAN GT RDN) RDS=1
IF (RBN GT RAN AND RBN GT RCN AND RBN GT RDN) RDS=2
IF (RCN GT RAN AND RCN GT RBN AND RCN GT RDN) RDS=3
IF (RDN GT RAN AND RDN GT RCN AND RDN GT RBN) RDS=4
```

Variable	Definition
RAN	Z-score for Analytic scale on DSI
RBN	Z-score for Behavioral scale on DSI
RCN	Z-score for Conceptual scale on DSI
RDN	Z-score for Directive scale on DSI
RA	Raw score for Analytic scale on DSI
RB	Raw score for Behavioral scale on DSI
RC	Raw score for Conceptual scale on DSI
RD	Raw score for Directive scale on DSI
RDS	Variable designating Rowe's decision style (1=Analytic; 2=Behavioral;etc.)

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Table 5-7

Fifty-Seven Subjects Categorized by Primary Rowe Decision Style
(RDS=1·Analytic; RDS=2:Behavioral; RDS=3:Conceptual; RDS=4:Directive)

Case	Income	Decision Error	Grade Points	RDS	Case	Income	Decision Error	Grade Points	RDS
1	96.0	49.3	149.0	1.0	29	63.0	116.4	171.0	3.0
2	171.0	16.2	149.0	3.0	30	137.0	90.6	90.0	3.0
3	179.0	5.7	202.0	2.0	31	120.0	65.2	149.0	1.0
4	103.0	60.1	143.0	2.0	32	127.0	58.6	128.0	4.0
5	110.0	75.7	152.0	2.0	33	73.0	33.7	111.0	4.0
6	87.0	101.6	88.0	2.0	34	145.0	28.5	134.0	2.0
7	150.0	25.0	169.0	4.0	35	152.0	30.6	140.0	3.0
8	163.0	34.4	203.0	2.0	36	129.0	32.6	116.0	2.0
9	65.0	110.7	157.0	4.0	37	106.0	56.8	142.0	1.0
10	106.0	69.8	119.0	2.0	38	18.0	158.0	190.0	2.0
11	103.0	9.2	112.0	3.0	39	153.0	20.2	161.0	3.0
12	122.0	54.2	184.0	3.0	40	130.0	44.2	174.0	1.0
13	159.0	41.6	116.0	4.0	41	106.0	85.3	115.0	2.0
14	131.0	12.2	174.0	3.0	42	48.0	90.5	150.0	1.0
15	183.0	2.4	190.0	3.0	43	56.0	143.0	137.0	1.0
16	101.0	76.0	180.0	2.0	44	160.0	19.4	190.0	3.0
17	154.0	29.2	181.0	3.0	45	164.0	23.5	123.0	3.0
18	173.0	12.2	184.0	1.0	46	-102.0	294.8	162.0	1.0
19	156.0	11.5	115.0	3.0	47	120.0	68.4	190.0	2.0
20	173.0	8.5	184.0	4.0	48	173.0	22.2	132.0	2.0
21	182.0	5.8	198.0	2.0	49	154.0	36.6	150.0	1.0
22	178.0	11.0	178.0	1.0	50	134.0	38.4	92.0	3.0
23	172.0	17.0	167.0	4.0	51	170.0	18.9	185.0	2.0
24	150.0	16.1	113.0	2.0	52	132.0	50.2	186.0	4.0
25	111.0	30.9	118.0	4.0	53	124.0	48.3	175.0	4.0
26	154.0	15.7	135.0	4.0	54	175.0	11.3	192.0	3.0
27	115.0	56.3	175.0	1.0	55	147.0	41.2	129.0	4.0
28	94.0	87.1	129.0	2.0	56	136.0	48.6	173.0	4.0
					57	159.0	21.5	138.0	1.0

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styles:

- o Analytic 12 subjects
- o Behavioral 17 subjects
- o Conceptual 15 subjects
- o Directive 13 subjects

In terms of Ryan's 2x2 research design, Rowe's four decision styles can be further broken down into each of the four treatment groups as shown in Table 5-8. This breakout illustrates clearly the degrees of freedom problem referred to in Chapter 4 and above. Looking at only the directive style, as an example, we see that Ryan's model ends up with only one subject in the cell representing "No Decision Error Feedback with Prediction Error Feedback", as shown in Figure 5-3. Under such circumstances, any two-way anova analysis using Ryan's 2x2 model would be fruitless.

Some of the key attributes of each of Rowe's four styles are summarized in Table 5-9. As can be seen, there are some significant differences between these four style groups. These differences are further accentrated when each group broken down further in terms of the "decision error treatment vs. decision style" and "prediction error treatment vs. decision style" models described above. Figure 5-4 shows this breakout for the directive subjects. The same breakout for the analytic, behavioral, and conceptual subjects has been included in Appendix J.

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Table 5-8

Distribution of 57 Subjects Categorized by Decision Styles the Four Treatment Groups in Ryan's Experiment

No Decision Error Feedback, and No Prediction Error Feedback

Style	ID	INC	
Analytic N=4	106	96	INC=113
	204	178	S=54.86
	306	130	
	310	48	
Conceptual N=2	107	171	INC=162
	304	153	S=17.73
Directive N=1	205	172	INC=172
			S=0
Behavioral N=5	108	179	INC=127.0
	201	182	S=68.2
	209	150	
	301	18	
	308	106	

With Decision Error Feedback, but No Prediction Error Feedback

Style	ID	INC	
Analytic N=2	227	120	INC=137
	326	154	S=24.0
Conceptual N=6	129	103	INC=135.0
	130	122	S=26.53
	132	131	
	133	183	
	223	137	
	331	134	
Directive N=4	124	65	INC=106
	131	159	S=44.8
	230	127	
	231	73	
Behavioral N=4	123	163	INC=146.0
	127	106	S=28.67
	232	145	
	333	170	

No Decision Error Feedback, but With Prediction Error Feedback

Style	ID	INC	
Analytic N=3	217	115	INC=23.0
	313	56	S=112.20
	318	-102	
Conceptual N=3	222	63	INC=129
	314	160	S=57.2
	315	164	
Directive N=3	121	150	INC=138.3
	214	111	S=23.76
	216	154	
Behavioral N=6	113	103	INC=114.5
	115	110	S=30.92
	117	87	
	219	94	
	319	120	
	321	173	

With Decision Error Feedback, and With Prediction Error Feedback

Style	ID	INC	
Analytic N=3	139	173	INC=146.0
	243	106	S=35.34
	343	159	
Conceptual N=4	138	154	INC=159.3
	141	156	S=10.6
	236	152	
	337	175	
Directive N=5	143	173	INC=142.4
	335	132	S=17
	336	124	
	340	147	
	341	136	
Behavioral N=2	135	101	INC=115
	240	129	S=19.8

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Figure 5-3

Breakout of Thirteen Subjects with Directive Style
By Decision Error Feedback and Prediction Error Feedback

		DECISION ERROR FEEDBACK	
		DEC=0	DEC=4
PREDICTION ERROR FEEDBACK	PRED=0	N=3	N=4
	PRED=1	N=1	N=5

Table 5-9

Key Attributes of Subjects Categorized By Rowe's Basic Style

Variable*	ANALYTIC	BEHAVIORAL	CONCEPTUAL	DIRECTIVE	TOTAL
N	12	17	15	13	57
INC	102.8	125.6	143.9	132.5	127.2
DERR	73.4	55.7	32.3	40.8	49.9
PERR	11.1	11.3	14.5	16.5	13.3
PTS	157.3	152.3	150.9	149.8	152.4

*Variable	Definition
N	Number of subjects in category
INC	Average Income over last 6 periods
DERR	Average Decision Error over last 6 periods
PERR	Average Prediction Error over last 6 periods
PTS	Points Achieved in Class

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Figure 5-4

Breakout of Thirteen Directive Subjects by Decision Error Feedback Treatment and by Prediction Error Feedback Treatment

		DEC 0	DEC 1	
X	0	N=23 INC=110.0 (S=65.7) DERR=68.3 (S=66.1) PERR=10.4(S= 7.0) PTS=155.3 (S=30.2)	N=21 INC=141.6 (S=25.4) DERR=35.3 (S=24.7) PERR=14.4 (S=12.1) PTS=151.0 (S=35.0)	N=45
X	1	N=4 INC=146.8 (S=25.7) DERR=22.1 (S=7.1) PERR=13.0 (S=4.6) PTS=147.3 (S=25.0)	N=9 INC=126.2 (S=36.1) DERR=49.0 (S=27.1) PERR=18.0 (S=22.7) PTS=151.0 (S=30.1)	N=13 INC=127.2
		N=27	N=30	

		PRED 0	PRED 1	
X	0	N=23 INC=133.9 (S=41.8) DERR=41.9 (S=37.7) PERR=13.5 (S=12.1) PTS=154.8 (S=35.1)	N=21 INC=116.6 (S=61.8) DERR=64.3 (S=64.6) PERR=11.1 (S=6.7) PTS=151.4 (S=29.5)	N=44
X	1	N=5 INC=119.2 (S=48.7) DERR=52.3 (S=35.9) PERR=26.4 (S=28.6) PTS=135.8 (S=25.0)	N=8 INC=140.9 (S=19.3) DERR=33.5 (S=16.1) PERR=10.2 (S=5.0) PTS=158.6 (S=26.9)	N=13 INC= 127.2
		N=28	N=29	

Variables	Definition
DEC	Decision Error Feedback Treatment
PRED	Pediction Error Feedback Treatment
0	No Feedback Reports for this Treatment
1	With Feedback Reports for this Treatment
INC	Mean of Six-Period Average Income for Subjects in Cell

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Results of Analysis of Rowe's Styles

Using these separate decision style (2x2) models for the decision error feedback treatment and prediction error feedback treatments, a two-way ANOVA was run on each of the eight models. The results of this analysis are summarized in Table 5-10 for the Decision Error Feedback Model and in Table 5-11 for the Predicition Error Feedback Model. From this analysis, it is clear that the only significant treatment effects are produced with the decision error feedback model. Further, decision style effects show up only for the analytical and conceptual styles. To gain some insight as to how the directive style group compares with the other subjects in the 57-subject sample as a whole, the attributes of the individual directive subjects and the overall attributes of the Directive style group versus the entire group are presented in Table 5-12. The same comparisons were made for each of the other style groups, and these comparisons have been included in Appendix J.

Summary

The objective of Chapter 5 was to analyze the subjects who completed Rowe's Decision Style Inventory (DSI) and to develop a model for testing the significance of Rowe's decision styles as determinants of performance. 66 subjects were in my original sample; 8 were eliminated for the same reasons Ryan eliminated them; and one additional person did not complete Rowe's DSI test. This resulted in a final sample of 57 subjects. Further analysis showed that the prediction error feedback treatment was not a significant treatment, thereby enabling me to develop a 2X2 model for testing the significance of particular decision

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Table 5-10

Results of Two-Way Anova Runs for Each of Rowe's Four Basic Styles Using the Decision Error Feedback Model

DECISION ERROR CRITERIA	MODEL*	ANALYTIC (N=12)	BEHAVIORAL (N=17)	CONCEPTUAL (N=15)	DIRECTIVE (N=13)	TOTAL** (N=57)
	X	.007 (.006 ***)	.523	.139	.827	----
INC	DEC	.061	.045	.089	.061	.052
	X	.004 (.003***)	.736	.104	.592	----
DERR	DEC	.036	.031	.055	.039	.029
	X	.003	.711	.101	.579	----
AYDR6	DEC	.036	.031	.056	.040	.030
	X	.039	.980	.419	.291	----
APDR6	DEC	.521	.451	.532	.570	.439
	X	.012	.730	.100	.820	----
AEQDR6	DEC	.024	.021	.037	.023	.019
	X	.234	.301	.043	.916	----
ACDR6	DEC	.109	.156	.160	.087	.087
	X	.003	.409	.141	.798	----
AOR6	DEC	.055	.037	.082	.059	.048

* Two-way class grade points and starting time as co-variates.
** One-way ANOVA to demonstrate decision error treatment effect (when decision style is ignored).
*** One-way ANOVA using decision style only.

Variables	Definition
INC	Average Income over last 6 periods
DERR	Average Decision Error over last 6 periods
AYDR6	Average Relative Impact of Decision Errors on Income
APDR6	Average Relative Impact of Decision Errors on Price
AEQDR6	Average Relative Impact of Decision Errors on Unit Cost
ACDR6	Average Relative Impact of Decision Errors on Variable Cost
AOR6	Average Relative Impact of Decision Error Act. vs. Opt. Income

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Table 5-11

Results of Two-Way Anova Runs for Each of Rowe's Four Basic Styles Using the Prediction Error Feedback Model

PREDICTION ERROR CRITERIA+	ANOVA MODEL*	ANALYTIC (RDS=1)	BEHAVIORAL (RDS=2)	CONCEPTUAL (RDS=3)	DIRECTIVE (RDS=4)	TOTAL** (N=57)
1. PERR	X	.584 (.538 ***)	.350	.741	.232	---
	PRED	.161	.134	.165	.114	.150
2. AYPR6	X	.928	.193	.733	.251	---
	PRED	.120	.095	.129	.089	.116
3. APPR6	X	.914	.864	.598	.785	----
	PRED	.508	.526	.492	.490	.506
4. AEQPR6	X	.872	.629	.947	.657	----
	PRED	.244	.236	.251	.233	.244
5. ACPR6	X	.958	.052	.282	.323	----
	PRED	.160	.104	.176	.127	.151

* Using Class Grade Point and Starting Time as co-variates.

** One-way ANOVA to demonstrate Prediction treatment effect (when style is ignored).

*** One-way ANOVA using style only.

+Variable	Definition
PERR	Average Prediction Error over last six periods
AYPR6	Average Relative Impact of Prediction Errors on Income
APPR6	Average Relative Impact of Prediction Errors on Price
AEQPR6	Average Relative Impact of Prediction Error on Unit Cost
ACDR6	Average Relative Impact of Decision Errors on Variable Cost
ACPR6	Average Relative Impact of Prediction Errors on Variable Cost
INC	Average Income over last 6 periods
DERR	Average Decision Error over last 6 periods
AOR6	Average Relative Impact of Decision Error Act. vs. Opt. Income

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Table 5-12

Attributes of Directive Style (13 cases)

	INC	DERR	PTS	RD	RA	RC	RB
1.	150.0	25.0	169.0	85.0	98.0	66.0	50.0
2.	65.0	110.7	157.0	81.0	83.0	79.0	57.0
3.	159.0	41.6	116.0	78.0	92.0	72.0	58.0
4.	173.0	8.5	184.0	88.0	91.0	58.0	63.0
5.	172.0	17.0	167.0	86.0	65.0	89.0	60.0
6.	111.0	30.9	118.0	93.0	69.0	65.0	58.0
7.	154.0	15.7	135.0	94.0	69.0	71.0	66.0
8.	127.0	58.6	128.0	90.0	90.0	67.0	44.0
9.	73.0	33.7	111.0	87.0	88.0	65.0	69.0
10.	132.0	50.2	186.0	97.0	86.0	74.0	42.0
11.	124.0	48.3	175.0	91.0	73.0	71.0	59.0
12.	147.0	41.2	129.0	84.0	80.0	74.0	50.0
13.	136.0	48.6	173.0	81.0	79.0	80.0	60.0

Attributes of Directive Style		Attributes of N=57 Sample		
Mean	Std.Dev.	Var.	Mean	Std.Dev
132.54	33.6	INC	127.2	48.6
40.7	25.9	DERR	49.9	48.1
16.5	18.8	PERR	13.3	12.4
138.8	33.2	ST	137.8	31.9
79.9	19.0	TT	73.7	18.8
149.8	27.6	PTS	152.4	31.0
0.81	0.50	AYDR6	0.99	0.93
1.15	1.11	AYPR6	0.95	0.79
0.81	0.28	APDR6	1.01	0.68
1.02	0.81	APPR6	0.99	0.54
0.90	0.47	AEQDR6	0.99	0.70
1.03	0.67	AEQPR6	0.98	0.50
0.94	0.82	ACDR6	1.01	0.93
1.17	0.98	ACPR6	0.94	0.98
0.88	0.48	AOR6	0.99	0.86
87.3	5.6	RD	72.8	11.2
81.8	10.3	RA	89.7	13.4
72.4	10.0	RC	76.4	13.8
56.6	8.0	RB	60.6	12.0
13.4	3.1	IE	12.9	4.4
57.5	8.6	GIAL	55.6	9.1

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styles, as shown below:

Decision Style Treatment	Decision Error Feedback Treatment: No Feedback	Decision Error Feedback Treatment: Feedback
Selected Decision Style	No Feedback Selected Style	Feedback Selected Style
Rest of Subjects in Total Sample	No Feedback Rest of Sample	Feedback Rest of Sample

The final thrust of Chapter 5 was to use the simplified model to test each of Rowe's four basic decision styles. Using this model, the results were truly significant, whereas up to this point I had spent a number of months in fruitless analysis. With this simplification of the treatment model to a 2X2 model, the available degrees of freedom increased to an average of 14 per cell, and the treatment effects became significant. Unfortunately, the directive style still showed no treatment effect (that is,it was not significantly different from the rest of the subjects) whereas the analytic and conceptual styles were significantly different from the rest of the sample. In Chapter 6 we will use the results developed in Chapter 5 to test the hypotheses outlined in Chapter 3.

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CHAPTER 6

Main Findings and Testing of Hyptheses

Summary of Findings in Chapter 5

As we noted in Chapter 5, Ryan's experiment can be viewed in terms of the feedback reports presented to the four groups of subjects. (Samples of these four reports are included in Appendix G - The Experiment by W. Ryan.) In this context, the four main treatments of Ryan's experiment can be summarized in terms of Ryan's four individual feedback reports, as follows:

Feedback Regarding Prediction Errors	Feedback Regarding Decision Errors: No	Feedback Regarding Decision Errors: Yes
No	Report Content: 1. Actual results of decisions.	Report Content: 1. Actual results of decisions,and 2. Impact of decision errors.
Yes	Report Content: 1. Actual results of decisions,and 2. Impact of prediction errors.	Report Content: 1. Actual results of decisions,and 2. Impact of decision errors,and 3. Impact of prediction errors.

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Since the prediction error feedback treatment effects were not significant when we eliminated the nine outliers from the original sample of 66 subjects, we simplified Ryan's feedback matrix as follows:

Feedback Report Treatment

Simple Feedback Reports	Complex Feedback Reports
1. Report of actual results only; or	1. Report of actual results plus feedback on impact of decision errors; or
2. Above report plus feedback on impact of prediction errors.	2. Above report plus feedback on impact of prediction errors.

From an examination of these four feedback reports (samples of these four reports are shown in Appendix G) it seems reasonable that the subjects found the prediction process easier than the decision process, and/or they found the the decision error feedback more useful in improving their performance than the feedback on prediction errors. The six-period average prediction errors for the analytic, directive and conceptual styles are shown below:

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	No Prediction Error Feedback			Prediction Error Feedback			Total Sample		
Decision Style	No.	Pred. Error	Difference	No.	Pred. Error	Difference	No.	Pred. Error	Difference
Analytic	6	10.1	7.2	6	12.1	1.6	12	11.1	2.4
Rest of Sample	22	17.3		23	10.5		45	13.5	
Directive	5	16.4	2.9	8	10.2	0.9	13	16.4	4.0
Rest Sample	23	13.5		21	11.1		44	12.4	
Conceptual	8	17.7	2.7	7	7.7	3.1	15	14.5	1.7
Rest of Sample	20	15.0		22	10.8		42	12.8	
Total Sample Difference	28	15.8		29	10.9		57	13.3	

While there generally was an improvement in prediction performance (i.e., a reduction in the six-period average prediction error) when the subjects received feedback regarding the impact of prediction errors, there was no significant difference in prediction performance attibutable to a particular decision style. In reviewing the results of a two-way ANOVA of prediction error feedback vs. decision style, we found no significant F levels, as can be shown below:

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Significance of Treatment Effects (F-Levels)
for Two-Way ANOVA using Style vs. Prediction Error model.

	Analytic Style		Conceptual Style		Directive Style		Total
Variable*	Style	PRED	Style	PRED	Style	PRED	PRED
PERR	.584	.161	.741	.165	.232	.114	.150
AYPR6	.928	.120	.733	.129	.251	.088	.116
AEQPR6	.872	.244	.947	.251	.657	.233	.244

*Variable	Definition
PERR	Average prediction error (6 period average).
AYPR6	Pred. error impact on price (6 period average).
AEQPR6	Pred. error impact on unit cost (6 period average).
PRED	Prediction error treatment effect.
STYLE	Style treatment effect.

The only style that shows some potential significance (i.e., 0.088) is the directive style, and that is primarily because the average prediction error for directives was so poor for the control group where the subjects had no feedback on the impact of prediction errors. The five directive style subjects in this treatment group had six-period average prediction errors of: $6,455, $33,072, $7,493, $11,445, and $73,794 for an average of $26,400 versus $16,400 for all 13 directives and $12,400 for all other subjects.

Since the prediction error treatment effects were not very significant (i.e., none were below the 10% level of significance), we were able to simplify Ryan's model down to just two treatment effects: 1) simple feedback reports, and 2) complex feedback reports. Then, using this simplified model, we were able to analyze each decision style in the context of the following model:

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		Decision Error Feedback Treatment	
		Simple Feedback Reports	Complex Feedback Reports
Style Treatment	Selected Style	Simple Report #1 Selected Style	Complex Report #1 Selected Style
	Rest of N=58 sample or Another Style Group	Simple Report #2 Rest of Treatment Group	Complex Report #2 Rest of Treatment Group

Note: Simple Report #1: No feedback.
Simple Report #2: Prediction error feedback only.
Complex Report #1: Decision error feedback only.
Complex Report #2: Prediction error and decision error feedback.

The results of our analysis using this model and the standard two-way ANOVA, with starting time (ST) and class grade points (PTS) as covariates, are discussed and presented in detail in the following section entitled Main Findings.

Hypotheses to be Tested

From our review of the literature, a list of givens or priors were summarized in Chapter 3. That list is paraphrased here:

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1. Analytic subjects are expected (hypothesized) to handle more complex feedback than less complex directive subjects especially under information overload conditions (complex reports).

2. Under conditions of low environmental load (simple reports) the directive style is expected to be significantly faster than some of the more complex styles.

3. Analytic subjects are expected to require more decision time in contrast to directives.

4. Infomation seeking declines from very high levels under low environmental load (simple reports) to very low levels under high load (complex reports). Thus, the decision times taken by analytics are expected to be longer than that taken by directives.

5. Directives initially are high information users, but rapidly settle into low information users, whereas analytics are expected to show a steady gradual shift toward less information (as opposed to the abrupt shift of decisives).

6. Under overload conditions (complex reports) directives are expected to lose their normal speed, and they move slowly with little data.

7. The normally fast directives are more easily overloaded (by complex reports) than are analytics; and, when overloaded, directives are expected to become deliberate (slow) and low data using.

8. Analytics in very structured tasks (complex reports) are

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expected to become high data users, and will process data at very high speeds compaired with directives. In less-structured environments (simple reports) differences in speed are less noticeable.

9. Analytics are expected to prefer and effectively use moderately complex feedback.

10. High-analytic directives are expected to not become overloaded (deliberate or slow) as quickly as low-analytic directives.

11. High-analytic analytics are expected to continue to prefer complex feedback even under overload conditions.

12. High-analytic directives also are expected to continue to prefer moderately complex feedback even under overload conditions.

While some of the above priors appear to be contradictory (e.g., "decision times for analytics should be greater than directives with complex reports" versus "decision times for directives should increase as directives become overloaded and more deliberate with complex reports"), we proceeded to state the following hypotheses:

Ho1: With complex reports, high-analytic directives are not expected to perform better than low-analytic directives.

Ho2: With complex reports, analytics are not expected to perform better than high-analytic or low-analytic directives.

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Ho3: With complex reports, low-analytic directives are not expected to take longer than other styles to make their decisions.

Prior to the experiment, we expected directives to be slower decision makers expecially with complex reports, but we also expected high-analytic directives to perform better than low-analytic directives, and possibly even as well as analytics. We also obviously expected analytics to perform better than directives, but what we did not expect was the outstanding performance of Rowe's conceptual style relative to the analytic style. In the next section we will examine our main findings relative to these hypotheses.

Main Findings

As noted above, the primary thesis of this research is that the directive and analytic styles (measured by Rowe's Decision Style Inventory) will perform in significantly different ways from the general population. In particular, it was argued that the analytic style would perform better than the general population, and that the directive style would not perform as well as the analytic style. Further, it was argued that the decision times for the directive style would be greater than the decision times for the analytic style. These were, in fact, the general findings. In a summary, the observed levels of performance for the thirty subjects which received the (complex) feedback reports were as follows:

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Comparison of Levels of Performance of Subjects Receiving Complex Reports

Style	No.	Income	Std. Dev.	Dec. Error	Std. Dev.	Total Time	Std. Dev.
Analytic	5	142.4	28.2	38.4	22.5	64.4	24.9
Directive	9	126.2	36.1	49.0	27.1	84.8	15.7
Behavioral	6	135.7	28.8	43.4	23.6	67.1	22.2
Conceptual	10	144.7	24.2	28.9	26.9	70.1	19.0
Total Population	30	137.0	29.2	39.4	25.8	73.0	20.4

(Note: Units of Income and Decision Error are thousands of dollars.
Units of Total Time: One hour = 100.)

The performance of the conceptual and behavioral styles were also included in the above summary to provide some comparison. It should be noted that the conceptual style also performed well, and this was not a totally expected result. Actually the conceptual style performed better than the analytic style with slightly longer average decision times (but still less time than for the general population). The behavioral style performed generally at about the same "average" level as the general population. The directives performed the poorest and took significantly longer to make their decisions.

The difference between each style can be highlighted by contrasting each style with the "rest" of the population as opposed to the total population (N=30) which received the complex feedback reports, as shown in Table 6-1.

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Table 6-1

Comparison of Each Style With "Rest" of the Population

Receiving the Complex Feedback Reports

	No	Income	Relative Income	Dec. Error	Pred. Error	Total Time	Grade Pts.	Witkin EFT Score
Analytic	5	142.4	0.77	38.4	7.0	64.4	52.6	20.0
Rest of Pop.	25	135.9	0.79	39.6	17.2	74.7	150.6	20.2
Directive	9	126.2	0.98	49.0	18.0	84.8	151.0	18.6
Rest of Pop.	21	141.6	0.71	35.3	14.4	67.9	151.0	21.0
Conceptual	10	144.7	0.59	28.9	18.6	70.1	147.0	20.8
Rest of Pop.	20	133.1	0.84	44.7	14.0	74.5	153.0	19.9
Total Population	30	137.0	0.79	39.4	15.5	73.0	151.0	20.9

Two-Way ANOVA Using Simplified 2X2 Model

These performance differences summarized in Table 6-1 were analyzed using the decision style versus decision error treatment (2X2) model developed in Chapter 5. Table 6-2 shows this 2X2 breakout (model) for the directive style. Using this model, each of Rowe's styles was analyzed using the standard two-way ANOVA with starting time and

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class grade points as covariates. Table 6-3 summarizes the results of these ANOVA runs.

Table 6-2

Decision Style Versus Decision Error Feedback Model

Decision Style	Decision Error Feedback Reports: Simple Reports	Complex Reports
Selected Style: Directives	N= 4 INC= 146.8 DERR= 22.1 TT= 69.0	N= 9 INC= 126.2 DERR= 49.0 TT= 84.8
All Other Subjects	N= 23 INC= 111.0 DERR= 68.3 TT= 75.5	N= 21 INC= 141.6 DERR= 35.3 TT= 67.9
Total by Decision Error Feedback Treatment Groups	27 Subjects INC= 116.3 DERR= 61.5 TT= 74.5	30 Subjects INC= 137.0 DERR= 39.4 TT= 73.0

Variables:
N = No. of subjects.
INC = 6-period average income.(Units: $1,000)
DERR = 6-period average decision error. (Units: $1,000)
TT = Total decision time.(Units: Hour = 100)

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Table 6-3

Levels of Significance (F-Values) from Two-Way ANOVA Using Data Presented in Table 6-1

Decision Error Criteria	Treat-ment	Analytic	Behavioral	Conceptual	Directive
Income	Style	.007	.523	.139	.827
(INC)	Dec.Feed.	.061	.045	.089	.061
Decision	Style	.004	.736	.104	.592
Error	Dec.Feed.	.036	.031	.055	.039
(DEC)					
Relative	Style	.003	.711	.101	.579
Income	Dec.Feed.	.036	.031	.056	.040
(AYDR6)					
Act. to	Style	.003	.409	.141	.798
Opt.Inc.	Dec.Feed.	.055	.037	.082	.059
(AOR6)					
Total	Style	.214	.453	.863	.130
Time	Dec.Feed.	.582	.963	.679	.466
(TT)					

Decision Styles: Analytic, Behavioral, Conceptual, Directive

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In Table 6-3 we see that analytics performed significantly different from the rest of the subjects. The performance of the conceptual style was only slightly significant compared to other subjects. The directive style, on the other hand, clearly showed no style effect, (that is, the directives did not perform significantly different from the other subjects) except for the fact that directives took significantly longer to make their decisions with the complex reports (average total time was 84.8 for the directive style vs. 64.4 for the analytic style).

The underlying reasons for the significant style effect for analytics versus only a slightly significant style effect for conceptuals can be seen by analyzing the comparisons presented in Table 6-4. The conceptual style did equally well (and significantly better than average) with the simple report as with the complex report (i.e., without decision error feedback as with feedback). In contrast, the analytics showed great treatment effect increasing from an income of 74.4 with the simple report up to an income of 142.4 with the complex report. In contrast, the directive style actually did poorer with the complex report.

Field-Independent (High-Analytic) Subjects

These differences can be further highlighted by splitting each decision style group into the high-analytic (field-independent) versus low-analytic (field-dependent) groups. Forty persons in the 57-subject sample (Rowe's decision styles) took the Witkin Embedded Figures test. The mean score was 18.8 (S=5.5), and all subjects with scores greater than 18 were considered to be field-independent (high-analytic) subjects.

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Table 6-4

Comparison of Directive, Analytic, and Conceptual Styles Based on 2X2 Decision Style Model

	Directives Simple	Directives Complex	Analytics Simple	Analytics Complex	Conceptuals Simple	Conceptuals Complex
Style:						
Income(1)	146.8	126.2	74.4(2)	142.4	142.2	144.7
Dec.Error	22.1	49.0	98.4	38.4	39.1	28.9
Rel.Inc.	0.43	0.98	1.96	0.77	0.76	0.59
Tot.Time	69.5	84.8	68.1	64.4	78.8	70.1
Rest of Population:						
Income	111.0	141.6	131.0	135.9	110.5	133.1
Dec.Error	68.3	35.3	48.5	39.5	66.5	44.7
Rel.Inc.	1.35	0.71	0.95	0.79	1.32	0.89
Tot.Time	75.5	67.9	76.7	74.7	73.5	74.5

Notes: 1. Units of Income (INC) and Decision Error (DEC) = $1,000.
Units of Relative Income (AYDR6) = Percent/100.
Units of Total Time (TT) = Hours x 100.

2. This group of analytics includes an outlier whose income was -$102,000. When this subject is omitted, the average income becomes $103,000.

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This breakout for the analytic, directive, and conceptual styles is presented in Table 6-5. The back-up data for Table 6-5 is shown in Table 6-6 which also includes those subjects who received the "simple" feedback reports along with those who received the "complex reports. Table 6-7 analyzes the representativeness of the reduced sample of 40 subjects who took the Witkin Embedded Figures test. None of the differences in Table 6-7 were significant thereby enabling us to proceed with some confidence in the analysis of the finer breakdowns of each decision style into the high-analytic versus low-analytic groups presented in Table 6-8.

Table 6-8
Summary Characteristics of High-Analytic and Low-Analytic Directives Who Received Simple Reports versus Complex Reports

SIMPLE REPORTS

High-Analytic Directives

(None)

Low-Analytic Directives

ID	INC	DERR	AYDR6	AOR6	TT
$\bar{X}$	144.3	24.3	0.47	0.67	77
S	30.9	7.0	0.13	0.51	21.2

COMPLEX REPORTS

High-Analytic Directives

ID	INC	DERR	AYDR6	AOR6	TT
$\bar{X}$	125.8	41.2	0.83	0.95	72.5
S	38.1	6.0	0.18	0.42	16.4

Low Analytic Directives

ID	INC	DERR	AYDR6	AOR6	TT
$\bar{X}$	121.7	59.3	1.13	1.08	96.3
S	54.2	51.1	0.96	0.83	1.2

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Table 6-5

Performance of Groups Receiving Complex Reports Broken Down by Decision Style and by Witkin High-Analytic vs. Low-Analytic Style

Decision Style	Variable*	High-Analytic	Low-Analytic	Did Not Take EFT	Total Group
Analytic	No.	4	0	1	5
	Income	151.5		106.0	142.4
	Tot.Time	70.5	---	40.0	64.4
Directive	No.	4	3	2	9
	Income	125.8	121.7	134.0	126.2
	Tot.Time	72.5	96.3	92.2	84.8
Conceptual	No.	5	1	4	10
	Income	153.4		137.3	144.7
	Tot.Time	79.2	40.0	66.3	70.1

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Table 6-6

Raw Data for High-Analytic Versus Low-Analytic Subjects Categorized by Feedback Reports Received: Simple Reports versus Complex Reports

SIMPLE REPORTS

High-Analytic Analytics

ID	INC	DERR	AYDR6	AOR6	TT	WFT
106	96	49.3	0.96	1.52	90	23
217	115	56.3	1.07	1.15	68	23
313	56	143.0	2.84	2.20	88	19
$\bar{X}$	89.0	82.8	1.62	1.62	82	21.7
S	30.1	52.2	1.06	0.53	12.2	2.3

High-Analytic Directives
(None)

High-Analytic Conceptuals

ID	INC	DERR	AYDR6	AOR6	TT	WFT
222	63	116.4	2.16	1.94	48	19
304	153	20.2	0.41	0.50	90	24
$\bar{X}$	108.0	68.3	1.29	1.22	69	21.5
S	63.6	68.0	1.24	1.02	29.7	3.5

Low-Analytic Analytics

ID	INC	DERR	AYDR6	AOR6	TT	WFT
310	48	90.5	1.88	2.44	58	3
318	-102	294.8	5.82	5.48	58	13
$\bar{X}$	-27	192.7	3.85	3.96	58	8
S	106.1	144.5	2.79	2.15	0	7.07

Low-Analytic Directives

ID	INC	DERR	AYDR6	AOR6	TT	WFT
121	150	25.0	0.48	0.51	85	17
205	172	17.0	0.33	0.26	93	11
214	111	30.9	0.59	1.25	53	8
$\bar{X}$	144.3	24.3	0.47	0.67	77	12
S	30.9	7.0	0.13	0.51	21.2	4.6

Low-Analytic Conceptuals
(None)

COMPLEX REPORTS

High-Analytic Analytics

ID	INC	DERR	AYDR6	AOR6	TT	WFT
139	175	12.2	0.24	0.21	98	18
227	120	65.2	1.32	1.13	77	21
343	159	21.5	0.40	0.40	67	21
$\bar{X}$	151.5	33.9	0.69	0.58	70.5	20
S	22.5	23.2	0.48	0.40	24.1	1.4

High-Analytic Directives

ID	INC	DERR	AYDR6	AOR6	TT	WFT
131	159	41.6	0.79	0.32	65	24
231	73	33.7	0.59	1.48	57	18
336	124	48.3	1.00	1.07	95	24
340	147	41.2	0.94	0.74	73	24
$\bar{X}$	125.8	41.2	0.83	0.95	72.5	22.5
S	38.1	6.0	0.18	0.42	16.4	3

High-Analytic Conceptuals

ID	INC	DERR	AYDR6	AOR6	TT	WFT
129	103	9.2	0.20	1.49	80	21
133	183	2.4	0.05	0.05	73	23
138	154	29.2	0.62	0.60	63	20
236	152	30.6	0.61	0.56	82	22
337	175	11.3	0.23	0.13	98	24
$\bar{X}$	153.4	16.5	0.34	0.57	79.2	22
S	31.2	12.6	0.26	0.57	12.9	1.6

Low-Analytic Analytics
(None)

Low-Analytic Directives

ID	INC	DERR	AYDR6	AOR6	TT	WFT
124	65	110.7	2.10	1.90	97	11
143	173	8.5	0.18	0.23	97	4
230	127	58.6	1.12	1.12	95	13
$\bar{X}$	121.7	59.3	1.13	1.08	96.3	9.3
S	54.2	51.1	0.96	0.83	1.2	4.7

Low-Analytic Conceptuals

ID	INC	DERR	AYDR6	AOR6	TT	WFT
132	131	12.2	0.26	0.94	40	15

SIMPLE REPORTS

Style	N	INC	DERR	AYDR6	TT
Analytic	7	74.4	98.4		68.1
Directive	4	146.8	22.1		69.0
Conceptual	5	142.2	39.1		78.8
All	27	116.3	61.5	1.1	74.5

COMPLEX REPORTS

Style	N	INC	DERR	AYDR6	TT
Analytic	5	142.4	38.4	0.77	64.4
Directive	9	126.2	49.0	0.98	84.8
Conceptual	10	144.7	28.9	0.59	70.1
All	30	137.0	39.4	0.79	73.0

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Table 6-7

Representativeness of Subjects Who Took Witkin Embedded Figures Test (EFT)

	Received Complex Reports					
	Analytics		Directives		Conceptuals	
	Took EFT	in N=58 Sample	Took EFT	in N=58 Sample	Took EFT	in N=58 Sample
No.	4	5	7	9	6	10
Income	151.5	142.4	124.0	126.2	149.7	144.7
Dec.Error	33.9	38.4	49.0	49.0	15.8	28.9
Tot.Time	70.5	64.4	82.7	84.8	72.7	70.1

	Received Simple and Complex Reports					
	Analytics		Directives		Conceptuals	
	Took EFT	in N=58 Sample	Took EFT	in N=58 Sample	Took EFT	in N=58 Sample
No.	9	12	10	13	8	15
Income	91.0	102.8	130.1	132.5	139.3	143.9
Dec.Error	85.4	73.4	31.6	40.8	28.9	32.3
Tot.Time	71.6	66.6	81.0	79.9	71.8	73.0

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Testing of the Hypotheses Developed in Chapter Three

The three null hypotheses developed in Chapter Three are restated here:

Ho1: Under conditions of a highly structured exercise (complex reports), the directives with the high-analytic (field-independent) style will not handle complex data better (and thereby will not perform better or any differently) than the directives with a low-analytic style.

Ho2· Under conditions of a highly structured exercise (complex reports), analytics will not handle complex data better (and thereby will not perform better) than directives with a high-analytic or a low-analytic style.

Ho3: Under conditions of a structured exercise (complex reports), directives with a low-analytic style will not take longer than all other styles to finish the exercise.

First Null Hypothesis on the Directive Decision Style

The first null hypothesis was predicated on the priors developed in Chapter 3 and restated above to the effect that high-analytic directives would perform better than low-analytic directives. As we have already demonstrated above, the directive style is not an exceptionally well performing group. In Table 6-1 and 6-3 we showed that the performance of the directive style group of 13 subjects was slightly less than the rest

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of the group, but not significantly different from the rest of the 57 subjects. If anything the directives appear to be poorer performers; however, to gain a deeper insight into the performance of directives let us look at the performance of the high-analytic directives versus the low-analytic directive groups, presented in Table 6-8.

Clearly, the resulting sample sizes are very small; and this obviously makes any testing of significance very difficult. Using the t-test for small samples, we obtain the results presented in Table 6-9 from applying the t-test to the comparison of the high-analytic directives with the two low-analytic directive groups.

Table 6-9

Results of T-Tests of Decision Performance Criteria for High-Analytic Directives with Complex Reports Versus Low-Analytic Directives with Complex Reports:

	High-Anal. Directives	Low-Anal. Directives	T-Value	2-Tail Prob.	Null Hypoth.
Income	125.8	121.7	0.12	0.910	Accept
Dec. Error	41.2	59.3	-0.72	0.501	Accept
Rel.Income	0.83	1.13	-0.63	0.556	Accept
Act./Opt.Income	0.95	1.08	-0.27	0.796	Accept
Total Time	72.5	96.3	-2.46	0.057	Reject

Results of T-Test of Decision Criteria Performance for High-Analytic Directives with Complex Reports Versus Low-Analytic Directives with Simple Reports

	High-Anal. Directives	Low-Anal. Directives	T-Value	2-Tail Prob.	Null Hypoth.
Income	125.8	144.3	-0.69	0.522	Accept
Dec. Error	41.2	24.3	3.47	0.018	Reject
Rel.Income	0.83	0.47	2.92	0.033	Reject
Act./Opt.Income	0.95	0.67	0.79	0.464	Accept
Total Time	72.5	77.0	-0.32	0.762	Accept

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These results are very interesting. Using the complex reports, the high-analytic directives performed only slightly better than the low-analytic directives, but obviously not sufficiently better to be significant. As we will see, however, in testing the third null hypothesis on decision times, the high-analytic directives achieved this slightly better performance in a significantly shorter period of time as compared with the low-analytic directives.

Another interesting (and totally unexpected result) is the very significant deterioration in the performance of the directives receiving the complex reports as compared with the low-analytic directives receiiving the simple reports, as shown below•

	Simple Reports Low-Analytic Directives	Complex Reports High-Analytic Directives	All 13 Directives	All 57 Subjects
Income	144.3	125.8	132.5	127.2
Dec.Error	24.3	41.2	40.8	49.9
Rel.Income	0.47	0.83	0.81	0.99
Act.to Op. Income	0.67	0.95	0.89	0.99
Total Time	77.0	72.5	79.9	73.7
Grade Pts.	151.0	132.8	149.8	152.4

The superior performance of the low-analytic directives might be explained in part by their higher grade point average of 151.0 versus the 132.8 for the high-analytic directives, but obviously this does not explain the total difference. The 151 grade points for the low-analytic

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directives was not above the average grade points for all 57 subjects, yet their performance was significantly above average performance. Another possible, yet simple explanation is based on the general impression one has of directives: that when they are under stress (using the complex reports) they become low-data users and do not perform well.

In summary, since the directives are on the average poor performers, and the high-analytic directives are equally poor performers, we are not able to reject the null hypothesis that high-analytic directives with complex reports perform any differently from the low-analytic directives with complex reports. Both of these two sub-groups perform equally poorly when compared with the rest of the subjects using the complex reports (i.e., 125.8 for high-analytic directives versus 121.7 for low-analytic directives versus 137.0 for all 30 subjects using complex reports). On the other hand, the low-analytic directives with simple reports performed significantly better than the high-analytic group using complex reports, in so far as decision error and the relative impact of decision error on income are concerned. (Accordingly to Ryan these two decision error feedback criteria are better measures of performance than is income itself.) Moreover, on the average, the four directive subjects in this treatment group (using simple reports) outperformed all other decision styles in any of the treatment groups, and they did it in a total decision time of 69.0, the lowest of any of the treatment groups.

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Second Null Hypothesis on the Analytic Decision Style

The second null hypotheses was predicated on the premise that the analytic decision style would outperform the directive decision style even when it was compared with the presumably superior performance of high-analytic directives. As we showed in Chapter 5, the analytic decision style did, in fact, perform in a superior (and statistically significant) manner relative to the rest of the subjects in the sample. The analytic decision style is compared below with the other three styles in order to highlight this superior performance.

Decision Performance Criteria for Subjects Who Received the Complex Report

Style	No.	Income	Dec.Error	Rel.Income	Act./Opt.Inc.
Analytic	5	142.4	38.4	0.77	0.73
Directive	9	126.2	49.0	0.98	0.99
Conceptual	10	144.7	28.9	0.59	0.70
Behavioral	6	135.7	43.4	0.85	0.82
Total	30	137.0	39.4	0.79	0.82

The important question here, however, is whether the smaller group of high-analytic analytic subjects performed in a superior fashion as compared with the high-analytic directives. A comparison of the performance of high-analytic analytics versus the high-analytic and low-analytic directives is shown in Table 6-10.

While the high-analytic analytics appear to have performed better

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Table 6-10

Results of T-Tests on Decision Performance Criteria for High-Analytic Analytics Versus the High-Analytic and Low-Analytic Directives Receiving Complex Reports

	N	Mean/ Std. Dev.	Inc.	Dec. Error	Rel. Inc.	Act./Op. Inc.
High-Analytic Analytics (Complex Reports)	4	X	151.5	33.9	0.69	0.58
		S	22.5	23.2	0.48	0.40
High-Analytic Directives (Complex Reports)	4	X	125.8	41.2	0.83	0.95
		S	38.1	6.0	0.18	0.42
Low-Analytic Directives (Complex Reports)	3	X	121.7	59.3	1.13	1.08
		S	54.2	51.1	0.96	0.83

T-Test Results	Dec.Error Performance Criteria	T-Test	$t_{5\%}$	Null Hypoth.
High-Analytic Analytics versus High-Analytic Directives	Income	1.16	1.94	Accept
	Dec.Err.	0.60	1.94	Accept
	Rel.Inc.	0.55	1.94	Accept
	Act/Op.Inc.	1.27	1.94	Accept
High-Analytic Analytics versus Low-Analytic Directives	Income	1.01	1.94	Accept
	Dec.Err.	0.90	1.94	Accept
	Rel.Inc.	0.81	1.94	Accept
	Act/Op.Inc.	1.07	1.94	Accept

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than the high-analytic and low-analytic directives, the small sample sizes of 4 subjects and 3 subjects made it highly unlikely that the computed levels of the t-test would achieve the required level of significance. Thus, while the total group of 12 analytics did outperform the other 45 subjects (less than a 5% level of significance based on the 2-way ANOVA tests reported above), the smaller group of "4" high-analytic analytics using complex reports did not outperform the smaller group of "4" high-analytic directives or the "3" low-analytic directives also using complex reports. Thus, we must accept the null hypothesis that high-analytic analytics will not handle complex data any better than high-analytic or low-analytic directives.

Third Null Hypothesis on Decision Times

The third null hypothesis is predicated on the contention that the information overload from the complex reports will cause the directives to take longer time to make their decisions. The actual times observed for the individuals in each of the decision style groups was presented in Table 6-6. In summary, these decision times (TT) were as follows:

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	Simple Reports			Complex Reports		
High-Analytic	No.	Time	S.D.	No	Time	S.D.
o Analytics	3	82.0	12.2	4	70.5	24.1
o Directives	0	---	---	4	72.5	16.4
o Conceptuals	2	69.0	29.2	5	79.2	12.9
Low-Analytics						
o Analytics	2	58.0	0.0	0	----	----
o Directives	3	77.0	21.2	3	96.3	1.2
o Conceptuals	0	----	----	1	40.0	0
Subjects Who Took EFT	10	73.1	17.8	17	76.4	19.4
Total No. of Subjects	27	74.5	17.2	30	73.0	20.5

No.=57· Time=73.7
S.D.= 18.8

Notation: No. = Number of subjects
Time = Total Decision Time
S.D. = Standard Deviation

The total times for the high-analytic and low-analytic directives and the results of applying the t-test to the paired comparisons of the high-analytic directives versus the low-analytic directives are summarized below in Table 6-11.

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Table 6-11

Results of T-Tests of Decision Times for High-Analytic and Low-Analytic Directives

Complex Reports:	No.	Time	S.D.
o High-analytic Directives	4	72.5	16.4
o Low-analytic Directives	3	96.3	1.2
Simple Reports:			
o High-analytic Directives	0	----	----
o Low-analytic Directives	3	77.0	21.2

	Computed T-test	5% Level of Significance	Null Hypothesis
Complex Reports: High-Analytic Directives versus Low Analytic Directives	2.44	2.02	Reject
Low-Analytic Directives: Simple Reports versus Complex Reports	1.57	2.13	Accept
High-Analytic Directives: Receiving Complex Reports versus Low-Analytic Directives Receiving Simple Reports	0.28	2.02	Accept

The results of the above t-tests on decision times really have to interpreted in the context of the analysis above in connection with the first null hypothesis (Hol) which stated that "high-analytic directives will not perform any better than low-analytic directives". In that case what we found was:

- With the complex reports, the high-analytic directives performed only slightly better than the low-analytic

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directives, but not enough better to be truly significant at the 5% level of significance.

- With the complex reports, the high-analytic directives were significantly poorer performers compared with the low-analytic directives receiving simple reports.

Now, in the light of the above testing of the directives' decision times, we can expand these earlier conclusions as follows:

- With the complex reports, the high-analytic directives performed about equally with the low-analytic directives (possibly a little better but it was not significant), but they achieved this equality (or slight superiority) in a significantly shorter period of time compared with the slower (more deliberate) low-analytic directives.

- The high-analytic directives receiving the complex reports were significantly poorer performers compared with the low-analytic directives receiving the simple reports, but there was no significant difference in the total average decision times for the two groups which averaged 77.0 and 72.5 respectively (compared with 73.7 for all 57 subjects).

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Summary

In this chapter I reviewed the research findings in Chapter 5 where I had analyzed the performances in Ryan's experiment of the 57 subjects (whose decision styles and been measured using Rowe's Decision Style Inventory) using the 2X2 decision-style/decision-error-feedback model developed in Chapter 4. Then I proceeded to review the priors (earlier research findings) which I used in Chapter 3 to develop the hypotheses which I tested in this chapter. After a restatement of the three hypotheses, I proceeded to test each of the hypotheses in turn, and we arrived at the following conclusions·

First Hypothesis: Using complex reports, high-analytic directives are not expected to perform better than low-analytic directives. This hypothesis was not rejected. We found that:

- o The directive style as a group is not an exceptionally well-performing group. If anything, the performance of the 9 subjects in this group using complex reports was slightly less (but not significant) from the rest of the subjects (i.e., 126.2 versus 141.6).

- o Using complex reports, the high-analytic directives performed only slightly better (but not significantly better) than than the low-analytic directives with complex reports.

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- Using complex reports, the high-analytic directives performed significantly poorer than the low-analytic directives using simple reports.

Second Hypothesis: Using complex reports, analytics are not expected to perform better than high-analytic directives or low-analytic directives. This hypothesis was not rejected. We found that:

- While the analytic style as a group is an exceptionally well-performing group (that is, their overall performance measured by the two-way ANOVA using the 2X2 decision style model was significantly different from the rest of the subjects), the performance of the 5 analytic subjects using complex reports was superior but not significantly different from the rest of the subjects using complex reports.

- The high-analytic analytic group of 4 subjects using complex reports did not outperform (significantly) the group of 4 high-analytic directives or the 3 low-analytic directives using complex reports (even though they had an average six-period income of 151.5 versus 125.8 and 121.7 for the two directive groups, respectively).

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Third Hypothesis: Using complex reports, low analytic directives are not expected to take longer than other styles to make their decisions. This hypothesis was rejected. We found that:

- o With complex reports, the high-analytic directives performed possible a little better (but not significantly better) than the low-analytic directives, but they achieved this (slight) superiority in a significantly shorter period of time (compared with the slower, more deliberate low-analytic directives).

- o With complex reports, the high-analytic directives were significantly poorer performers compared with low-analytic directives using simple reports, although there was no significant difference in the total decision times for the two groups.

In essence, the performance of Rowe's decision style groups can be summarized best by using the following table:

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	Simple Reports			Complex Reports			Total		
Style	No.	Income	TT	No.	Income	TT	No.	Income	TT
o Analytic	7*	74.4	68.1	5	142.4	64.4	12	102.8	66.6
o Behavioral	11	120.4	78.6	6	135.7	67.1	17	125.7	74.5
o Conceptual	5	142.2	78.8	10	144.7	70.1	15	143.9	73.0
o Directive	4	146.8	69.0	9	126.2	84.8	13	132.5	79.9
	27	116.4	74.5	30	137.0	73.0	57	127.2	73.7

*Note: This group of 7 analytics includes an outlier whose income -$102,000. When this subject was omitted, the average income becomes $103,000.

In this table we see that the directive decision maker using simple reports is on the average a quick decision maker and he performs well. Using complex reports the directive decision maker becomes slow and deliberate and, at best, is only an average decision maker. In contrast, the cognitively complex analytic and conceptual decision makers using complex reports are superior performers and they make their decision in significantly short periods of time.

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Chapter 7

Summary of Findings and Outlook for the Future

Summary

The underlying thesis of this dissertation is that decision styles are important and significant determinants of performance in the processing of accounting information, and that Rowe's Decision Style Inventory (DSI) would segregate decision makers into four uniquely different decision styles whose differences in performance could be measured and, more importantly, be demonstrated to be significantly different from each other. Many researchers in the field of human information processing have doubted whether such decision style effects even exist, let alone whether they are important and significantly different. To demonstrate the significance of such style effects, the approach taken in this dissertation was to select one of Rowe's styles -- the decisive decision style (which Rowe labels directive) and to examine the performance of Rowe's directive style relative to the rest of the population (i.e., versus the other three styles).

In approaching this examination of the directive (decisive) style, I postulated that the directive decision maker's performance would be adversely impacted by the complex reports used in Ryan's experiment. I also conjectured that the Witkin Embedded Figures Test would be able to distinguish the high-analytic decision makers from the low-analytic decision makers, and if this were the case, the high-analytic directives would not be as adversly impacted by the complex reports as were the

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low-analytic directives.

As a benchmark for measuring the directive style, I selected Rowe's analytic style. Based upon some of the priors established from previous related research, it was anticipated that the analytic decision maker would be best able to utilize Ryan's complex report, and that the high-analytic directive would perform equally well (comparable to the analytic style). Finally, it was anticipated that using complex reports, the directive decision maker would become a much slower (more deliberate) decision maker when compared to the analytic decison maker.

The development of a model to use in the final analysis came about only after months of fruitless work using the original 12-treatment model (2 decision error treatments plus 2 prediction error treatments plus 3 economies treatments). Even when Ryan's original model was simplified by ignoring the three economies, the superimposing of Rowe's four decision styles still produced 16 cells and an average of only 3 to 5 subjects per cell. Only when Ryan's original model was reduced further to a two-treatment model of simple reports (with no Decision Error Feedback) versus complex reports (with Decision Error Feedback) did we obtain significant results. Even with this improvement, we were further hampered by the poor response to the Witkin Embedded Figures Test. Still all in all, however, I believe that the results presented above in this dissertation have proven the original contention that Ryan's results are interpreted in a more meaningful way by analyzing the performance of individual decision styles of the subjects involved in his experiment.

Using the final decision style (2X2) model based upon decision

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styles and decision error feedback reports, we showed that the directive decision makers performed quite well using the simple reports, but they were only average decision makers using the complex reports. Moreover, the directive decision makers did, in fact, become slower decision makers when they have to use the complex reports.

A second major finding was that the analytic and conceptual decision makers were significantly superior performers, so much so that when they were removed from the 57-subject sample, all the treatment effects disappeared. To demonstrate these confounding effects, the following Table 7-1 shows the changes in key attributes when the 27 analytic and conceptual subjects are removed from the original sample of 57 subjects.

Table 7-1
Effect of Removing the Analytic and Conceptual Subjects from the Original Sample of 57 Subjects

	Simple Reports					Complex Reports				
	No.	Inc.	Dec. Err.	Rel. Inc.	Time	No.	Inc.	Dec. Err.	Rel. Inc.	Time
Total Sample	27	116.3	61.4	1.22	74.6	30	137.0	39.5	0.79	73.0
Analytic	7	74.4	98.4	1.96	68.1	5	142.4	38.5	0.77	64.4
Conceptual	5	142.2	39.1	0.76	78.8	10	144.7	29.0	0.59	70.1
Analytic & Concept.	12	102.7	73.7	1.46	72.6	15	143.9	32.1	0.65	68.2
Remaining Subjects	15	127.3	51.6	1.02	76.1	15	130.0	46.8	0.93	77.7
Directive	4	146.8	22.2	0.44	69.0	9	126.2	49.0	0.98	84.8
Behavioral	11	120.0	62.4	1.23	78.7	6	135.7	43.4	0.85	65.2

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As can be seen in Table 7-1, the key attributes of the remaining 30 subjects (after the 27 analytic and conceptual subjects are removed) are practically identical; and a one-way ANOVA shows no significant treatment differences between the group of 15 subjects using the simple reports versus the 15 subjects using the complex reports, whereas there are significant style difference between analytic, directive, and conceptual groups, as shown in Table 7-2.

Table 7-2

Effect of Removing Analytic and Conceptual Styles from Original Sample of 57 Subjects Who Took Rowe's DSI Test

	Analytic and Conceptual				Behavioral and Directive			
	Simple	Complex	Total	ANOVA	Simple	Complex	Total	ANOVA
Income	102.7	143.9	125.6	0.05	127.3	130.0	128.6	0.769
Dec.Err.	73.7	32.1	50.6	0.05	51.6	46.8	49.2	0.405
Rel.Inc.	1.46	0.65	1.01	0.057	1.02	0.93	0.97	0.391
Total Time	72.6	68.2	70.1	0.735	76.1	77.7	76.7	0.806

	Analytic versus Conceptual			Analytic versus Directive		
	ANOVA (Style)	2-Way (Style)	ANOVA (Feed.)	ANOVA (Style)	2-Way (Style)	ANOVA (Feed.)
Income	0.004	0.012	0.142	0.070	0.123	0.231
Dec.Error	0.003	0.011	0.156	0.024	0.051	0.336
Rel.Income	0.004	0.011	0.165	0.023	0.049	0.340
Tot.Time	0.385	0.340	0.568	0.047	0.090	0.368

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As we can see clearly from the above two tables, the treatment effects in this experiment are explained almost entirely by the performance of the analytic and conceptual subjects. In other words, the significant treatment effects obtained in this experiment can be explained in large part by the performance of the analytic and conceptual subjects.

This approach of examining the performance of selected subsets of decision styles can be tested further by analyzing the high-analytic analytics and conceptuals versus the low-analytic directives (using starting time and the Witkin Embedded Figures Test scores as covariates). The results of this approach are very significant. The data in the following 2X2 model was analyzed in terms of a two-way ANOVA.

	Decision Error Feedback	
	Simple Report	Complex Report
Low-Analytic Directives	No. = 3 Income = 144.3 Time =77.0	No. = 3 Income = 121.7 Time=96.3
High-Analytic Analytics and Conceptuals	No. = 5 Income = 96.6 Time = 76.8	No. = 8 Income = 150.0 Time = 72.5

Using the above 2X2 model, the results (F-Values) from the 2-way ANOVA analysis are shown in the following table.

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Decision Error Performance Criteria	Treatments Effects (Significance Levels of F-values) Style	Decision Feedback
Time (TT)	.008	.859
Income (INC)	.056	.055
Decision Error (DERR)	.089	.106
Rel.Income (AYDR6)	.084	.123
Act./Opt.Income(AOR6)	.028	.014

From this analysis it is clear that the style effects are significant, and that there are significant differences in the performance of the low-analytic directives versus the high-analytic analytics and conceptuals. Even with the limited degrees of freedom because of the small sample and cell values (3,3,5 and 8), the levels of significance are all below the 10% level. The decision error feedback treatment effects are not as significant as the style effects, and this is a reflection of the argument made above that the treatment effects, in fact, are eliminated to a great extent by removing the analytics and conceptual subjects from the original sample of 57 subjects.

Conclusions

It is clear that there are indeed significant performance effects associated with groups of subjects categorized according to the styles measured by Rowe's Decision Style Instrument. It is also clear that there is a stong correlation between the Witkin Embedded Figures Test scores and Rowe's analytic and conceptual scores. Seventy-eight percent of the analytic subjects were field-independent (highly-analytic) and eighty-

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eight percent of the conceptual subjects were field-independent, whereas only forty percent of the directives were field-independent.

What really makes some of these results more relevant, however, are the more sharply focused treatment effects resulting from the finer categories of high-analytic directives versus the low-analytic directives. Even with the small sample size (i.e., six low-analytic directives), the results of the two-way ANOVA show the very significant difference in total decision time (an increase in total time from 77.0 to 96.3) when the low-analytic directives were using the complex reports. These results are summarized in Table 7-3. While the treatment effect of the complex reports apparently caused the low-analytic directives to become slower in their decision making, the apparent deterioration in performance was not significant. On the other hand, the increased decision times required by the directive decision makers when they had to use complex reports did not make them superior performers. At best, directives using complex reports are only average performers.(Using simple reports, the directives were excellent performers; but there was a significant deterioration in performance when directives had to use complex reports.) The really stellar performers, on the other hand, are the cognitively complex (analytic and conceptual) decision makers.

The average six-period income for all 57 subjects was $127,200. The conceptual decision makers earned $146,800 using the simple reports and $144,700 using the complex reports. The analytic decision makers also earned an above-average $142,400 using the complex reports. In sharp contrast, the directive and behavioral styles were collectively only

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Table 7-3

Evaluation of Performance of Low-Analytic Directives

Low-Analytic Directives

Simple Reports

ID	Income(2)	Decision Error(2)	Time(2)
121	150.0	24.97	85
205	172.0	16.99	93
214	111.0	30.86	53
Mean:	144.3	24.3	77.0
Std.Dev.	30.9	6.9	21.2

Complex Reports

ID	Income	Decision Error	Time
124	65.0	110.72	97
143	173.0	8.47	97
230	127.0	58.59	95
Mean:	121.7	59.3	96.3
Std.Dev.	54.2	51.1	1.2

Two-Way ANOVA Levels of Significance (F-Values)

Treatment	Income	Decision Error	Time
Style	0.885	0.819	0.051(1)
Dec.Error	0.054	0.030	0.647

Notes:

1. The two decision style groups are not significantly different (given the small sample involved) except for total decision time (TT). In this case, even with the small sample sizes, the level of significance is 0.051 (5.1%).

2. The units of INC and DERR are $1,000, and the units of Total Time (TT) are Hours X 100.

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average performers as we saw from the analysis in Table 7-1 (where the analytic and conceptual decision makers were eliminated from the sample). In essence, this seems to confirm that with information overload the directive decision maker is only an average performer. Under stress, the directive becomes a slower (more deliberate) decision maker and, at best, is only able to perform at an average level of achievement. In sharp contrast, the outstanding performers are the analytic and conceptual decision makers, and they make their decisions quickly.

Other Decision Style Tests and Their Relation to Above Results

As we noted at the outset of this dissertation, the 57 subjects involved in the above analysis using Rowe's styles were also categorized into the alternative decision styles based upon Driver's IST model. In addition, most of the participants also completed the Rotter Internal/External Locus of Control test and the Myers-Briggs Type Indicator test. Throughout all the subsequent analyses using these other style groupings, I was similarly plagued by the small sample size problem and the limited available degrees of freedom as in the case with Rowe's styles. In particular, a great deal of time was devoted to analyzing the subjects' performance utilizing Driver's decision style model in an attempt to correlate the results with the above findings using Rowe's decision style model. The results of this analysis were not very fruitful as can be seen from the detailed analysis presented in Appendix I (Analysis of Decision Styles Based on Driver's IST Test).

In order to obtain some clue as to how Rowe's styles compare with

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Driver's model, I performed a cross-mapping between Rowe's and Driver's Models. From this simple comparison, it was clear that there is no clearcut cross-mapping between the two models. The two Rowe styles which showed a significant difference in performance from the rest of the population are the analytical and conceptual styles, and all that can be said regarding these two styles relative to Driver's styles is that

1. Rowe's analytic style maps about equally into Driver's integrative and flexible styles; and
2. Rowe's conceptual style maps about equally into Driver's hierarchic and decisive style.

This is probably the main reason why there were no decision style effects when each of Driver's five decision styles were analyzed using the same decision error feedback model that was used to analyze Rowe's decision styles. As can be seen in Appendix I, there are decision or prediction error treatment effects, but clearly <u>there is no evidence of any style effects for any one of Driver's five styles</u>.

There are several other possible explanations for this lack of any decision style treatment effects based upon the use of Driver's IST exercise as it was administered in this experiment:

1. According to Dr. Driver, I did not properly administer the IST Exercise. He argues that the subjects should have been restricted to completing the exercise in the classroom and within an alloted period of time. As a result of my permitting the subjects to take the IST exercise home and to complete it

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without the time pressure of the classroom, spurious results may have been obtained causing the decisive styles to be improperly measured.

2. The subjects in this exercise showed practically no learning patterns. (Ryan, 1983, p.216) The subjects were required to attain a level of proficiency before starting the experiment by preparing graphs and projected income statements. As a result, a significant number of subjects may not have felt the need to pay much attention to the feedback data and simply made their decisions without much analysis or reflection. If such an unpressured approach was taken by a significant number of subjects, it might have produced spurious correlations between decision style and report treatment effects. This, of course, did not occur within Rowe's decision style groupings thereby tending to weaken this argument somewhat.

3. Stress also may have been a confounding variable in this experiment. Under stress, subjects tend to rely on past patterns of performance rather than work out new solutions. Accordingly, some subjects may have totally ignored some of the new feedback data presented to them. Also, under stress they may have shifted during the exercise from their primary decision style into an alternative backup style thereby confounding the results. Performance data correlated with a primary style for certain subjects possibly should have been

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more correctly associated with the subjects' back-up styles, but one cannot easily determine which subjects were using their primary style and which were using their back-up styles, making analysis practically impossible.

4. Another possible reason for the lack of crossmapping between Driver's and Rowe's models is the fact that Rowe's DSI test measures one's perception of one's style whereas Driver's IST test is a case study which measures style under different circumstances. A better test to use might have been Driver's CXSD test which is a measure of one's perceived decision style.

In any event, it was a significant setback that this experiment was unable to shed much light on the relation between Rowe's and Driver's models, or on the efficacy of the use of Driver's IST test in an experiment such as the one used here.

Rotter Internal/External Locus of Control Test

There was a slight negative correlation (-0.16) between the Rotter scores and average six-period income. This means that the subjects who have an internal locus of control also tended to do better in the exercise as opposed to those subjects who have an external locus of control (persons who believe that external factors influence or control them as opposed to their feeling they are in charge).

The Rotter scores also produced some significant F-levels using

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the same decision style model used throughout this study. One such analysis was the two-way ANOVA run using Rotter scores greater than "17" which is included in Appendix L.

These results clearly indicate that this decision style measure should be studied further.

General Incongruity Adaptation Level (GIAL) test

There was a slight positive correlation between income performance and GIAL scores. This means that those subjects who have a high tolerance for ambiguity also tended to perform better in the exercise. Several ANOVA studies were done using those subjects who had a low GIAL score (i.e., who had a low tolerance for ambiguity). The results of these studies were significant and clearly indicate that this instrument also should be examined further.

Myers-Briggs Model

Mann (1982) in his Ph.D. dissertation found a strong relationship between the Myers-Briggs model and Rowe's decision style model. In particular, he found that the analytic style resembles not only the intuitive-thinking (NT) type, but also the sensing-thinking (ST) type. This was also my finding. The 12 analytics in my study could be categorized by the following Myers-Briggs types:

	Number
Sensing-Thinking (ST) Type	5
Intuitive-Thinking (NT) Type	5
Sensing-Feeling (SF) Type	1
Intuitive-Feeling (NF) Type	1

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Karl Dickel in his Ph.D. dissertation (1983) also found a strong correlation with the Myers-Briggs model. He found that directives most resemble the ST-Type, and least the NT-Type. What I found was that the eleven directives (who also took the Myers-Briggs test) could be categorized as follows:

	Number
Sensing-Thinking (ST) Type	6
Intuitive-Thinking (NT) Type	1
Sensing-Feeling (SF) Type	3
Intuitive-Feeling (NF) Type	1

This correlation between Rowe's DSI and the Myers-Briggs model led Dickel to conclude that the directives:

> . . . have a short-range orientation for a single goal (usually profit), like centralized and well-defined tasks and organizational structures, and are fairly autocratic in decison making.

In contrast with directives, Dickel concludes that analytics resemble the intuitive-thinking type, as well as the sensing-feeling type. One the other hand, analytics are least like the feeling type. Thus, he felt that the analytic:

". . . is very unemotional in decision making . . ."

An interesting set of treatment effects emerged when I did a two-way ANOVA selecting only the ten analytics who were ST and NT types. Even with the reduced number of degrees of freedom (with the smaller sample of 10 analytics) we had some very significant style effects. In particular, the total decision time was significantly different from the rest of the population. If we took a closer look at the TT values involved, we find a very interesting relationship, as seen below·

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	Simple Reports			Complex Reports		
	No.	Income	Time	No.	Income	Time
All Analytics	7	74.4	68.1	5	142.4	64.4
Analytics who are ST & NT Types	5	73.8	59.8	5	142.4	64.4
Rest of Sample	22	126.0	77.8	25	135.9	74.7
Total	27	116.3	74.5	30	137.0	73.0

While there was no significant change in the six-period average income as we reduced the sample size from 7 analytics to 5 analytics with simple reports (i.e., 74.4 versus 73.8), the total decision time was reduced significantly to 59.8 (from 68.1).

It is clear that the Myers-Briggs model strongly correlates with Rowe's Decision Style model, and when it is used in conjunction with Rowe's styles, some of the performance effects in this experiment are significantly enhanced. Of all the alternative models discused above, the Myers-Briggs model appears to be the most worthy of future research along with Rowe's DSI and the Witkin Embedded Figures test.

Limitation of this Study

As with any research project, there are many aspects which leave a lot to be desired. The use of students in a managerial accounting class as surrogates for practicing accountants processing (using) accounting information to make decisions is a major limitation in and of itself. At best it is only an indication of what one might expect to find in the real accounting world. Also, the small number of subjects in this experiment

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was a very serious limitation and it undoubtedly masked numerous effects, or obviated significant results that might otherwise have been observed and proven to be significant. Another serious problem with this experiment was the improper or inadequate control over the administration of several of the decision style tests used in this study. It was unfortunate that Driver's IST was not administered in accordance with Driver's preferred method of administering the test. It also was a disappointment that the entire sample of 57 subjects did not elect to take the Witkin Embedded Figures Test. Along this line it was a major loss not having all of Ryan's subjects take all the decision style tests. As a result, much time was spent determining the representativeness of my (reduced) sample sizes in order to evaluate the comparability of my results with Ryan's findings.

Another limitation of this experiment was the way we had to operationalize the complex report (versus the simple report). Clearly, the existence of prediction error feedback confounded one of the simple reports, and the absence of prediction error feedback confounded one of the complex reports. In future research, we intend to operationize this treatment effect in a more effective manner.

In the final analysis, however, the real limitation of this experiment was the small sample sizes for each of Rowe's decision styles broken down by treatment groups. All too often the results appeared to be in the direction that was anticipated but still the sample sizes were not large enough to make these results statistically significant. This certainly caused me (and my faculty advisors) to be skeptical of some of

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my assertions, and rightfully so.

Even with these limitations, however, some of the results were statistically significant. Consider for a moment the contrast in the results from using Rowe's decision style test versus using Driver's decision style test. In the one instance Rowe's instrument produced subgroupings of the subjects (decision style groupings) which produced additional treatment effects (due to the style groupings) which were truly significant style treatment effects. In the other case and in sharp contrast, Driver's IST exercise produced different subgroupings of the exact same subjects which did not produce any different style treatment effects. This, I believe is in a real sense the most significant finding of this experiment. It now seems clear that there are, indeed, decision style instruments designed to measure differences in the way people ostensibly make decisons which when put to the test (i.e., the rigors of statistical tests in an experiment such as this one) do in fact segregate subjects into groups which perform significantly different from other groups subjected to the same test environment. More importantly, these persons perform in ways that were predicted based upon the priors established from earlier research by Driver and Mock (1975), Vasarhelyi (1977), Rowe (1981), and other pioneers in this (young) field of decision style research.

Areas of Future Research

There are several obvious avenues for future research along the lines of this experiment itself. First of all, the same simulation exercise should be repeated with only one economy treatment and with only the

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decision error feedback reports. This would greatly simplify the original treatment model. In place of the 2X2X3 model, we would have the simple treatment of· 1) Simple Report of actual results with no feedback on the impact of decision errors; versus 2) Complex Reports of actual results plus feedback on the impact of decision errors. This approach would greatly simplify the statistical analysis and practically eliminate the degrees of freedom problem encountered in this study.

A second research objective consideration should be the rigorous administration of the decision style tests to all the participants in the experiments. No exceptions should be allowed to occur to give rise to numerous possible questions on the representativeness of the sample; the attributes of excluded subjects; the reduced number of degrees of freedom; the decision styles of subjects willing to be tested (versus those who were unwilling to be tested); etc.

Finally, there is the important research question of which tests to select for a repetition of this experiment. Clearly one should use Rowe's DSI along with the Witkin Embedded Figures test and the Myers-Briggs Type Indicator test. (The main reason for using the Myers-Briggs test is the need to develop a broader base of validation of Rowe's DSI by building on the vast body of research already existing based upon this widely used (tested and validated) Myers-Briggs model.

Another obvious area that needs to be researched further is the cross validation of Rowe's DSI with Driver's IST and/or CXSD tests. There has been a lot of research utilizing Driver's IST test that needs to be validated and correlated with the growing body of research building

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upon Rowe's DSI used in conjunction with the Myers-Briggs model.

In the final analysis, however, the most significant research question that still needs to be answered in an unequivocal way is whether the decision style concept is a significant determinant of performance in an accounting environment. If decision style is important, than it obviously has significance in the design of reporting systems that will minimize the problems created by mismatches between styles and accounting task requiements that inevitably happen in any real world situation. It is too much to hope for that each accounting task is a particular situation will be perfectly matched to the proper cognitive style. Hopefully, however, we will be able to eventually design accounting information systems that will minimize any bad effects from the inevitable decision style mismatches. This has been my primary goal in pursuing this type of research. And now that we have a measuring instrument that clearly measures unique styles (i.e., Rowe's Decision Style Inventory), we now have a real capability to test a new accounting information system to determine whether it, in fact, has any style biases which desirably we might wish to design out of the system.

It seems clear that many of the decision style effects described by Driver, Rowe, Mock, and others do, in fact, exist. More importantly, these style effects are significant and appear to be material enough to warrant consideration in the design and implementation of accounting information (reporting) systems designed to minimize the effects of mismatches between the actual decison styles of accounting managers and the task requirements of their jobs. A more rigorous application of

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the research methodology developed in Ryan's dissertation and furthered in this dissertation should go a long way toward proving once and for all that cognitive style research is a fruitful and essential part of human information processing research.

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APPENDIX A

DRIVER/MOCK DECISION STYLE MODEL

Driver and Mock (1975) propose looking at the individual's informational processing in a two-dimensional system. One dimension is the amount of information used in making a decision, ranging from low-information use to high-information use. The other dimension measures the amount of focusing used in processing that information ranging from single-focus or single-solution orientation to mulitple-focus or multiple solution orientation. The more focused one becomes the fewer solutions one seeks in problem solving.

This decision making model (shown in the following figure) does not seek to differentiate good and bad styles of decision making, only to classify decision makers. A particular decision style does not produce good and bad decisions, rather the interaction between the style and the environment tends to dictate the better style for that environment.

Driver/Mock Model

Information Used	Uni-focus	Multi-focus
High	Hierarchic	Integrative
Low	Decisive	Flexible

Focus

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The styles defined are Decisive, Flexible, Hierarchic, Integrative, and Complex. These names are not meant to imply any bias toward particular styles and should not be taken in that light. The individual decision styles are defined as follows:

The Decisive Style is a fast, action style. A person using this style uses low information and keeps very focused. In this manner, he can handle many problems, one at a time. This person tends to reach very fast decisions in simple environments, although research by Driver and Mock (1975) tends to indicate that if the environment gets too complex, the Decisive will become a slow decision maker. A person using this style is concerned with tight control over a small area. He tends to like the well-defined organization with a minimum of intervention and a minimum of deviation from the rules. He prefers brief discussions and summarized reports leading to action steps to be taken.

The Flexible Style also uses low information input but tends to be diffuse in the use of the information. Many interpretations from the same data are possible from this style. The Flexible style uses a lot of intuitive decisions and tends to dislike rigid organizational control. This style likes a lot of communication with a group but, like the Decisive, the Flexible likes the communication short but from a variety of people. Differing solutions do not bother this style at all. There is a great affinity for committee chairmanship or membership in this style.

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<u>The Hierarchic Style</u> is an information maximizer. This style likes plenty of information and would like to control the information flow. A person using this style tends to use a large amount of information to justify one solution and attempts to develop the "perfect" solution. Where the Flexible style might tend to "satisfice" in arriving at a solution, the Hierarchic style tends to "maximize" in generating a solution. Long, well-thought-out, elaborate solutions are the output of this style. Brief communication is either not tolerated or simply ignored, and the Hierarchic tends to make long thorough reports reaching a single "obvious" conclusion. The Hierarchic does not appreciate alternate solutions as they are viewed as a lack of understanding of the real problem.

<u>The Integrative Style</u> is also an information maximizer. While the person using this style also tends to be a solution maximizer, this style generates many good solutions rather than the "best" solution. This style loves information for information's sake, and it loves to share the information with anyone who will discuss it. Where the Flexible style can generate a new solution from the same information given a second look, the Integrative style can generate almost endless solutions each time it looks at the information. Planning is only for the general direction and can be changed at any time. The Integrative can be highly creative and highly experimental. The style works best in non-hierarchically structured organizations and is an excellent team member. Communication is of a complex and lengthy nature and tends to explore many areas at once.

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The Complex Style is a multiple style. The Decision Style Model suggests that some people will exhibit more than one basic style. While some mixed styles are found in all border areas, the Complex style has been overruling with great consistency. The Complex style is a mix of the Hierarchic and the Integrative styles. This style has the characteristics of both styles on which it borders. It considers all the information it can get and produces multiple solutions. However, unlike the Integrative style, this style can choose the solution it feels is the "best" of all. Other characteristics are shared in much the same way (Driver and Mock, 1975).

Back-up Decision Style is that style which a person falls back on (or resorts to) when he is confronted with "information overload" and/or time pressure which forces him to modify his usual (more relaxed) style of decision making. All sorts of back-up styles are possible. For example, one person might be normally a hierarchic decision maker, whereas under pressure, he will tend to become decisive. Another person might be just the opposite, moving from the decisive style toward the hierarchic style when confronted with information overload.

Integration Style Test(IST)

There are two measures of the decision styles postulated by Driver and Mock: 1) the Driver Decision Style Exercise or Integration Style Test (IST), designed to assess unconscious style; and 2) the Driver-Streufert Complexity Index (CXSD), aimed at measuring one's conscious style. The Driver Integration Style Test was the instrument used in this research project.

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APPENDIX B

MANGERIAL DECISION STYLES*

by Alan J. Rowe

Perhaps one of the most intriguing approaches to understanding the decision maker is the analysis of decision styles. It provides an insight and perspective not previously available for predicting and understanding why managers make decisions the way they do. Decision styles are useful in describing the manager's problem-solving capability as well as the manager's leadership attributes. Because problem solving involves the manager's perceptual and cognitive skills, it is a key element in defining decision styles. On the other hand, because strategy implementation involves the organization and is concerned with the manager's leadership ability, environmental complexity is the other critical element in decision styles. Both factors are used to define a manger's decision style. More othen than not we observe that decision styles form the basis for strategies that are pursued.

Early approaches that were used described the manager's leadership style as being either authoritarian or democratic. Later approaches have dealt with either the amount of power that the manager is willing to share with subordinates or the ability to handle information.

At the outset of the discussion of decision style, two important issues should be treated. The first concern is whether there is a "one

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* Rowe, A., Mason, R., and Dickel, <u>Strategy Management and Business Policy.</u> Addison-Wesley Publishing Co., Reading, Mass., 1982.

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best" style. Closely related to this idea is the second question of "style flexibility". A normative approach to management suggests a "one best" way. However, style appropriateness depends on the particular situation, and it is thus difficult to specify ahead of time a single ideal style. Rather, style flexibility appears to be a more appropriate basis for determining how best to respond to varying and complex situations. On the other hand, a manager's personality or style may be fixed. There are rigid, controlled managers who seldom change, while others can change dramatically. The evidence indicates that some mangers are inherently inflexible, while some are quite flexible and can adapt their style as required by the situation. The factors shown in Table B-1 indicate characteristics thar can be used to distinquish flexible and rigid decision styles. These factors illustrate differences in behavior that can contribute to style flexibility and to a manager's ability to deal with highly ambiguous or changing conditions. Although the flexible style is better at handling complex problems, the rigid style is able to deal with problems that require quick decisions or rapid action.

Cognitive Aspect of Decision Styles

There is growing recognition of the role of conscious goal setting in understanding individual behavior and performance. By examining cognitive processes, one can explain differences in individual thinking, remembering, or perceiving. Cognitive processes describe the learned habits by which people think, process information, utilize their conceptual capability, and respond to stress.

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Cognitive complexity involves the differentiation, which respresents the number of dimensions and individual extracts from data, the ability to articulate, and the fineness of discrimination that one achieves. Integration deals with the complexity of the rules used to combine data and new constructs that are considered. Highly analytical individuals, for example, perceive patterns of data interrelatedness or wholeness. Because people utilize varying constructs to evaluate information, the low-cognitively complex person tends to perceive the environment in terms of a few rigid rules of integration. On the other hand, the individual with high cognitive complexity can easily tolerate ambiguity and contradictory cues.

Decision Styles

Decision styles are only one aspect of a decision situation. It would be unrealistic to expect that styles alone could provide the basis for more effective decision making. Yet when considered in the entire organizational context and as one facet of the decision process, decision styles provide valuable insights for understanding the decision maker, for explaining actions taken, and for relating the individual to the task requirements. Becuase of the importance of styles in decision making, they have been examined in considerable detail and related to the managerial functions of problem solving and leadership. A detailed discussion of the Cognitive-Contingency Model follows:

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TABLE B-1. Style Flexibility

Factor	Rigid style	Flexible style
Tolerance for ambiguity	Low	High
Need for structure	High	Low
Use of power	Authoritarian	Sensitive
Need for control	High	Low
Values that are important	Rules	Honesty
Dealings with others	Expects results	Supportive
Personal orientation	Self	Others

A Cognitive-Contingency Model of Decision Styles

A cognitive-contingency decision style model is shown in Figure B-1. It is based on two principal components· the manager's cognitive style and the manager's environmental concerns. It incorporates the task/people dimension as part of the environmental complexity and develops a distinction between the manager and the leader based on cognitive complexity. As described by Zaleznick (1970), areas that not cognitively complex are considered the maintenance function of management, where the focus is on obtaining results and motivating employees. The more cognitively complex manager deals with ideas and can be considered a leader who is concerned with direction or outlook for the firm.

The right half and the left half of the model in Figure B-1 appear to correspond with the results of research on the left and right hemispheres of the brain. The left hemisphere deals with logical thought, is analytic, processes information serially, and is used for oral and written language. It handles speech, pointing, and smiling as well as the

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abstract logic needed for mathematics. The right hemisphere specialized in intuition and creativity. It perceives things as a whole, has a comprehensive sense of timing, and can encompass many thoughts at the same time (parallel processing of information). It appreciates space, imagery, fantasy, and music. Right-brain thinkers are artistic, and dreams seem to be predominately right-brain functions.

The style descriptions provided below are an attempt to relate the decision making of an individual to the cognitive-thinking domain and to the managerial requirements of dealing with tasks and people. The lower half of Figure B-1 shows the directive and behavioral styles, who prefer structure. The cognitive complexity dimension, which separates the upper and lower half, is used to distinquish the managerial from the leadership functions.

FIGURE B-1. Cognitive-Contingency Decision Style Model

Cognitive complexity	Tolerance for Ambiguity	Analytic	Conceptual
	Need for Structure	Directive	Behavioral
		Technical	Organizational

Environmental Complexity

1. Directive style: This individual has a low tolerance for ambiguity and tends to focus on the technical side of the environmental complexity scale. Generally a person with this style is autocratic and has

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a high need for power. Because they use little information and few alternatives, speed and satisficing are typical of these individuals. Directive people tend to prefer structure and detailed information that is given orally. They also tend to follow procedures and to be aggressive. Their focus is internal to the orgnization and short-range, with tight controls. Although they are effective and logical, they need security and status, and they have the drive required to control and dominate others.

2. Analytic style: This individual has a much higher tolerance for ambiguity than the directive manager. He also has a more cognitively complex personality. These features lead to the desire for more information and consideration of more alternatives than used by the directive style. However, because of the low environmental complexity factor, concern tends to be technically oriented with an autocratic bent. The analytic style is best typified by the ability to adapt to or cope with new situations. This style is oriented to problem solving and strives for the maximum that can be achieved in a given stiuation. An important characteristic of analytic individuals is that they often reach top posts in a company or start their own firms. They enjoy variety and prefer written reports. They value results and enjoy challenges. They tend to be creative and are good at abstract or deductive thinking.

3. Behavioral style: While low on the cognitive complexity scale, this manager has a deep concern for the organization and for the development of people. The behavioral style manager tends to be supportive of people, is concerned with subordinates, and enjoys counseling. Because of receptivity to suggestions, an individual with this

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style communicates easily, shows warmth, is empathetic, uses persuasion, and accepts loose control. With low data input, this style tends toward short- or medium-range focus, using verbal means for communicating. Individuals with this style seek acceptance and are basically people-oriented.

4. Conceptual style: Having both high cognitive complexity and a focus on high environmental complexity, people with this style tend to be systems-oriented with high data usage. They like long elaborate reports and consider many alternatives. As with the supportive style, there is trust and openness in relations and shared goals with subordinates. Conceptual managers tend to be perfectionists who value quality and want to examine many solutions to problems. They tend to be innovative in their solutions and can visualize complex relationships. Their concern is on long-range problems, and they have high organizational commitment. They are achievement-oriented, and they value praise, recognition, and independence. They prefer loose control to power and will use participation frequently.

Although the above categories appear to be distinct and non-overlapping, most managers have characteristics that fall into more than one. The dominant style is the one used most frequently. However, managers have multiple styles, with one often being dominant while the others are backup styles. Current research indicates that the dominant style depends on the context within which a decision is made. Thus, the style categories listed above are intended to describe typical or general

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situations, and another model has to be used to describe the environmental factors (e.g., Rowe's four-force model).

Although any decision style categorization is bound to be only approximate, knowing an individual's dominant style provides a useful reference point. If one can identify the dominant cognitive style and orientation to environmental requirements, decision-making behavior can be better understood.

FIGURE B-2. Expanded Cognitive-Contingency Model

Thinking orientation	Analytic Control Logic Variety	Conceptual Achievement Systems Completeness	Proactive Adaptive Change Evaluative	Leader
Action orientation	Directive Power Structure Speed	Behavioral Support Persuasion Empathy	Reactive Rules Maintenance Verbal	Manager
	Task (Initiating)	People (Organization)		

Another means of examining the four basic styles is shown in Table B-2. The above figure focuses on the differences each style exhibits in terms of the thinking/action and leader/manager dichotomy. The analytic and conceptual styles are more cognitively oriented than the directive or behavioral styles. This is reflected in the approaches they follow, as shown at the right side of Figure B-2. The cognitive-contingency model also can be used to distinguish leader and manager behavior. Thus the upper half of the table shows leaders, who are proactive and change-oriented. The lower half focuses primarily on

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the maintenance activities used by managers to ensure organizational performance.

The reaction of each style to stress, motivation, and perception provides another basis for understanding decision makers. This is related to the four styles, as shown in Figure B-2.

TABLE B-2. Managerial Style Reactions

Basic style:	Under stress:	Is motivated by:	Reacts to stimuli by using:	Stimuli are seen:
Directive	Becomes annoyed	Power/ status	Precepts	Serially
Analytic	Follows rules	Challenge	Insight	Logically
Behavioral	Avoids	Acceptance	Instinct	Behaviorally
Conceptual	Is erratic	Recognition	Intuition	Relationally

One would not expect managers to fit neatly into one category; yet the typical manager has a dominant style with at least one, and often two, backup styles. For example, a group of twenty-six presidents who took the cognitive-contingency inventory provided in Figure B-3 had almost equal scores in all four categories. The implication is that young presidents have considerable flexibility and find little difficulty in changing from one style to another as the situation warrants.

The decision style inventory in Figure B-3 includes twenty questions referring to the different criteria discussed. While this inventory may not capture all aspects of decision style, it will nevertheless provide a good indication of a person's style.

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Figure B-3

Decision Style Inventory Name ______________________________

The following decision style inventory is used to determine the manager's self-perception in terms of the cognitive-contingency model. Each question is answered by assigning an 8 to the answer that is most appropriate, a 4 to the next most appropriate answer, then a 2, and finally a 1 for the least appropriate answer. For example, in the first question an individual may want to assign an 8 to "be recognized for my work," a 4 to "have a position with status," a 2 to "feel secure," and a 1 to "be outstanding in my field." Remember that each score can be assigned only once to each question. In other words, all four numbers, 8, 4, 2, and 1, *must* be used for each question. Do *not* repeat any of these four numbers for any one question. Thus using two 8s would not be a correct response to any given question..

One should relax when filling in the inventory and recognize that it reflects one's self-image. There are *no* right or wrong answers. Each person is different and will, therefore, score the questions differently. Generally the first answer that comes to mind is the best to put down.

Decision Style Inventory III*

Please score the following questions based on the instructions given. Your score reflects *how you see yourself*, not what you believe is correct or desirable, as related to your work situation.

1. MY PRIME OBJECTIVE IS TO:	HAVE A POSITION WITH STATUS		BE THE BEST IN MY FIELD		ACHIEVE RECOGNITION FOR MY WORK		FEEL SECURE IN MY JOB	
2. I ENJOY JOBS THAT:	ARE TECHNICAL & WELL DEFINED		HAVE CONSIDERABLE VARIETY		ALLOW INDEPENDENT ACTION		INVOLVE PEOPLE	
3. I EXPECT PEOPLE WORKING FOR ME TO BE:	PRODUCTIVE AND FAST		HIGHLY CAPABLE		COMMITTED AND RESPONSIVE		RECEPTIVE TO SUGGESTIONS	
4. IN MY JOB, I LOOK FOR	PRACTICAL RESULTS		THE BEST SOLUTIONS		NEW APPROACHES OR IDEAS		GOOD WORKING CONDITIONS	
5. I COMMUNICATE BEST WITH OTHERS	ORALLY AND DIRECT		IN WRITING		BY HAVING A DISCUSSION		IN A GROUP MEETING	
6. IN MY PLANNING I EMPHASIZE:	CURRENT NEEDS		MEETING OBJECTIVES		FUTURE GOALS		ORGANIZATIONAL NEEDS	
7. WHEN FACED WITH SOLVING A PROBLEM, I:	RELY ON PROVEN APPROACHES		APPLY CAREFUL ANALYSIS		LOOK FOR CREATIVE APPROACHES		RELY ON MY FEELINGS	
8. WHEN USING INFORMATION I PREFER	SPECIFIC FACTS		ACCURATE AND COMPLETE DATA		BROAD COVERAGE OF MANY OPTIONS		LIMITED DATA EASILY UNDERSTOOD	
9. WHEN I AM UNCERTAIN ABOUT WHAT TO DO, I:	RELY ON HUNCH AND INTUITION		SEARCH FOR FACTS		EXPLORE A POSSIBLE COMPROMISE		DELAY MAKING A DECISION	
10. WHENEVER POSSIBLE, I AVOID	LONG DEBATES		INCOMPLETE WORK		USING NUMBERS OR FORMULAS		CONFLICT WITH OTHERS	
11. I AM ESPECIALLY GOOD AT:	REMEMBERING DATES & FACTS		SOLVING DIFFICULT PROBLEMS		SEEING MANY POSSIBILITIES		INTERACTING WITH OTHERS	
12. WHEN TIME IS IMPORTANT, I:	DECIDE AND ACT QUICKLY		FOLLOW PLANS AND PRIORITIES		REFUSE TO BE PRESSURED		SEEK GUIDANCE OR SUPPORT	
13. IN SOCIAL SETTINGS I GENERALLY	SPEAK WITH OTHERS		THINK ABOUT WHAT IS BEING SAID		OBSERVE WHAT IS GOING ON		LISTEN TO THE CONVERSATION	
14. I AM GOOD AT REMEMBERING:	PEOPLE'S NAMES		PLACES WE MET		PEOPLE'S FACES		PEOPLE'S PERSONALITY	
15. THE WORK I DO PROVIDES ME:	THE POWER TO INFLUENCE OTHERS		CHALLENGING ASSIGNMENTS		ACHIEVING MY PERSONAL GOALS		ACCEPTANCE BY THE GROUP	
16. I WORK WELL WITH THOSE WHO ARE:	ENERGETIC & AMBITIOUS		PUNCTUAL & CONFIDENT		CURIOUS & OPEN MINDED		POLITE & TRUSTING	
17. WHEN UNDER STRESS, I:	BECOME ANXIOUS		CONCENTRATE ON THE PROBLEM		BECOME FRUSTRATED OR ANNOYED		AM CONCERNED OR FORGETFUL	
18. OTHERS CONSIDER ME:	AGGRESSIVE & DOMINEERING		DISCIPLINED & PRECISE		IMAGINATIVE AN PERFECTIONIST		SUPPORTIVE & COMPASSIONATE	
19. MY DECISIONS ARE:	REALISTIC & IMPERSONAL		SYSTEMATIC & ABSTRACT		BROAD AND FLEXIBLE		SENSITIVE TO THE NEEDS OF OTHERS	
20. I DISLIKE:	LOSING CONTROL		BORING WORK		FOLLOWING RULES		BEING REJECTED	

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APPENDIX C

MYERS-BRIGGS TYPE INDICATOR TEST

Developed from Jung's personality typology, the Myers-Briggs Type Indicator Test (MBTI) has been used by a large number of HIP researchers to measure the cognitive style of a decision maker. Jung postulated that a person's cognitive ability could be determined through the evaluation of self-perspection in these four scales: extraversion-introversion (E-I), sensation-intuition (S-N), thinking-feeling (T-F), and judgement-perception (J-P).

Jung argued that seemingly random variations in human behavior are actually quite orderly and constant. This concept is based on the assumption that people are creatures of habit, having natural preference within the extremes of the four scales which Jung proposed.

Four Personality Scales

The four personality scales proposed by Jung are·

1. Extraversion-introversion (E-I) measures one's view of life. An extraverted individual is a person oriented and concerned with the events occuring around him. Introverts are inwardly oriented, often being controlled by the environment.

2. Sensation-intuition (S-N) measures one's perception of stimuli. A sensing type is concerned with certainty and is often involved with details. An intuition type follows hunches, tolerates uncertainty, and deals with abstractions.

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3. Thinking-feeling (T-F) measures one's style of decision making. A thinking individual is analytical and he prefers to deal with objective tasks. A feeling type is more people oriented and prefers subjective tasks.

4. Judging-perceptive (J-P) measures a person's preference in dealing with life. The judging type wants to regulate life and control it. The perceptive type, on the other hand is flexible and prefers spontaneous life.

Scoring

To determine habitual preferences between the two poles of each scale, questions on the MBTI test are set up in a forced form. The indicator yields two types of scores for each person. One is a dichotomous score where the person is typed in four dichotomous type categories. The other score is the continuous score which is the translation of the four individual scores into a single overall measure.

Intercorrelations of Type-Category Scores

Stricker and Ross (1963) and Webb (1964) studied MBTI type categories. The results of these studies confirmed independence of the E-I, S-N, and T-F scales but S-N and J-P categories were found to measure the same characteristics of personality. Additionally, the studies by Madison, Wilder, and Suddiford (1963), Myers (1962), Richek (1969), Schmidt and Fretz (1965), and Stricker, Schiffman and Ross (1965) confirm the above findings that the E-I, S-N, and T-F scales are actually

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three independent personality dimensions.

Retest Results of MBTI

Studies of Levy, Murphy and Carlson (1972), Stalcup (1968), and Stricker and Ross (1964a) involved college students; and the study by Wright (1966) involved elementary school teachers. The subjects were retested after a period of six years to determine the stability of type category scores. In every case the agreement was significantly greater than would be expected by chance.

Validity of the Myers-Briggs Type Indicator

Three types of validity studies have been published, dealing with the problems of: Extraversion-Introversion validity; Sensing-Intuition validity; and Thinking-Feeling validity.

Extraversion-Introversion Validity

Extraverted types appear to like action and getting involved in new situations. Myers (1962); Ross (1966); Webb (1964); and Stricker and Ross (1962) studies concluded that extraverted types tend to be talkative, gregarious and impulsive. These studies also indicate that introverted types would rather reflect before acting, and they enjoy working alone. Stricker and Ross (1964) studied the career preferences of these two personality types. The results confirmed earlier assumptions of these personality types. Extraverts prefer working with others and are attracted to such vocations as selling and social work. Introverts, on the

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other hand, prefer a career in a technical field which often has them working alone.

Sensing-Intuition Validity

McCaulley and Natter (1974) research indicates that a preference for sensing leads to an interest in what is solid and real. The sensing type has a factual orientation and a strong need for order. Stricker and Ross (1964b) suggest that sensing types are attracted to careers in banking, sales, and police work. Intuition types appear to be stimulated by novelty and chance. The intuitors prefer to use their minds and have considerable tolerance for complexity (Stricker and Ross, 1962). They usually prefer professional vocations which allow them more autonomy, such as writers, scientists, and musicians (Stricker and Ross, 1964b).

Thinking-Feeling Validity

Thinking types tend to be objective and analytical in making a decision. They are generally attracted to vocations which require logical thinking such as scientific, technical, and business professions (Stricker and Ross, 1964b).

Feeling types appear to be extremely interested in human values and interpersonal relationships. They tend to be attracted to the helping professions, such as teaching, counseling, customer relations, social work, and the ministry (Stricker and Ross, 1964b).

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Predictive Validity

Conary (1966), Godschmidt (1967), and Stricker et al. (1965) studied the MBTI indicator's ability to predict choice of a student's major along with his success in college. These researchers concluded that the MBTI test has a moderate predictive validity.

Recent Research Using MBTI

While not focusing on decision making per se, Mitroff and Kilner (1976) used the MBTI in a content analysis of manager's stories about their "ideal organizations". The findings are summarized below:

Personality type	Ideal Organization
ST	Rigid organizational structure, impersonal.
NT	Broad, global orgainzation. A "theoretical" organization, idealistic, and "impersonal".
NF	Global theories, but they focus on general personal and humanistic values.
SF	Rigid organizational structure, that focuses on personal and human relationships.

Henderson and Nutt (1980) explored the effect of decision style on a decision maker's perception of risk and his inclination to adopt capital expansion project. They have found a strong correlation between the choices made by executives and cognitive style. They concluded that SF executives like to confront the uncertainty while ST executives preferred to defer action and/or to analyze the uncertainty. They speculate that the participation of ST and SF executives in the same

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decision making situation may be the main cause of conflicts in decision making.

Dickson, Senn and Chervany (1977) studied the relationship between a vecision maker's cognitive style (i.e., analytic versus heuristic) and MIS utilization. They have found a positive correlation between these two variables.

Behling, Gifford and Tolliver (1980) showed that "intuitives" bet significantly larger amounts of money than "sensors", regardless of how information was provided. Apparently, they are willing to take more risks and/or perceive less risk than sensors do.

Myers-Briggs Type Indicator Decision Model

The Myers-Briggs Type Indicator test measures significant differences in personality that are accounted for by alternate mental functioning. This approach to cognitive (decision) styles is based on Jung's premise that people use different ways to perceive things, people, or ideas and use differing judgments in arriving at conclusions concerning what has been perceived. Jung defined two ways of perceiving and two ways of judging as follows:

1. Perceiving by: a)sensing things directly, or
   b)intuition based on unconscious ideas or associations.

2. Judging by: a)logical, impersonal processes, or
   b)the use of feeling or subjective values

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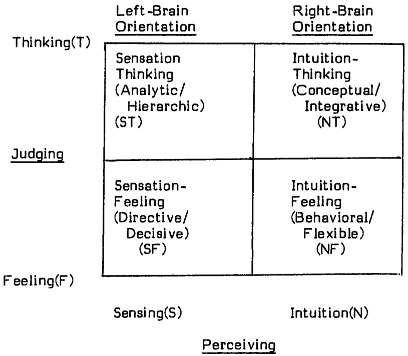
In addition to the four basic categories, two other aspects were added. The first is the introvert-extrovert dichotomy where perception and judgment focus either on concepts or ideas rather than people and things. The second is termed the "shadow side", which can be construed either as a back-up style or behavior under stress because of suppression of conscious thinking. Diagramatically, the Jung model is shown below:



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Rowe's Decision Style Inventory (DSI) versus Myers-Briggs Type Indicator

Rowe's DSI measures cognitive styles along two dimensions: cognitive complexity and environmental complexity. The DSI classifies a subject into one of four cognitive styles: directive, analytic, conceptual, or behavioral.

The MBTI test's thinking-feeling and sensing-intuition scales seem to parallel the cognitive complexity and environmental complexity dimensions of Rowe's Cognitive-Contingency model shown in Figure C-1. Further, cognitive complexity can be divided into two separate orientations: thinking and action. A thinking person is one who likes to control his environment. An action oriented individual prefers to manage, desiring rules and maintaining status quo.

Figure C-1

Cognitive-contingency Decision Style Model

Cognitive Complexity		Technical	Organizational
	Tolerance for Ambiguity	Analytic (ST)	Conceptual (NT)
	Needfor Structure	Directive (SF)	Behavioral (NF)

Environmental Complexity

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In this model the SF individual relies mainly on facts and makes decisions using impersonal analysis based on a serial, logical process of reasoning. This category matches the directive style of the cognitive-contingency model. The NF person relies on senses for perceiving but prefers feeling as the basis of judging. They are warm and are more interested in facts about people than things. This matches the behavioral category. The ST individual uses intuition for perception, but they focus on technical, impersonal analysis. This corresponds to the analytic category. Finally, the NT person prefers intuition and focuses on new possibilities. They exhibit warmth and commitment and communicate easily. This last category is comparable to the conceptual in the cognitive-contingency model. The correspondence between the two models offers further support for the utility of the cognitive approach.

The similarities between the MBTI and Rowe's models are shown in Table C-1.

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TABLE C-1

Personality characteristics	DSI	MBTI
Proactive	A,C	E,N
Adaptive	A,C	E,N
Change	A,C	E,N
Evaluate	A,C	I,S
Reactive	D,B	I,S
Rules	D,B	T,S
Maintenance	D,B	T,S
Verbal	D,B	N,E
Logical	D,A	T,S
Analytical	D,A	T,S
Speed	D,B	F,N
Intuitive	C	F,N
People-oriented	C,B	E,N,F
Task-oriented	D,A	I

A - Analytic
B - Behavioral
C - Conceptual
D - Directive

E - Extravert
I - Introvert
T - Thinking
F - Feeling
S - Sensing
N - Intuitive

Since MBTI is a bipolar instrument, the corresponding two dimensions in Rowe's model are compared. The results of this matching process yield Table C-1. The two tests are compared for the common personality characteristics which they both measure.

Just from a simple observation, one can see the differences between the two tests. Rowe contends that analytics are pro-active. This characteristic is found in MBTI's intuitives and extraverts. Analytics and intuitives are clearly at two opposite extremes but following both of these models' definition, the overlapping occurs. This seems to suggest incompatibility between these two tests.

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APPENDIX D

WITKIN EMBEDDED FIGURE TEST

The Witkin Embedded Figure Test (EFT) is often used to measure a subject's analytic abilities. The test presents a series of geometric figures, each of which contains embedded figures that the subject must find. In the first part of the test, the subject is shown the figure's size, shape, and direction. Then, the subject is given a picture from which the figure, shown in the first part, is to be located. The subject is scored on the number of correct figures he locates and/or the amount of time it takes him to find the figures.

The test was developed originally to measure two behavioral styles called field independence (FI) and field dependence (FD). A field independent person locates more of the embedded figures while a field dependent individual has difficulty in identifying figures.

Witkin's Research

According to Witkin et al. (1962, 1971) the ability to "break-up" a basic configuration is related not only to the subject's perception but also his/her problem solving style.

> "The cognitive style approaches perceptual and intellectual activities from the perspective of the person engaged in them. persuit of this has demonstrated that an individual shows the same characteristic ways of functioning across these activities, suggesting that the classical division between the perceptual and the intellectual needs to be relaxed." (Witkin et al., 1971, p.7-8)

Other Research

A number of subsequent research studies, such as Lusk (1973), Doktor and Hamilton (1973), Benbasat (1978), and Bariff and Lusk (1977)

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have extended the broad interpretation of the field-independent style to also imply higher analytical reasoning. Furthermore, Benbasat (1979) found support of the use of the Embedded Figure Test in this more extended interpretation.

The Witkin Embedded Figure Test has been widely used in research in human information processing. Lusk (1973) used the EFT to determine whether the analyst is more analytical than students. He found that the cognitive style/report format interation affects only those inexperienced in making the task division.

Lusk interpreted these findings to mean that the work environment affects the cognitive style used. Doktor and Hamilton (1973) wanted to know how cognitive style affects the acceptance of recommendations. Using the EFT, the students and managers in this test were classified into high analytic and low analytic categories. These subjects were presented with two recommendations, one general and one analytic. They found that no relationship exists between cognitive style and the information format.

Recent Research

Benbasat and Dexter (1978) conducted an experiment using the EFT in an experiment designed to observe the relation between the decision maker's behavioral performance and his information use. This research was one of the first findings to support the interaction between cognitive style and the information format.

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Conclusion

The planned used of the EFT to classify decisives in high and low analytic categories may not produce useful results. This conclusion appears to be supported by recent research on the left and right hemisphere of the brain. According to Rowe (1982), the right hemisphere perceives things as a whole, has a comprehensive sense of timing, and can encompass many thoughts at the same time (parallel processing of information). This explanation of right hemisphere thinking appears to parallel the concept of field dependence (vs. field independence). Furthermore, the concept of field dependence also appears to parallel Driver's notion of focus, and since decisives focus on one alternative at time, it would appear that decisives are left-brain oriented (or field independent) and analytical in orientation. On the other hand, based upon the definition by Dermer (1977) that the analytic person is one who prefers more information, the EFT may serve only to confirm the analytical ability of the hierarchic decision maker. There is some indication, based upon recent research by Mann (1982), that Rowe's analytic style is indeed more field independent than the directive style. This also appears to have been the case in research reported on by Mock and Vasarhelyi (1976) where the decisive decision maker tends to be classified as low analytic and hierarchic tend to be classified as high analytics. If this is the case, then the EFT test may serve to further sharpen our categorization of "decisive" decision makers.

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APPENDIX E

CHARACTERISTICS OF ANALYTICS AND HEURISTICS

The concept of "cognitive style", introduced by Witkin (1964), is closely related to a person's analytical capability. This link is between cognitive or decision-making style and a person's analytical capability was substantiated by Huysmans (1970) in his research into the nature of cognitive style and its influence on the problem-solving behavior of management scientists. The early research suggested a strong relationship between thought (cognitive) processes and the nature of the researcher-management interface in the implementation of operations research projects.

The term "cognitive style" is used to refer to the characteristic, self-consistent way of functioning that an individual exhibits across perceptual and intellectual activities. Huysmans' study was the first HIP research to measure the impact of cognitive style differences between management scientists and managers in the process of implementing the recommendations of an operations research project. Huysmans distinguished his subjects into analytic and heuristic ways of reasoning after observing the subject's behavior in three complex problem-solving situations.

In order to categorize his subjects in these two styles of reasoning, Huysmans defined the characteristics expected from each of the cognitive styles. He described analytics as follows:

> The analytic decision maker reduces problem situations to a core set of underlying causal relationships.... (When

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> making decisions, he prefers to use more or less explicit models, often stated in quantitative terms, to form the basis for each decision."

In addition, Huysmans concluded that analytics place lesser importance on unquantifiable information. Analytics also are considered to be data maximizers in search of the optimal solution.

Heuristics are the opposite of the analytical style of reasoning. Instead of searching for causal relationships:

> "The heuristic decision maker searches for analogies with familiar solved problems rather than for a system of underlying causal relationships, which is often thought illusory.... The resulting decision can be characterized by its emphasis on consistency with internal and external environment, in contrast with the decision of an analytic reasoner who emphasizes optimality."

According to Huysmans' definition, the heuristic seeks to satisfice or compromise in deriving at a solution, compared to an analytic who consumes additional data to develop an optimal solution.

Research in Analytical Thinking

Most of the recent HIP research in cognitive styles and management decision making incorporates the concept of analytic/ heuristic reasoning in classifying the subjects. Mock (1972) and Vasarhelyi (1977) adopted Huysmans' definition of high analytic and low analytic (heuristic) in their own HIP research.

Mock (1972) studied the relationships between information structures, decision approaches and the learning patterns of decision makers. In a set of controlled laboratory experiments, businessmen and student subjects reach a set of micro-economic business decisions for 15

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simulated time periods. The subjects were presented with two different information structures: The first structure (I_1) communicated real-time information about the decision environment, whereas a second information structure (I_2) presented lagged information reflective of the previous period.

Mock's study followed Huysmans' method of testing the subject's cognitive style by observing their behaviors. His findings relevant to this discussion are:

a. Analytics can be expected to out-perform heuristics in terms of profits.

b. Analytics can be expected to out-perform heuristics in terms of input cost minimization.

c. Initially, analytics are expected to require additional decision time.

d. Rates of learning measured in terms of profit improvement are not expected to differ between analytics and heuristics.

Other finds in Mock's study are shown in Table 1.

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TABLE 1

Summary of Hypothesis Tests

Main hypotheses	Decision periods considered	t or F statistics under null hypothesis	Null hypothesis rejected or accepted	Main hypothesis supported or not supported
H_1: Analytics can be expected to outperform heuristics in terms of profits	4–15	$t = 1.95$	Rejected ($\alpha = .025$)	H_1 supported
H_2: Analytics can be expected to outperform heuristics in terms of input cost minimization	4–15	$t = -4.26$	Rejected ($\alpha = .025$)	H_2 supported
H_3: Initially, analytics are expected to require additional decision time	2–8	$t = 1.86$	Rejected ($\alpha = .05$)	H_3 supported
H_4: During latter periods, analytics are expected to require less decision time	9–15	$t = .81$	Accepted	H_4 not supported
H_5: Rates of learning measured in terms of profit improvement are not expected to differ between analytics and heuristics	4–15	$F = 1.8$ (analytics) $F = .006$ (heuristics)	Regressions were not significant. Therefore no learning was evident.	H_5 supported
H_6: Rate of learning measured in terms of economics in decision time are initially expected to be larger for analytics	2–9	$F = -.0031$	Accepted	H_6 not supported
H_9: I_1 subjects are expected to require less decision time	2–15	$t = 1.89$	Rejected ($\alpha = .025$)	H_9 not supported
H_{10}: No significant learning differences are expected between I_1 and I_2 subjects when learning is measured in terms of changes in profits.	4–15	$F = .08$ (I_1) $F = .008$ (I_2)	Regressions were not significant. Therefore no learning was evident.	H_{10} supported
H_{11}: No significant learning differences are expected between I_1 and I_2 subjects when learning is measured in terms of rate of decrease in decision time	2–9	$F = -.0014$	Accepted	H_{11} supported

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Vasarhelyi (1977) extended cognitive style considerations in a decision context to such factors of decision process as information quantity and utilization, as well as the subject's background. In his research, the behavioral observation is used to classify the subjects into analytics and heuristics.

Some of the significant findings by Vasarhelyi (1977) were:

a. Analytics utilize computers in planning more than heuristics.

b. Heuristics will more often express their concern for the lack of flexibility of a man-machine system than analytics.

c. Heuristics utilize less information than analytics.

d. Heuristics make decisions faster than analytics.

Others findings by Vasarhelyi are shown in Table 2.

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TABLE 2

Summary of Hypothesis Tests

Description	Test results	Null hypothesis supported	Significance level	Stated hypothesis supported
(1) Analytics will utilize the structured part of the IPS to a greater extent than heuristics.	$t = .11$ 33df $t = .74$ 11df (strict)	Yes	Not Significant	No
(2) Heuristics will utilize the unstructured part of the IPS to a greater extent than analytics.	$t = .12$ 33df $t = .75$ 11df (strict)	Yes	Not Significant	No
(3) Analytics and heuristics will perform equally in planning.	Mann-Whitney $n_1 = 13$ $n_2 = 22$ $u = 22$ $z = .7638$	Yes	Not Significant	Yes
(4) Heuristics will utilize qualitative information more than analytics.	$t = .7066$ Mann-Whitney $u = 127$ $z = .336$	Yes	Not Significant	No
(5) Heuristics will utilize quantitative information less than analytics	$t = 1.186$ 33df	Yes	Not Significant	No
(6) Heuristics will utilize less information than analytics.	$t = 1.342$ 33df	No	.1	Yes
(7) Heuristics will make decisions faster than analytics.	$t = .58$ 33df (general) $t = 1.4$ 11df (strict)	Partially	Not Significant .1	Partially
(8) Experienced computer users will change their attitudes toward computers less than the inexperienced users.	$t = 1.34$ 31df	No	.1	Yes
(9) There will be a positive relationship between education and performance.	Spearman Rho = .295	No	.025	Yes
(10) Analytics will like utilizing computers in planning more than heuristics.	$t = 1.32$ 33df (pre) $t = 1.14$ (post)	No	.1	Yes
(11) Analytics will be less impressed with the "power" of the computer as a decision tool than will be the heuristics.	$t = .041$ 33df	Yes	Not Significant	No
(12) Heuristics will more often express their concern for the lack of flexibility of a man-machine system than analytics.	$t = 1.617$ 33df Mann-Whitney	No	.05	Yes
(13) Analytics will have less difficulty in using the IPS than heuristics.	$t = 1.23$ 33df	Yes	Not Significant	No
(14) Exposure to the IPS will make users more inclined toward man-machine planning systems.	paired $t = 3.817$ 40df	No	.01	Yes
(15) Exposure to the IPS will make users more aware of the possibilities of creative utilization of computers.	paired $t = 2.773$ 40df	No	.01	Yes
(16) There will be no differences in performance related to sex.	Mann-Whitney $u = 124$ $n = .54$	Yes	Not Significant	Yes
(17) There will be no differences in performance related to type of recruitment.	Mann-Whitney $u = 206$ $n = -.538$	Yes	Not Significant	Yes
(18) Individual users will utilize less information than their prior expectations.	paired $t = 4.597$ 40df	No	.01	Yes

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Analysis

In testing a managers decision approach, assumptions must be made as to the approach he takes in reaching a decision. Although the actual process that a manager's mind goes through cannot be observed, the person's analytical ability can be tested from observing his behavior. In other words, we are testing Huysmans' conception of an analytic as being a data maximizer in search of an optimal solution. Huysmans also suggested that analytics are more structured in their thinking and , therefore, will more often use a model or a computer program to form decision. Compared to analytics, heuristics are then considered to be more intuitive, disliking the structured decision making process. (If we can accept that analytics prefer working with models and computers, then the opposite also might be true that heuristics can be expected to dislike working with computers!)

Interestingly, most of the characteristics of Huysmans' definition (1970) were the subject of research by Mock (1972) and Vasarhelyi (1977). While these studies weakly supported the validity of Huysmans' definition, the actual findings lacked significance to firmly support the dichotomous concept of analytics vs. heuristics. Thus, if one interprets these results in a different perspective, the findings suggest that the above definitions are actually the "extremes" of a dichotomy, and most decision makers fall somewhere in between these extremes.

It seems clear that the underlying premise of most research on cognitive styles and human information processing is that the decision maker is dominantly one cognitive style, and that basically he does not

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switch to other styles. Following this line of reasoning, an information processing system should be customed to the special needs of the decision maker, not the other way around. However, an alternative consideration is suggested by McKenney:

> Most individuals would seem to have the capacity to analyze situations in all modes of behavior. However, past processes, training and individual tendencies would indicate that most individuals have the propensity or habits of analyzing tasks for which they have a normal professional role, in one mode or other....

A Conclusion

Much of the recent cognitive style research suggests that decision makers who characteristically or spontaneously use an intuitive approach are also capable to being systematic, and vice versa. If this assertion is true, then the basis for future research should be refocused to examine such considerations as the case of switching one's cognitive style versus the case of designing customized information systems.

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APPENDIX F

COGNITIVE STYLE MEASUREMENT INSTRUMENTS

The following cognitive style measuring instruments are included in Appendix F:

1. Purdue-Rutgers Prior Experience Inventory

2. Rotter Internal/External Locus of Control Test

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PURDUE - RUTGERS PRIOR EXPERIENCE INVENTORY

The following questions are designed to assess some of your important past experiences.

Please read each item, then blacken on your answer sheet the one number on the scale to the right which best indicates how frequently that item has occurred in your past experience.

For example:

	Very frequently true				Not at all true
A. In riding through the park, I had interesting thoughts.	5	4	3	2	1

If you never had interesting thoughts, you would blacken the "1" on your answer sheet; if you had interesting thoughts half the time, the "3" position would be blackened on your answer sheet; and so on. If there are any questions, please raise your hand.

PLEASE DO NOT MARK THE BOOKLET.
MARK ONLY YOUR ANSWER SHEET.

HOW FREQUENTLY TRUE TO YOUR EXPERIENCE

	Very frequently true				Not at all true
1. In general, in reviewing your past experience, would you say that you usually like to avoid problems in general.	5	4	3	2	1
2. In general, in reviewing your past experience, would you say that you usually like to solve little problems but avoid larger ones.	5	4	3	2	1
3. In general, in reviewing your past experience, would you say that you usually like to solve major, lengthy problems.	5	4	3	2	1
4. In general, in reviewing your past experience, would you say that you usually like to find new problems to solve.	5	4	3	2	1
5. Generally, I have found that slight frustration gets me quite upset.	5	4	3	2	1
6. Generally I have found that minor frustration doesn't bother me but when a major plan fails, I am greatly disturbed.	5	4	3	2	1
7. Generally I have found that I can laugh at minor frustrations as long as major plans are working out.	5	4	3	2	1

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8.	Generally I have found that as long as I have some major plan working out, I don't get too bothered by other important things going wrong.	5	4	3	2	1
9.	Generally I have found that I don't worry about failures too much.	5	4	3	2	1
10.	If you had your way, would you like to know exactly what lay in store in the future.	5	4	3	2	1
11.	If you had your way, would you like to know pretty much what to expect in the years ahead.	5	4	3	2	1
12.	If you had your way, would you like to know just a general idea of future developments.	5	4	3	2	1
13.	If you had your way, would you like to know nothing for certain, only some hints as to future possibilities.	5	4	3	2	1
14.	If you had your way, would you like to know nothing of the future.	5	4	3	2	1
15.	With respect to my recent tastes in movies, TV or reading, I have often sought extremely unusual, novel forms of entertainment such as science fiction or fantasy.	5	4	3	2	1
16.	With respect to my recent tastes in movies, TV or reading, I have often sought moderately novel entertainment, such as accounts of events in remote places.	5	4	3	2	1
17.	With respect to my recent tastes in movies, TV or reading, I have often sought material which is somewhat novel but also familiar, such as mysteries and biographical or documentary pieces.	5	4	3	2	1

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18. With respect to my recent tastes in movies, TV or reading, I have often sought material which is mostly familiar to me, such as Westerns.	5	4	3	2	1
19. With respect to my recent tastes in movies, TV or reading, I have often sought material which is extremely familiar, such as present-day romances or situation comedies.	5	4	3	2	1
20. I watch TV programs that emphasize weird and bizarre humor.	5	4	3	2	1
21. I watch TV programs that emphasize satirical and unconventional humor.	5	4	3	2	1
22. I watch TV programs that emphasize stand-up comics.	5	4	3	2	1
23. I watch TV programs that emphasize slapstick humor.	5	4	3	2	1
24. I watch TV programs that emphasize traditional, "down home" humor.	5	4	3	2	1
25. If I had a choice of games, I would select one which had a 100% chance of winning.	5	4	3	2	1
26. If I had a choice of games, I would select one which had an 80% chance of winning.	5	4	3	2	1
27. If I had a choice of games, I would select one which had a 60% chance of winning.	5	4	3	2	1
28. If I had a choice of games, I would select one which had a 40% chance of winning.	5	4	3	2	1
29. If I had a choice of games, I would select one which had a 20% chance of winning.	5	4	3	2	1
30. When I lose at a game such as cards or a team sport which I had expected to win, I am usually pretty cheerful.	5	4	3	2	1

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31.	When I lose at a game such as cards or a team sport which I had expected to win, I am usually not at all bothered.	5	4	3	2	1
32.	When I lose at a game such as cards or a team sport which I had expected to win, I am usually slightly bothered.	5	4	3	2	1
33.	When I lose at a game such as cards or a team sport which I had expected to win, I am usually moderately annoyed, at least at first.	5	4	3	2	1
34.	When I lose at a game such as cards or a team sport which I had expected to win, I am usually extremely angry although I usually get over it quickly enough.	5	4	3	2	1
35.	I am very hopeful that in my lifetime I can rapidly attain an eminent position and then sit back and enjoy it.	5	4	3	2	1
36.	I am very hopeful that in my lifetime I can continuously strive with total success for increasingly more important positions.	5	4	3	2	1
37.	I am very hopeful that in my lifetime I can continuously strive with at least some success at a variety of important jobs.	5	4	3	2	1
38.	I am very hopeful that in my lifetime I can find a good stable position with guaranteed advancement.	5	4	3	2	1
39.	I am very hopeful that in my lifetime I can find a compatible job that I enjoy regardless of its "importance."	5	4	3	2	1
40.	On the average, with respect to my high school grades, I was extremely satisfied.	5	4	3	2	1
41.	On the average, with respect to my high school grades, I was quite satisfied.	5	4	3	2	1

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42. On the average, with respect to my high school grades, I was about as satisfied at some times as I'm dissatisfied at other times.	5	4	3	2	1
43. On the average, with respect to my high school grades, I was quite dissatisfied.	5	4	3	2	1
44. On the average, with respect to my high school grades, I was very dissatisfied.	5	4	3	2	1
45. When someone has disagreed with me in a discussion, I have usually felt a strong negative reaction no matter who it is.	5	4	3	2	1
46. When someone has disagreed with me in a discussion, I have usually felt considerable hostility unless it was a friend or someone I respected.	5	4	3	2	1
47. When someone has disagreed with me in a discussion, I have usually felt dislike, unless it was a matter of little concern to me.	5	4	3	2	1
48. When someone has disagreed with me in a discussion, I have usually felt mild interest if it was not too important.	5	4	3	2	1
49. When someone has disagreed with me in a discussion, I have usually felt great interest if it was not too critical.	5	4	3	2	1
50. When someone has disagreed with me in a discussion, I have usually felt considerable interest no matter what the importance of the topic.	5	4	3	2	1
51. Generally speaking, when I have come into a situation where I have not had any clear idea what would happen or how I should act, I have been extremely disturbed.	5	4	3	2	1
52. Generally speaking, when I have come into a situation where I have not had any clear idea what would happen or how I should act, I have been somewhat upset.	5	4	3	2	1

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53.	Generally speaking, when I have come into a situation where I have not had any clear idea what would happen or how I should act, I have been slightly upset.	5	4	3	2	1
54.	Generally speaking, when I have come into a situation where I have not had any clear idea what would happen or how I should act, I have been unperturbed.	5	4	3	2	1
55.	Generally speaking, when I have come into a situation where I have not had any clear idea what would happen or how I should act, I have been slightly interested, but not upset.	5	4	3	2	1
56.	Generally speaking, when I have come into a situation where I have not had any clear idea what would happen or how I should act, I have been quite fascinated.	5	4	3	2	1
57.	With regard to my daily activities, I have rarely changed my daily routine in the last few years.	5	4	3	2	1
58.	With regard to my daily activities, I have changed some minor aspects from time to time.	5	4	3	2	1
59.	With regard to my daily activities, I change some aspects rather frequently.	5	4	3	2	1
60.	With regard to my daily activities, I make major revisions from time to time.	5	4	3	2	1
61.	With regard to my daily activities, I have sought to vary my routine as much as possible.	5	4	3	2	1
62.	With regard to my daily activities, I would have had no fixed routine, if at all possible.	5	4	3	2	1
63.	When I have thought about life at present, I'd rather have lived in the more exciting and unpredictable days of old.	5	4	3	2	1

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64. When I have thought about life at present, I'd rather return to the more predictable days of old.	5	4	3	2	1
65. When I have thought about life at present, I've been pretty satisfied with things as they are today -- mostly predictable but not too much so.	5	4	3	2	1
66. When I have thought about life at present, things are pretty unpredictable now and I'd like to see them stay that way.	5	4	3	2	1
67. When I have thought about life at present, I'd rather see the world become a bit more exciting and unpredictable, even though it's fairly unpredictable now.	5	4	3	2	1
68. When I have thought about life at present, I'd like to move out into a new and intensely uncertain world although everything is very unpredictable as it is.	5	4	3	2	1
69. When I have thought about life at present, I'd like to see a new and more predictable world come about.	5	4	3	2	1
70. In my daydreaming, I have travelled to the remotest regions, including other planets.	5	4	3	2	1
71. In my daydreaming, I have travelled to the remotest and most unfamiliar regions of the planet.	5	4	3	2	1
72. In my daydreaming, I have travelled to unusual places like South America or Japan but not "far out" places like Africa.	5	4	3	2	1
73. In my daydreaming, I have travelled to moderately unusual places like Spain or Mexico.	5	4	3	2	1
74. In my daydreaming, I have travelled to places somewhat different yet familiar like Bermuda or the British Isles.	5	4	3	2	1

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75. In my daydreaming, I have travelled to moderately familiar places such as distant parts of the USA or Canada.	5	4	3	2	1
76. In my daydreaming, I have travelled to very familiar places nearby.	5	4	3	2	1
77. In discussions with others, I have defended my point of view and have particularly disliked those who switch positions for no reason.	5	4	3	2	1
78. In discussions with others, I have defended my point of view and have felt somewhat uneasy when others have changed their position with little reason.	5	4	3	2	1
79. In discussions with others, I have defended my point of view and have not cared whether others changed or not.	5	4	3	2	1
80. In discussions with others, I have enjoyed defending my point of view against others who have changed their positions frequently.	5	4	3	2	1
81. In discussions with others, I have sometimes taken an opposite point of view to my own in order to show what was wrong with it.	5	4	3	2	1
82. In discussions with others, I have enjoyed taking on a variety of different points of view to explore their implications.	5	4	3	2	1
83. In discussions with others, I have enjoyed defending many points of view which I don't particularly agree with partly to excite discussion and partly to somewhat "shake up" certain other people.	5	4	3	2	1
84. With respect to attaining my goals, I usually set my goals so as to attain them.	5	4	3	2	1

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85. With respect to attaining my goals, I always put out as much effort as is needed to attain my goals.	5	4	3	2	1
86. With respect to attaining my goals, I attain some goals, while missing some others.	5	4	3	2	1
87. With respect to attaining my goals, when I find I can't attain my goals I usually try to find easier goals if I can.	5	4	3	2	1
88. With respect to attaining my goals, I haven't had much luck so far but I keep trying since I think I have reasonable goals.	5	4	3	2	1
89. With respect to attaining my goals, I tend to set rather unreasonably high goals which naturally I haven't attained yet.	5	4	3	2	1
90. With respect to attaining my goals, I find that as soon as I get close to attaining a goal, I set a higher standard for myself.	5	4	3	2	1
91. When someone has pointed out to me that I have just said something inconsistent with some previous remark, I have normally felt quite embarrassed.	5	4	3	2	1
92. When someone has pointed out to me that I have just said something inconsistent with some previous remark, I have normally felt somewhat embarrassed.	5	4	3	2	1
93. When someone has pointed out to me that I have just said something inconsistent with some previous remark, I have normally felt slightly embarrassed.	5	4	3	2	1
94. When someone has pointed out to me that I have just said something inconsistent with some previous remark, I have normally felt unaffected.	5	4	3	2	1

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95. When someone has pointed out to me that I have just said something inconsistent with some previous remark, I have normally felt interested in explaining why the statements were not in conflict.	5	4	3	2	1
96. When someone has pointed out to me that I have just said something inconsistent with some previous remark, I have normally felt interested in exploring the situation more.	5	4	3	2	1
97. When someone has pointed out to me that I have just said something inconsistent with some previous remark, I have normally felt quite please since inconsistency is. the "hobgoblin of little minds."	5	4	3	2	1
98. When someone has pointed out to me that I have just said something inconsistent with some previous remark, I have normally felt somewhat pleased, since at times I rather enjoy appearing inconsistent to some people.	5	4	3	2	1

Questions 99 and 100 have special scoring directions:

99. Count how many of the following types of magazines you frequently read (at least once a month).

a. Decorating/Gardening
b. Fashion
c. Foreign magazines/newspapers
d. Historical
e. Homemaker oriented
f. Humor
g. Literary/Intellectual
h. Mechanical (auto, home repair)
i. Men's
j. Mystery
k. Movie and TV Guide
l. News
m. Parents
n. Pictorial
o. Professional/trade journals, your field
p. Professional/trade journals, other fields
q. Psychological
r. Science fiction
s. Scientific
t. Sports
u. Travel
v. Women's

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99. Continued:

If your total is between 0-2, blacken on your answer sheet the number "1".

OR

If your total is between 3-5, blacken on your answer sheet the number "2".

OR

If your total is between 6-8, blacken on your answer sheet the number "3".

OR

If your total is between 9-11, blacken on your answer sheet the number "4".

OR

If your total is between 12-14, blacken on your answer sheet the number "5".

100. Count how many of the following types of television programs you frequently watch (at least once a week).

a. "Big star" specials
b. Cartoons
c. Children's shows
d. Comical spy stories
e. Comical war stories
f. Conversation programs
g. Crime shows
h. Domestic movies
i. Educational
j. Fantasies or science fiction
k. Foreign movies
l. News programs
m. "Problem" documentaries
n. Quiz/panel shows
o. Serials
p. Situation comedies
q. Spy stories (serious)
r. Travel documentaries
s. Variety programs
t. War stories (serious)

If your total is between 0-2, blacken on your answer sheet the number "1".

OR

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If your total is between <u>3-5</u>, blacken on your answer sheet the number <u>"2"</u>.

OR

If your total is between <u>6-8</u>, blacken on your answer sheet the number <u>"3"</u>.

OR

If your total is between <u>9-11</u>, blacken on your answer sheet the number <u>"4"</u>.

OR

If your total is between <u>12-14</u>, blacken on your answer sheet the number <u>"5"</u>.

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I-E SCALE

(Julian C. Rotter, Author)

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

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

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

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

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

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

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

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

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

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

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

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

12. a. The average citizen can have an influence in government decisions.
    b. This world is run by the few people in power, and there is not much the little guy can do about it.

13. a. When I make plans, I am almost certain that I can make them work.
    b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. a. There are certain people who are just no good.
    b. There is some good in everybody.

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

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

17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
    b. By taking an active part in political and social affairs the people can control world events.

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

19. a. One should always be willing to admit mistakes.
    b. It is usually best to cover up one's mistakes.

20. a. It is hard to know whether or not a person really likes you.
    b. How many friends you have depends upon how nice a person you are.

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21. a. In the long run the bad things that happen to us are balanced by the good ones.
    b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. a. With enough effort we can wipe out political corruption.
    b. It is difficult for people to have much control over the things politicians do in office.

23. a. Some times I can't understand how teachers arrive at the grades they give.
    b. There is a direct connection between how hard I study and the grades I get.

24. a. A good leader expects people to decide for themselves what they should do.
    b. A good leader makes it clear to everybody what their jobs are.

25. a. Many times I feel that I have little influence over the things that happen to me.
    b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. a. People are lonely because they don't try to be friendly.
    b. There's not much use in trying too hard to please people, if they like you, they like you.

27. a. There is too much emphasis on athletics in high school.
    b. Team sports are an excellent way to build character.

28. a. What happens to me is my own doing.
    b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. a. Most of the time I can't understand why politicians behave the way they do.
    b. In the long run the people are responsible for bad government on a national as well as on a local level.

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APPENDIX G

OVERVIEW OF RYAN'S MAIN EXPERIMENT BASED ON MOCK'S INFORMATION STRUCTURE EXPERIMENT

Overview

The main experiment in Ryan's dissertation (1983) was a continuation of the line of research begun by Mock (1969) which used a computer gaming methodology. This methodology provides the researcher with the opportunity to simulate the desired business decision context while utilizing a mode of information communication commonly used in business today. Possibly the biggest advantage of this methodology is the rapid feedback of results once a decision is entered into the system. This feature makes research using a continuous context over many decision periods feasible, even when faced with significant time constraints.

The subjects in Ryan's experiment received a case problem a number of days prior to their participation in the experiment. They were required to have a reasonably good understanding of the case before starting the experiment. They entered their decisions using computer terminals in the Keck Management Center on the University of Southern California Campus while being supervised by a researcher to ensure that the subjects were working alone. The business problem which subjects faced utilized a production planning and marketing decision context over seven periods. Depending on the experimental treatment, subjects made predictions on certain economic variables and indicated their action

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choices as to material and labor inputs, production quantities, and the amount of advertising.

The variation that made Ryan's experiment different from its predecessors was the incorporation of a meaningful framework for the prediction process and a means of measuring the impact of different information systems on the prediction phase of the decision process versus the action choice phase.

Research Methodology

Mock's (1969) decision model is the basis for determining outcomes from the action choices of the subjects.The model used a Cobb-Douglass type production function wherein labor and material inputs can be exchanged for each other. The relationship between the two inputs is constrained by the requirement that the product of the two input factors must equal 1.0. Thus, if prices of one of these factors increased relative to the other, the input mix can be changed so as to minimize the total cost of the two. Subjects must set the input factor for materials as one of three action choices that must be made. The computer then determines the labor input factor.

A detailed discussion of this decision model appears in Chapter 5 of Ryan's dissertation (1983), together with a description of his experiment and findings. To assist the reader of this dissertation I have included, with Ryan's permission, Chapter 5 and 6 of his dissertation. Therefore, the remaining pages of this Appendix G includes Chapter 5 and 6 of William Ryan's Ph.D. idssertation at the University of Southern California published in December 1983. The following pages are numbered

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as they were in the actual disseration, as follows:

- Chapter 5,
  The Main Experiment,
  Pages 131 through 220.

- Chapter 6,
  Summary and Conclusions,
  Pages 221 through 248.

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APPENDIX H

STUDENT PACKET

This Appendix H includes some of the materials that were included in the packet distributed to each of the subjects who participated in Ryan's experiment. The packet was given out during the class meeting following the actual experiment, and the students were given several weeks to complete the tests and return the packet. Sixty-six packets were returned, but only fifty-seven subjects' (who completed Rowe's DSI test) were used in my decision style analysis. The following materials are included in this appendix:

- o Covering letter to student
- o Personal Values and Ethics questionnaire
- o Student Information Sheet

The following tests were included in Appendix B and Appendix F and are not repeated here:

- o Rowe's Decision Style Inventory (Appendix B)
- o Purdue-Rutgers Prior Experience Inventory (Appendix F)
- o Rotter Internal/External Locus of Control Scale (Appendix F)

Not included in this appendix are the copyrighted tests distributed to the students:

- o Myers-Briggs Type Indicator (Form G) available from Consulting Psychologists Press, Inc., 577 College Ave., Palo Alto, California 94306.
- o Decision Style Test by Michael J. Driver, University of Southern California.

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21500 Deerpath Lane
Malibu, CA 90265
March 24, 1983

Dear Fellow USC Student:

I am a doctoral student and my dissertation research is on the relationship between the decision styles of accountants and their use of accounting information. This letter is an invitation to participate in my research for which you will receive:

- A report on how you like to look at things and how you go about deciding things; and
- $10 (ten dollars) for your assistance in completing a battery of decision style tests.

In the attached package you will find the following instruments:

1. Decision Style Exercise by Prof. Michael J. Driver and its scoring sheet.
2. Decision Style Inventory by Prof. Alan J. Rowe.
3. Purdue-Rutgers Prior Experience Inventory and Scantron Sheet Form 882N.
4. I-E Scale and Scantron Sheet Form 882.
5. Myers-Briggs Type Indicator and its scoring sheet.
6. Personal Values and Ethics Questionnaire.
7. Student Information Sheet.

It is important that you complete all seven instruments correctly, so, if you have any questions please feel free to call me day or night:

Day telephone: (213) 970-8383
Nights and Weekends: (213) 456-6203

Carefully read the instructions and proceed with each instrument as requested. If for any reason you cannot complete all seven instruments, the most important ones are #1, #2, #5 and #7. The other ones are also important and are used to corroborate the results of the four most important instruments. In order for me to prepare the promised report it is necessary for you to complete all seven instruments.

Thank you in advance for your willingness to participate in this important research. I sincerely believe that you will find the promised personal report on your own decision style useful in your career planning.

Very Truly Yours,

Clifford J. Craft

Clifford J. Craft

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NAME______________________________

PERSONAL VALUES AND ETHICS

1. What is an example of a personal value or ethical standard which you consider to be important in your daily life?
____

2. How would you rank your own personal code of ethics relative to that of your superiors?
___Much higher ___Higher ___About the same ___Less than

How you rank your own personal code of ethics relative to that of your peers?
___Much higher ___Higher ___About the same ___Less than

How would you rank your own personal code of ethics relative to that of your subordinates?
___Much higher ___Higher ___About the same ___Less than

3. Do you believe that religious values influence ethical standards:
___ Yes ___ No

Have religious values influenced in any way your own personal code of ethics? ___ Yes ___ No

4. Have you ever had any of the following experiences?
   a. Left a company's employ because of a conflict of interest or for other ethical consideration? __Yes __No
   b. Discontinued a personal association because of an ethical consideration or difference of opinion? __Yes __No
   c. Observed someone else leave a company or restrict his actions because of ethical consideration? __Yes __No

5. Are America's ethical standards:
___ Rising ___Unchanging ___Declining

6. Do you think business ethics have any practical impact on business practices? ___ Yes ___ No
If yes, how?____
____

7. Do you agree with this statement:
"The businessman exists for only one purpose, to create and deliver value satisfactions at a profit to himself....If what is offered can be sold at a profit...then it is legitimate....The cultural, spiritual, social, and moral consequences of his actions are none of his concern." ___ Yes ___ No
Why?____
____

8. Do you believe ethical standards should be changing?___ Yes ___ No
Why?____

9. Do you think ethical standards can be raised by:
   a. Professionalization ___ Yes ___ No
   b. Legislation ___ Yes ___ No
   c. Political Leadership ___ Yes ___ No
   d. Religious revival ___ Yes ___ No

10. Should the conduct of a multinational firm in international dealings be guided by the same code of ethics as they are guided by within this country? ___ Yes ___ No
Why?____

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STUDENT INFORMATION SHEET

Name:_________________

ID No:________________

Major: __________

Year in school: __________

Part-time or
full-time student: __________

Age: __________

Sex: __________

Prior course work:

Indicate the grade received and the date.
For courses you have not taken, indicate nt, and
for courses you are taking currently, indicate curr.

	Grade	Date
Math 118	______	______
BUAD 280	______	______
BUAD 310	______	______
BUAD 311	______	______

If you have used the IMAGINIT game in any course
please indicate the course, grade, and date.

______ ______ ______

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APPENDIX I

ANALYSIS OF DECISION STYLES BASED ON DRIVER'S IST

In order to obtain some clue as to how the performance results for Rowe's decision styles might compare with Driver's decision style model, the analysis in Table I-1 was done to see if there is any obvious crossmapping between Rowe's and Driver's Models. From this simple comparison, it is clear that there is no clearcut crossmapping between the two decision style models. The two Rowe styles which showed a significant difference in performance from the rest of the population are the analytical and conceptual styles. From the above crossmapping, all that might be said regarding Rowe's analytic and conceptual styles relative to Driver's styles is that:

1. Rowe's Analytic style maps about equally into Driver's Integrative and Flexible styles; and
2. Rowe's Conceptual style maps about equally into Driver's Hierarchic and Decisive style.

Results of the Analysis of Driver's Style

There were 57 subjects out of the overall sample of 58 who completed Driver's decision style instrument. The actual 57 cases are presented in Table I-2, and some of the key attributes of each style are summarized in Table I-3. This exhibit is followed by the listings of the individual subjects in each of the five style groups presented in Table I-4 through I-8.

Each of Driver's five decision styles was analyzed using the

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Table I-1

CROSS-MAPPING BETWEEN ROWE'S AND DRIVER'S DECISION STYLES

		Primary Driver's Style						Driver's Backup Style					
Style	Total	H	I	F	D	C	Total	H	I	F	D	C	Total
Analytic	12	0	4	5	2	1	12	4	1	0	3	4	12
Behavioral	16	1	5	5	2	3	16	6	2	1	4	2	15
Conceptual	15	5	2	1	6	1	15	4	0	1	5	3	13
Directive	13	1	5	3	1	3	13	2	2	2	6	1	13
Total	56	7	16	14	11	8	56	16	5	4	18	10	53

Legend:	Driver's Style
H	Hierarchic
I	Integrative
F	Flexible
D	Decisive
C	Complex

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Table I-2

Raw Data for 57 Subjects Who Completed Driver's DSI

ID	INC	DERR	PTS	HI	IN	DE	DDS	RDS
106.00	96.00	49.30	149.00	25.40	42.80	37.30	2.00	1.00
107.00	171.00	16.20	149.00	61.70	18.70	36.50	1.00	3.00
108.00	179.00	5.66	202.00	22.55	16.00	23.82	3.00	2.00
113.00	103.00	60.07	143.00	27.15	38.00	34.95	2.00	2.00
115.00	110.00	75.73	152.00	24.70	35.80	40.00	2.00	2.00
117.00	87.00	101.62	88.00	50.50	41.55	26.00	5.00	2.00
121.00	150.00	24.97	169.00	22.60	19.20	46.07	4.00	4.00
123.00	163.00	34.42	203.00	20.60	10.70	33.00	3.00	2.00
124.00	65.00	110.72	157.00	32.50	25.05	40.82	1.00	4.00
127.00	106.00	69.80	119.00	26.40	7.75	48.62	4.00	2.00
128.00	93.00	69.41	92.00	27.60	18.60	54.60	4.00	0.00
129.00	103.00	9.16	112.00	37.40	38.15	34.80	5.00	3.00
130.00	122.00	54.23	184.00	11.50	11.50	49.00	4.00	3.00
131.00	159.00	41.59	116.00	17.50	38.60	51.30	2.00	4.00
132.00	131.00	12.19	174.00	21.60	11.70	48.90	4.00	3.00
133.00	183.00	2.39	190.00	25.00	15.60	46.47	4.00	3.00
135.00	101.00	75.95	180.00	13.00	35.35	37.20	2.00	2.00
138.00	154.00	29.15	181.00	21.40	24.00	54.90	4.00	3.00
139.00	173.00	12.20	184.00	43.90	39.00	5.62	3.00	1.00
141.00	156.00	11.49	115.00	71.80	98.00	6.40	2.00	3.00
143.00	173.00	8.47	184.00	37.00	39.40	24.60	5.00	4.00
201.00	182.00	5.76	198.00	4.85	24.70	33.48	3.00	2.00
204.00	178.00	11.04	178.00	16.30	13.00	33.60	3.00	1.00
205.00	172.00	17.00	167.00	13.50	40.80	41.90	2.00	4.00
209.00	150.00	16.09	113.00	30.80	28.20	27.00	3.00	2.00
214.00	111.00	30.86	118.00	93.00	39.90	32.60	5.00	4.00
216.00	154.00	15.68	135.00	11.70	18.80	33.17	3.00	4.00
217.00	115.00	56.26	175.00	22.00	28.60	36.50	4.00	1.00
219.00	94.00	87.12	129.00	7.80	10.20	64.00	4.00	2.00
222.00	63.00	116.41	171.00	62.00	14.60	41.13	1.00	3.00
223.00	137.00	90.60	90.00	20.85	21.00	19.38	3.00	3.00
227.00	120.00	65.16	149.00	14.10	31.20	41.60	2.00	1.00
230.00	127.00	58.59	128.00	24.80	31.00	48.07	2.00	4.00
231.00	73.00	33.71	111.00	10.15	59.00	40.40	2.00	4.00
232.00	145.00	28.49	134.00	30.80	49.40	33.27	2.00	2.00
236.00	152.00	30.55	140.00	42.00	17.50	36.83	3.00	3.00
240.00	129.00	32.61	116.00	6.80	32.00	50.40	2.00	2.00
243.00	106.00	56.75	142.00	18.55	32.50	22.98	1.00	1.00
304.00	153.00	20.22	161.00	42.00	18.00	36.67	3.00	3.00
306.00	130.00	44.20	174.00	34.60	130.00	35.00	1.00	1.00
308.00	106.00	85.30	115.00	40.60	39.00	35.12	2.00	2.00
310.00	48.00	90.50	150.00	55.10	65.30	19.90	1.00	1.00

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Table I-2 (continued)

ID	INC	DERR	PTS	HI	IN	DE	DDS	RDS
313.00	56.00	142.99	137.00	28.20	20.50	43.80	1.00	1.00
314.00	160.00	19.44	190.00	22.90	58.00	36.40	3.00	3.00
315.00	164.00	23.45	123.00	52.20	32.00	18.60	3.00	3.00
318.00	-102.00	294.81	162.00	46.40	38.65	15.00	1.00	1.00
319.00	120.00	68.40	190.00	60.00	36.60	17.80	2.00	2.00
321.00	173.00	22.27	132.00	36.00	32.80	40.40	5.00	2.00
326.00	154.00	36.55	150.00	28.00	12.00	26.70	1.00	1.00
333.00	170.00	18.86	185.00	25.50	21.20	31.10	2.00	2.00
331.00	134.00	38.44	92.00	18.00	13.30	56.30	3.00	3.00
335.00	132.00	50.20	186.00	5.10	48.10	32.27	4.00	4.00
336.00	124.00	48.33	175.00	91.00	35.00	77.00	4.00	4.00
337.00	175.00	11.26	192.00	25.00	27.60	46.00	3.00	3.00
340.00	147.00	41.15	129.00	9.50	22.70	35.93	3.00	4.00
341.00	136.00	48.64	173.00	29.40	20.10	26.83	3.00	4.00
343.00	159.00	21.48	138.00	27.70	33.45	39.60	2.00	1.00

Variable	Definition
ID	Identification number
INC	Average Income over last 6 periods
DERR	Average Decision Error over last 6 periods
PTS	Points achieved in class
HI	Driver's Hierarchic raw score
IN	Driver's Integrative raw score
DE	Driver's Decisive raw score
DDS	Driver's Decision Style
RDS	Rowe's Decision Style

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Table I-3

Key Attributes of Subjects Categorized by Driver's Decision Style

Driver's Style	DDS	Cases	Variable* INC	DERR	PERR	PTS
Hierarchic	1	7	$127,857	$55,137	$7,689	155.9
Integrative	2	16	124,375	45,707	18,375	145.3
Flexible	3	14	137,643	49,157	9,986	160.3
Decisive	4	12	126,083	49,850	15,084	152.8
Complex	5	8	125,875	43,777	17,644	137.3
Total		57	$128,509	$48,303	$14,207	150.7

Variable	Mean	Std. Dev.
INC	128.51	46.55
DERR	48.31	45.94
PERR	14.21	13.58
ST	136.87	32.48
TT	73.68	18.83
PTS	150.72	31.62
RD	72.75	11.32
RA	89.52	13.48
RC	76.96	13.21
RB	60.29	11.77

*Variable	Definition
INC	Average Income over last six periods
DERR	Average Decision Error over last six periods
PERR	Average Prediction Error over last six periods
PTS	Points achieved in class
ST	Starting time
TT	Total time
RD	Rowe's Directive scale raw score
RA	Rowe's Analytic scale raw score
RC	Rowe's Conceptual scale raw score
RB	Rowe's Behavioral scale raw score

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Table I-4

Driver's Hierarchic Style
(7 cases)

ID	INC	DERR	PTS	HI	IN	E	RDS
107.00	171.00	16.20	149.00	61.70	18.70	36.50	3.0
124.00	65.00	110.72	157.00	32.50	25.05	4.82	4.0
222.00	63.00	116.41	171.00	62.00	14.60	41.13	3.0
236.00	152.00	30.55	140.00	42.00	17.50	36.83	3.0
304.00	153.00	20.22	161.00	42.00	18.00	36.67	3.0
315.00	164.00	23.45	123.00	52.20	32.00	18.60	3.0
319.00	120.00	68.40	190.00	60.00	36.60	17.80	2.0

Variable	Mean	Std. Dev.
INC	126.86	45.82
DERR	55136.86	43521.25
PERR	7689.14	3738.75
ST	135.43	30.51
TT	78.00	19.35
PTS	155.86	21.61
RD	71.14	9.72
RA	83.29	9.34
RC	86.00	11.46
RB	59.57	5.80

*Variable	Definition
INC	Average Income over last six periods
DERR	Average Decision Error over last six periods
PERR	Average Prediction Error over last six periods
PTS	Points achieved in class
ST	Starting time
TT	Total time
RD	Rowe's Directive
RA	Rowe's Analytic
RC	Rowe's Conceptual
RB	Rowe's Behavioral

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Table I-5

Driver's Integrative Style
(16 cases)

ID	INC	DERR	PTS	HI	IN	E	RDS
106.00	96.00	49.30	149.00	25.40	42.80	37.30	1.0
113.00	103.00	60.07	143.00	27.15	38.00	34.95	2.0
115.00	110.00	75.73	152.00	24.70	35.80	40.00	2.0
131.00	159.00	41.59	116.00	17.50	38.60	51.30	4.0
135.00	101.00	75.95	180.00	13.00	35.35	37.20	2.0
141.00	156.00	11.49	115.00	71.80	98.00	6.40	3.0
205.00	172.00	17.00	167.00	13.50	40.80	41.90	4.0
227.00	120.00	65.16	149.00	14.10	31.20	41.60	1.0
230.00	127.00	58.59	128.00	24.80	31.00	48.07	4.0
231.00	73.00	33.71	111.00	10.15	59.00	40.40	4.0
232.00	145.00	28.49	134.00	30.80	49.40	33.27	2.0
240.00	129.00	32.61	116.00	6.80	32.00	50.40	2.0
310.00	48.00	90.50	150.00	55.10	65.30	19.90	1.0
314.00	160.00	19.44	190.00	22.90	58.00	36.40	3.0
335.00	132.00	50.20	186.00	5.10	48.15	32.27	4.0
343.00	159.00	21.48	138.00	27.70	33.45	39.60	1.0

Variable	Mean	Std. Dev.
INC	124.36	34.60
DERR	45.71	23.81
PERR	18.38	17.16
ST	140.25	39.59
TT	76.86	18.86
PTS	145.25	25.46
RD	76.31	10.77
RA	89.31	12.72
RC	73.56	11.70
RB	60.19	12.69

*Variable	Definition
INC	Average Income over last six periods
DERR	Average Decision Error over last six periods
PERR	Average Prediction Error over last six periods
PTS	Points achieved in class
ST	Starting time
TT	Total time
RD	Rowe's Directive
RA	Rowe's Analytic
RC	Rowe's Conceptual
RB	Rowe's Behavioral

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Table I-6

Driver's Flexible Style
(14 cases)

ID	INC	DERR	PTS	HI	IN	E	RDS
108.00	179.00	5.66	202.00	22.55	16.00	23.82	2.00
123.00	163.00	34.42	203.00	20.60	10.70	33.00	2.00
139.00	173.00	12.20	184.00	43.90	39.00	5.62	1.00
201.00	182.00	5.76	198.00	4.85	24.70	33.48	2.00
204.00	178.00	11.04	178.00	16.30	13.00	36.60	1.00
209.00	150.00	16.09	113.00	30.80	28.20	27.00	2.00
216.00	154.00	15.68	135.00	11.70	18.80	33.17	4.00
223.00	137.00	90.60	90.00	20.85	21.00	19.38	3.00
243.00	106.00	56.75	142.00	18.55	32.50	22.98	1.00
318.00	-102.00	294.81	162.00	46.40	38.65	15.00	1.00
326.00	154.00	36.55	150.00	28.00	12.00	26.70	1.00
333.00	170.00	18.86	185.00	25.50	21.20	31.10	2.00
340.00	147.00	41.15	129.00	9.50	22.70	35.93	4.00
341.00	136.00	48.64	173.00	29.40	20.10	26.83	4.00

Variable	Mean	Std. Dev.
INC	137.64	72.03
DERR	49.16	74.57
PERR	9.99	6.34
ST	145.64	30.37
TT	66.14	19.34
PTS	160.29	34.94
RD	71.07	10.90
RA	93.79	16.31
RC	73.00	11.39
RB	62.14	13.82

*Variable	Definition
INC	Average Income over last six periods
DERR	Average Decision Error over last six periods
PERR	Average Prediction Error over last six periods
PTS	Points achieved in class
ST	Starting time
TT	Total time
RD	Rowe's Directive
RA	Rowe's Analytic
RC	Rowe's Conceptual
RB	Rowe's Behavioral

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Table I-7

Driver's Decisive Style
(12 cases)

ID	INC	DERR	PTS	HI	IN	DE	RDS
121.00	150.00	24.97	169.00	22.60	19.20	46.07	4.00
127.00	106 [illegible]	69.80	119.00	26.40	7.75	48.62	2.00
128.00	93.00	69.41	92.00	27.60	18.60	54.60	0.00
130.00	122.00	54.23	184.00	11.50	11.50	49.00	3.00
132.00	131.00	12.19	174.00	21.60	11.70	48.90	3.00
133.00	183.00	2.39	190.00	25.00	15.60	46.47	3.00
138.00	154.00	29.15	181.00	21.40	24.00	54.90	3.00
217.00	115.00	56.26	175.00	22.00	28.60	36.50	1.00
219.00	94.00	87.12	129.00	7.80	10.20	64.00	2.00
313.00	56.00	142.99	137.00	28.20	20.50	43.80	1.00
331.00	134.00	38.44	92.00	18.00	13.30	56.30	3.00
337.00	175.00	11.26	192.00	25.00	27.60	46.00	3.00

Variable	Mean	Std. Dev.
INC	126.08	36.49
DERR	49.85	39.60
PERR	15.08	15.14
ST	123.08	31.36
TT	74.58	19.82
PTS	152.83	37.23
RD	67.55	12.40
RA	91.36	12.36
RC	83.09	17.10
RB	57.91	13.26

*Variable	Definition
INC	Average Income over last six periods
DERR	Average Decision Error over last six periods
PERR	Average Prediction Error over last six periods
PTS	Points achieved in class
ST	Starting time
TT	Total time
RD	Rowe's Directive
RA	Rowe's Analytic
RC	Rowe's Conceptual
RB	Rowe's Behavioral

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Table I-8

Driver's Complex Style
(8 cases)

ID	INC	DERR	PTS	RD	RA	RC	RDS
117.00	87.00	101.62	88.00	74.00	82.00	78.00	2.00
129.00	103.00	9.16	112.00	68.00	98.00	90.00	3.00
143.00	173.00	8.47	184.00	88.00	91.00	58.00	4.00
214.00	111.00	30.86	118.00	93.00	69.00	65.00	4.00
306.00	130.00	44.20	174.00	64.00	111.00	69.00	1.00
308.00	106.00	85.30	115.00	71.00	77.00	82.00	2.00
321.00	173.00	22.27	132.00	68.00	82.00	76.00	2.00
336.00	124.00	48.33	175.00	91.00	73.00	77.00	4.00

Variable	Mean	Std. Dev.
INC	125.86	31.88
DERR	43.77	34.15
PERR	17.04	16.29
ST	136.75	22.82
TT	75.38	16.79
PTS	137.25	35.69
RD	71.07	11.64
RA	93.79	13.95
RC	73.00	10.07
RB	62.14	9.57

*Variable	Definition
INC	Average Income over last six periods
DERR	Average Decision Error over last six periods
PERR	Average Prediction Error over last six periods
PTS	Points achieved in class
ST	Starting time
TT	Total time
RD	Rowe's Directive
RA	Rowe's Analytic
RC	Rowe's Conceptual
RB	Rowe's Behavioral

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Decision Error Feedback Model that was used to analyze Rowe's decision styles. The results of this analysis based on the same two-way ANOVA is presented in Table I-9. The same styles were also analyzed using the prediction error feedback model and the results are summarized in Table I-10. As can be seen in Table I-10, there are decision or prediction error treatment effects, but clearly there is no evidence of any style effects for any one of the five styles.

In an attempt to uncover some possible style effects, the data was rerun using the larger data base of 58 subjects including all the potential outliers. The results of this additional analysis is presented in Table I-11. Here again it is clear that there were absolutely no style effects. The decision error feedback treatment effects were more significant with the larger sample of 58 subjects, but the significance of the style effects decreased with the larger sample. Even when pairs of individual styles like the Decisive and Flexible styles were compared as shown in Table I-12, no decision style effect was observed.

There are several possible explanations for this lack of any decision style treatment effects based upon the use of Driver's IST exercise as it was administered in this experiment:

1) According to Dr. Driver the IST Exercise was not administered properly. The subjects should have been restricted to completing the exercise in the classroom and within the alloted period of time. As a result of my permitting the subjects to take the IST exercise home and to complete it without the time pressure of the classroom, spurious results may have been obtained causing the

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Table I-9
ANALYSIS OF DRIVER'S DECISION STYLES USING DECISION ERROR FEEDBACK MODEL

DECISION ERROR CRITERIA	ANOVA MODEL*	HIERARCHIC STYLE (N=7)	INTEGRATIVE STYLE (N=16)	FLEXIBLE STYLE (N=14)	DECISIVE STYLE (N=12)	COMPLEX STYLE (N=8)	TOTAL ** (N=57)
INC	X	.884	.589	.911	.997	.660	----
	DEC	.089	.082	.092	.092	.081	.085
DERR	X	.917	.957	.354	.821	.366	----
	DEC	.055	.052	.042	.053	.037	.046
AYDR6	X	.978	.931	.333	.827	.396	----
	DEC	.054	.053	.043	.053	.039	.047
APRD6	X	.626	.743	.417	.390	.968	----
	DEC	.354	.380	.363	.445	.406	.388
AEQDR6	X	.515	.568	.655	.809	.484	----
	DEC	.053	.043	.036	.034	.031	.035
ACDR6	X	.537	.475	.432	.728	.883	----
	DEC	.163	.119	.044	.145	.133	.131
AOR6	X	.725	.626	.822	.890	.673	----
	DEC	.072	.074	.077	.084	.072	.075

* Using Class Grade Points and Starting Time as co-variates.
** One-way ANOVA to demonstrate Decision treatment effect (when style is ignored).

Variable	Definition
X	Decision Style Treatment: X=1 for style being tested and X=0 for rest of subjects in N=57 sample of subjects who took Driver's IST test.
DEC	Decision Error Feedback Treatment.

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Table I-10

ANALYSIS OF DRIVER'S DECISION STYLES USING PREDICTION ERROR FEEDBACK MODEL

PREDICTION ERROR CRITERIA	ANOVA MODEL VARIABLES*	HIERARCHIC STYLE (DDS=1)	INTEGRATIVE STYLE (DDS=2)	FLEXIBLE STYLE (DDS=3)	DECISIVES STYLE (DDS=4)	COMPLEX STYLE (DDS=5)	TOTAL** (N=57)
PERR	X	.220	.223	.342	.748	.717	---
	PRED	.075	.068	.062	.077	.065	.069
AYPR6	X	.223	.286	.534	.783	.843	---
	PRED	.053	.050	.048	.056	.048	.050
APPR6	X	.134	.202	.979	.587	.672	----
	PRED	.378	.346	.361	.345	.338	.351
AEQPR6	X	.068	.254	.831	.938	.561	----
	PRED	.127	.119	.123	.126	.110	.119
ACPR6	X	.792	.462	.232	.549	.967	----
	PRED	.080	.076	.061	.084	.076	.073

* Using Class Grade Point and Starting Time as co-variates.

** One-way ANOVA to demonstrate Prediction treatment effect (when style is ignored).

Variable

X Decision style treatment· X=1 for style being tested and X=0 for rest of subjects in N=57 subjects who took Driver's IST test.

PRED Prediction Error Feedback Treatment.

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Table I-11

COMPARISON OF ANALYSIS OF DRIVER'S DECISION STYLE DATA USING LARGER SAMPLE OF 58 SUBJECTS VERSUS SMALLER SAMPLE OF 57 SUBJECTS

DECISION ERROR CRITERIA	N	Hierarchic DEC	Hierarchic X	Integrative DEC	Integrative X	Flexible DEC	Flexible X	Decisive DEC	Decisive X	Complex DEC	Complex X	Total DEC
AYDR6	58	.030	.887	.034	.852	.027	.464	.03	.749	.023	.362	.028
	57	.054	.978	.053	.931	.043	.333	.05	.827	.039	.396	.047
AOR6	58	.043	.617	.048	.705	.051	.975	.056	.814	.045	.621	.047
	57	.072	.725	.074	.626	.077	.822	.084	.890	.072	.673	.075

Table I-12

Comparison of Driver's Decisive and Flexible Styles

Decision Error Feedback (DEC)				Decision Error Feedback (DEC) (Omitting an outlier)			
Style(X)	No	Yes	No.	Style(X)	No	Yes	No.
Flexible	6	8	14	Flexible	5	8	13
Decisive	4	8	12	Decisive	4	8	12
No.	10	16	26	No.	9*	16	25

	DEC	X	DEC	X
INC	.096	.818	.048	.226
DERR	.091	.374	.161	.661
PERR	.757	.450	.650	.391
AYDR6	.099	.359	.202	.730
APDR6	.523	.367	.327	.816
AEQDR6	.055	.665	.075	.269
ACDR6	.247	.946	.444	.735
AOR6	.102	.672	.250	.090

*Note: An outlier was omitted to enhance treatment effects; however, as can be seen, they still were not significant.

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Decisive styles to be improperly measured.

2) The subjects in this exercise showed practically no learning patterns. (See page 216 of Appendix G.) The subjects were required to attain a level of proficiency before starting the experiment by preparing graphs and projected income statements. As a result, a significant number of subjects may not have felt the need to pay much attention to the feedback data and simply made their decisions without much analysis or reflection. This unpressured approach taken by a significant number of subjects may have given supurious correlations between decision style and results.

3. Another possible explanation is that stress may have been a confounding variable in this experiment. Under stress, subjects tend to rely on past patterns of performance rather than work out new solutions. Accordingly, some subjects may have totally ignored some of the new feedback data presented to them. Also, under stress they may have shifted during the exercise from their primary decision style into an alternative backup style thereby confounding the results. Performance data which I attempted to correlate with the primary style for certain subjects might more correctly be associated with the subjects' back-up style.

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Not withstanding these possible explanations for the absence in this experiment of any decision style treatment effects, it also might be somewhat the same problem which earlier researchers encountered in attempting to uncover treatment effects based upon Driver's IST Exercise (Savich, 1977). The IST may indeed measure certain significant attributes of decision style, but at the same time these are not the attributes that distinguish good performers from average performers in a complex (time-pressured) simulation exercise like the one used in this experiment.

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APPENDIX J

RAW DATA USED IN THIS EXPERIMENT

This appendix includes the raw data and some of the tabulations used in this experiment. Also, included are some of the computer printouts of the raw data and the statistical data generated by the SPSS programs which I used. An SPSS program listing is also included.

The following is a listing of the exhibits in this appendix:

1. Decision style test results for 66-subject sample for Rowe's DSI test, Driver's IST test, and Witkin's EFT test.

2. Decision style test results for 66-subject sample for Rotter's IE test, GIAL test, and Myers-Briggs test.

3. Rowe's DSI raw test scores, Z-scores derived from raw data and Rowe's decision style.

4. Driver's IST raw test scores, Driver's primary and back-up styles, and alternative Driver style based upon Z-scores (DNS).

5. Driver's IST raw test scores, Z-scores computed from raw scores, and alternative Driver style based upon Z-scores (DNS).

6. Comparison of Driver's and Rowe's decision styles.

7. Raw data from management simulation exercise (INC, DERR, PERR, ST, TT, PTS, AYDR6, APDR6, AEQDR6, ACDR6, AOR6).

8. Rowe's analytic style broken down in terms of feedback/ style (2X2) model.

9. Rowe's behavioral style broken down in terms of feedback/style (2X2) model.

10. Rowe's conceptual style broken down in terms of feedback/style (2X2) model.

11. Rowe's directive style broken down in terms of feedback/style (2X2) model.

12. Rowe's data broken down by Ryan's 2X2 model.

13. Analytic subjects: raw data and attributes of style.

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33. SPSS program listing (lines 10 through 600).

34. SPSS program listing (lines 610 through 1220).

35. SPSS program listing (lines 1230 through 1830).

36. SPSS program listing (lines 1840 through 2300).

37. Raw data for 58-subject sample (INC plus relative data AYDR6 through AOR6.

38. Driver's Hierarchic style broken down in terms of feedback/ decision style (2X2) model.

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RD: DIRECTIVE (RDS= 4)
RA: ANALYTICAL (RDS= 1)
RC: CONCEPTUAL (RDS=3)
RB: BEHAVIORAL (RDS=2)

HI: HIERARCHIC
IN: INTEGRATIVE
FL: FLEXIBLE
DE: DECISIVE

DDS: PRIMARY STYLE
DBU: BACKUP STYLE
1: HIERARCHIC
2: INTEGRATIVE
3: FLEXIBLE
4: DECISIVE
5: COMPLEX

	ROWE'S DECISION STYLE					DRIVER'S DECISION STYLE						WITKIN EMBEDDED FIGURES TEST
ID	RD	RA	RC	RB	RDS	HI	IN	FL	CE	DDS	DBU	WFT
101.	70.	79.	80.	71.	2.00	13.60	35.70	-10.00	46.50	2.00	4.00	21.00
104.	87.	76.	62.	75.	2.00	17.00	32.00	70.00	20.30	3.00	2.00	99.00
106.	61.	105.	83.	51.	1.00	25.40	42.80	0.0	37.30	2.00	1.00	23.00
107.	73.	88.	89.	50.	3.00	61.70	18.70	-60.00	36.50	1.00	4.00	99.00
108.	68.	93.	65.	74.	2.00	22.55	16.00	70.00	23.82	3.00	1.00	25.00
113.	76.	88.	57.	79.	2.00	27.15	38.00	10.00	34.95	2.00	1.00	99.00
115.	65.	88.	78.	65.	2.00	24.70	35.80	0.0	40.00	2.00	1.00	6.00
117.	74.	82.	78.	66.	2.00	50.50	41.55	10.00	26.00	5.00	4.00	15.00
121.	85.	98.	66.	50.	4.00	22.60	19.20	0.0	46.07	4.00	1.00	17.00
123.	75.	73.	74.	78.	2.00	20.60	10.70	50.00	33.00	3.00	1.00	22.00
124.	81.	83.	79.	57.	4.00	32.50	25.05	0.0	40.82	1.00	2.00	11.00
127.	61.	91.	69.	79.	2.00	26.40	7.75	0.0	48.62	4.00	1.00	22.00
128.	99.	95.	99.	99.	0.0	27.60	18.60	-30.00	54.60	4.00	1.00	15.00
129.	68.	98.	90.	43.	3.00	37.40	38.15	0.0	34.80	5.00	4.00	21.00
130.	47.	94.	92.	67.	3.00	11.50	11.50	10.00	49.00	4.00	99.00	99.00
131.	78.	92.	72.	58.	4.00	17.50	38.60	-30.00	51.00	2.00	4.00	24.00
132.	62.	92.	95.	51.	3.00	21.60	11.70	0.0	48.90	4.00	1.00	15.00
133.	73.	93.	87.	47.	3.00	25.00	15.60	0.0	46.47	4.00	1.00	23.00
135.	62.	94.	77.	67.	2.00	13.00	35.40	20.00	37.20	2.00	3.00	25.00
138.	72.	76.	108.	44.	3.00	21.40	24.00	-30.00	55.00	4.00	5.00	20.00
139.	66.	118.	70.	54.	1.00	43.90	35.30	80.00	5.60	3.00	5.00	18.00
141.	72.	92.	83.	53.	3.00	71.80	98.00	-10.00	6.40	2.00	1.00	99.00
142.	103.	104.	55.	38.	4.00	13.80	12.80	-10.00	54.50	4.00	99.00	99.00
143.	88.	91.	58.	63.	4.00	37.00	35.40	30.00	24.60	5.00	3.00	16.00
201.	72.	93.	66.	69.	2.00	14.85	24.70	50.00	33.48	3.00	2.00	25.00
202.	107.	72.	67.	54.	4.00	88.60	21.80	10.00	36.60	1.00	2.00	7.00
204.	72.	112.	63.	53.	1.00	16.30	13.00	50.00	33.60	3.00	4.00	99.00
205.	86.	65.	89.	60.	4.00	13.50	40.80	0.0	41.50	2.00	4.00	11.00
209.	58.	100.	53.	89.	2.00	30.80	28.20	40.00	27.00	3.00	5.00	95.00
214.	93.	65.	65.	58.	4.00	42.30	40.00	0.0	32.60	5.00	4.00	8.00
216.	94.	69.	71.	66.	4.00	11.70	18.80	50.00	33.17	3.00	4.00	99.00
217.	80.	102.	63.	55.	1.00	22.00	28.60	20.00	36.50	4.00	5.00	23.00
219.	54.	65.	68.	83.	2.00	7.80	10.20	-30.00	64.00	4.00	99.00	20.00
222.	76.	63.	58.	63.	3.00	62.00	14.60	-20.00	41.13	1.00	4.00	19.00
223.	49.	93.	97.	61.	3.00	20.85	21.00	80.00	19.38	3.00	5.00	99.00
227.	67.	103.	76.	54.	1.00	14.00	31.20	10.00	41.60	2.00	4.00	21.00
230.	90.	90.	67.	44.	4.00	24.80	31.00	-20.00	48.07	2.00	1.00	13.00
231.	87.	88.	56.	65.	4.00	10.20	58.80	-10.00	40.40	2.00	4.00	18.00
232.	67.	94.	57.	82.	2.00	30.80	49.40	0.0	33.27	2.00	1.00	20.00
236.	52.	84.	103.	61.	3.00	42.00	17.50	10.00	36.83	1.00	4.00	22.00
240.	88.	69.	64.	79.	2.00	6.80	32.00	-10.00	50.40	2.00	4.00	99.00
243.	70.	102.	65.	63.	1.00	18.55	32.50	60.00	22.98	3.00	2.00	99.00
301.	78.	98.	44.	81.	2.00	99.00	99.00	99.00	99.00	99.00	99.00	22.00
304.	75.	88.	81.	56.	3.00	42.00	18.00	10.00	36.67	1.00	4.00	24.00
306.	64.	111.	69.	56.	1.00	34.60	30.50	10.00	35.00	5.00	4.00	99.00
308.	71.	77.	82.	70.	2.00	40.60	34.60	0.0	35.10	5.00	4.00	22.00
310.	72.	111.	71.	46.	1.00	55.10	65.30	0.0	20.00	2.00	1.00	3.00
313.	61.	112.	65.	62.	1.00	28.20	20.50	0.0	43.80	4.00	5.00	19.00
314.	76.	69.	98.	56.	3.00	22.90	58.60	-10.00	36.40	2.00	1.00	99.00
315.	65.	91.	82.	62.	3.00	52.20	32.00	40.00	18.60	1.00	3.00	95.00
318.	69.	112.	74.	45.	1.00	46.40	38.70	50.00	15.00	2.00	5.00	13.00
319.	76.	86.	70.	68.	2.00	59.90	36.60	30.00	17.80	1.00	2.00	23.00
320.	64.	77.	115.	44.	3.00	19.70	19.20	0.0	47.10	4.00	95.00	18.00
321.	68.	82.	76.	74.	2.00	36.00	32.80	-10.00	40.40	5.00	4.00	17.00
324.	64.	97.	84.	55.	1.00	22.70	48.60	40.00	22.50	2.00	3.00	25.00
326.	72.	120.	71.	37.	1.00	28.10	12.00	60.00	26.70	3.00	1.00	20.00
328.	89.	70.	80.	61.	4.00	24.60	25.00	30.00	33.50	3.00	5.00	99.00
331.	65.	90.	98.	47.	3.00	18.00	13.30	-20.00	56.30	4.00	99.00	99.00
333.	65.	77.	87.	71.	2.00	25.50	21.20	40.00	31.10	3.00	5.00	99.00
335.	97.	86.	75.	42.	4.00	5.10	48.10	30.00	32.27	2.00	3.00	95.00
336.	91.	73.	77.	55.	4.00	38.20	35.00	10.00	32.30	5.00	4.00	24.00
337.	53.	92.	103.	52.	3.00	25.00	27.60	-10.00	46.00	4.00	5.00	24.00
338.	64.	60.	114.	62.	3.00	38.20	37.40	70.00	11.50	2.00	5.00	20.00
340.	84.	80.	86.	50.	4.00	9.50	22.70	40.00	35.93	3.00	7.00	24.00
341.	81.	79.	80.	60.	4.00	29.40	20.10	50.00	26.83	3.00	5.00	99.00
343.	77.	95.	74.	54.	1.00	27.70	33.50	0.0	39.62	2.00	1.00	21.00

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ID	LE	GIAL	E	I	S	N	T	F	J	P	MBT
	ROTTER INTERNAL-EXTERNAL TEST	GENERAL INCONGRUITY ADAPTATION LEVEL TEST	MYERS - BRIGGS TEST								
101.	19.	67.	99.00	31.00	21.00	99.00	99.00	3.00	15.00	95.00	3.00
104.	12.	39.	99.00	31.00	19.00	99.00	13.00	99.00	99.00	1.00	1.00
106.	8.	59.	99.00	35.00	13.00	99.00	99.00	13.00	47.00	99.00	3.00
107.	15.	53.	19.00	95.00	5.00	99.00	99.00	7.00	99.00	11.00	3.00
108.	14.	34.	99.00	25.00	99.00	11.00	11.00	95.00	99.00	1.00	2.00
113.	9.	58.	27.00	99.00	99.00	7.00	5.00	99.00	99.00	5.00	2.00
115.	3.	58.	3.00	95.00	99.00	21.00	99.00	35.00	99.00	27.00	4.00
117.	11.	46.	5.00	95.00	99.00	29.00	29.00	99.00	31.00	95.00	2.00
121.	16.	62.	99.00	1.00	99.00	7.00	15.00	95.00	17.00	99.00	2.00
123.	12.	76.	99.00	17.00	15.00	99.00	99.00	23.00	25.00	99.00	3.00
124.	15.	43.	99.00	21.00	7.00	99.00	99.00	7.00	99.00	9.00	3.00
127.	8.	57.	19.00	99.00	99.00	17.00	99.00	3.00	19.00	99.00	4.00
128.	99.	99.	25.00	99.00	99.00	3.00	99.00	17.00	7.00	99.00	4.00
129.	17.	66.	95.00	31.00	99.00	17.00	7.00	99.00	99.00	13.00	2.00
130.	12.	36.	99.00	21.00	29.00	99.00	33.00	99.00	41.00	99.00	1.00
131.	9.	59.	99.00	99.00	99.00	99.00	99.00	99.00	99.00	95.00	99.00
132.	9.	46.	27.00	99.00	23.00	99.00	21.00	99.00	99.00	19.00	1.00
133.	18.	46.	23.00	99.00	99.00	35.00	27.00	99.00	17.00	95.00	2.00
135.	14.	62.	49.00	99.00	17.00	99.00	99.00	15.00	99.00	11.00	3.00
138.	19.	46.	25.00	99.00	99.00	25.00	21.00	99.00	99.00	13.00	2.00
139.	14.	60.	99.00	23.00	99.00	27.00	23.00	95.00	5.00	99.00	2.00
141.	18.	59.	33.00	95.00	7.00	99.00	15.00	99.00	1.00	99.00	1.00
142.	17.	62.	17.00	99.00	99.00	17.00	37.00	95.00	17.00	99.00	2.00
143.	9.	54.	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
201.	7.	69.	99.00	43.00	33.00	99.00	99.00	9.00	35.00	95.00	3.00
202.	10.	64.	99.00	51.00	13.00	99.00	25.00	95.00	27.00	99.00	1.00
204.	15.	48.	25.00	99.00	9.00	99.00	25.00	95.00	99.00	21.00	1.00
205.	18.	66.	11.00	99.00	25.00	99.00	17.00	99.00	11.00	99.00	1.00
209.	10.	61.	21.00	99.00	35.00	99.00	5.00	99.00	39.00	99.00	1.00
214.	18.	37.	3.00	99.00	41.00	99.00	41.00	99.00	95.00	35.00	1.00
216.	18.	66.	99.00	17.00	27.00	99.00	9.00	99.00	1.00	99.00	1.00
217.	17.	61.	3.00	99.00	99.00	5.00	21.00	99.00	21.00	99.00	2.00
219.	5.	63.	33.00	99.00	99.00	15.00	99.00	15.00	95.00	25.00	4.00
222.	20.	51.	33.00	95.00	99.00	15.00	5.00	99.00	27.00	99.00	2.00
223.	12.	60.	99.00	9.00	9.00	95.00	99.00	15.00	29.00	99.00	3.00
227.	13.	53.	27.00	99.00	9.00	99.00	11.00	99.00	15.00	99.00	1.00
230.	17.	64.	99.00	9.00	1.00	99.00	53.00	99.00	5.00	95.00	1.00
231.	13.	52.	9.00	99.00	17.00	99.00	25.00	99.00	99.00	3.00	1.00
232.	15.	53.	27.00	99.00	11.00	95.00	41.00	95.00	5.00	95.00	1.00
236.	10.	57.	99.00	41.00	7.00	99.00	25.00	99.00	25.00	99.00	1.00
240.	15.	52.	39.00	99.00	99.00	39.00	13.00	99.00	99.00	17.00	2.00
243.	8.	51.	17.00	99.00	99.00	7.00	5.00	99.00	99.00	1.00	2.00
301.	99.	74.	49.00	99.00	55.00	99.00	99.00	51.00	51.00	99.00	3.00
304.	9.	99.	37.00	99.00	25.00	99.00	99.00	9.00	99.00	31.00	3.00
306.	18.	57.	9.00	99.00	99.00	31.00	17.00	95.00	99.00	27.00	2.00
308.	11.	69.	99.00	11.00	19.00	99.00	99.00	17.00	9.00	99.00	3.00
310.	99.	53.	99.00	5.00	21.00	95.00	29.00	99.00	47.00	99.00	1.00
313.	16.	57.	9.00	99.00	99.00	33.00	95.00	21.00	99.00	9.00	4.00
314.	15.	68.	21.00	99.00	99.00	27.00	25.00	99.00	99.00	15.00	2.00
315.	15.	53.	23.00	95.00	99.00	33.00	37.00	99.00	99.00	29.00	2.00
318.	21.	41.	23.00	99.00	99.00	9.00	11.00	95.00	21.00	99.00	2.00
319.	9.	63.	99.00	41.00	31.00	99.00	23.00	95.00	41.00	99.00	1.00
320.	17.	38.	17.00	55.00	19.00	99.00	35.00	99.00	99.00	3.00	1.00
321.	11.	39.	25.00	99.00	17.00	99.00	25.00	95.00	23.00	99.00	1.00
324.	14.	52.	19.00	99.00	99.00	1.00	21.00	99.00	21.00	95.00	2.00
326.	18.	48.	13.00	99.00	39.00	99.00	49.00	99.00	49.00	99.00	1.00
328.	16.	63.	3.00	99.00	25.00	99.00	21.00	99.00	99.00	17.00	1.00
331.	16.	53.	99.00	15.00	99.00	7.00	45.00	99.00	95.00	33.00	2.00
333.	3.	49.	99.00	7.00	99.00	41.00	99.00	5.00	99.00	49.00	4.00
335.	10.	65.	99.00	27.00	99.00	5.00	95.00	5.00	99.00	11.00	4.00
336.	11.	55.	95.00	29.00	21.00	99.00	95.00	15.00	19.00	95.00	3.00
337.	22.	55.	49.00	95.00	99.00	33.00	47.00	99.00	99.00	31.00	2.00
338.	6.	47.	99.00	7.00	99.00	33.00	13.00	99.00	99.00	23.00	2.00
340.	11.	58.	13.00	99.00	5.00	99.00	37.00	95.00	1.00	99.00	1.00
341.	14.	63.	7.00	95.00	35.00	99.00	99.00	7.00	43.00	99.00	3.00
343.	6.	45.	43.00	99.00	17.00	99.00	17.00	95.00	99.00	35.00	1.00

MBT TYPE
1 = S-T
2 = N-T
3 = S-F
4 = N-F

KEY
99 = MISSING VALUE

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N	ID	RD	RA	RC	RB	RAN	RBN	RCN	RDN	RDS	DDS
1	106.00	61.00	105.00	83.00	51.00	1.14	-0.81	0.48	-1.05	1.00	2.00
2	107.00	73.00	88.00	89.00	50.00	-0.12	-0.89	0.91	0.01	3.00	1.00
3	108.00	68.00	93.00	65.00	74.00	0.25	1.11	-0.82	-0.43	2.00	3.00
4	113.00	76.00	88.00	57.00	79.00	-0.12	1.53	-1.40	0.28	2.00	2.00
5	115.00	65.00	88.00	78.00	69.00	-0.12	0.70	0.12	-0.70	2.00	2.00
6	117.00	74.00	82.00	78.00	66.00	-0.57	0.45	0.12	0.10	2.00	5.00
7	121.00	85.00	98.00	66.00	50.00	0.62	-0.89	-0.75	1.08	4.00	4.00
8	123.00	75.00	73.00	74.00	78.00	-1.24	1.45	-0.17	0.19	2.00	3.00
9	124.00	81.00	83.00	79.00	57.00	-0.50	-0.30	0.19	0.73	4.00	1.00
10	127.00	61.00	91.00	69.00	79.00	0.10	1.53	-0.53	-1.05	2.00	4.00
11	129.00	68.00	98.00	90.00	43.00	0.62	-1.47	0.99	-0.43	3.00	5.00
12	130.00	47.00	94.00	92.00	67.00	0.32	0.53	1.13	-2.30	3.00	4.00
13	131.00	78.00	92.00	72.00	58.00	0.17	-0.22	-0.32	0.46	4.00	2.00
14	132.00	62.00	92.00	95.00	51.00	0.17	-0.81	1.35	-0.96	3.00	4.00
15	133.00	73.00	93.00	87.00	47.00	0.25	-1.14	0.77	0.01	3.00	4.00
16	135.00	62.00	94.00	77.00	67.00	0.32	0.53	0.04	-0.96	2.00	2.00
17	138.00	72.00	76.00	108.00	44.00	-1.02	-1.39	2.29	-0.07	3.00	4.00
18	139.00	66.00	110.00	70.00	54.00	1.52	-0.55	-0.46	-0.61	1.00	3.00
19	141.00	72.00	92.00	83.00	53.00	0.17	-0.64	0.48	-0.07	3.00	2.00
20	143.00	88.00	91.00	58.00	63.00	0.10	0.20	-1.33	1.35	4.00	5.00
21	201.00	72.00	93.00	66.00	69.00	0.25	0.70	-0.75	-0.07	2.00	3.00
22	204.00	72.00	112.00	63.00	53.00	1.67	-0.64	-0.97	-0.07	1.00	3.00
23	205.00	86.00	65.00	89.00	50.00	-1.84	-0.05	0.91	1.17	4.00	2.00
24	209.00	58.00	100.00	53.00	89.00	0.77	2.37	-1.69	-1.32	2.00	3.00
25	214.00	93.00	69.00	65.00	58.00	-1.54	-0.22	-0.82	1.79	4.00	5.00
26	216.00	94.00	69.00	71.00	66.00	-1.54	0.45	-0.39	1.88	4.00	3.00
27	217.00	80.00	102.00	63.00	55.00	0.92	-0.47	-0.97	0.64	1.00	4.00
28	219.00	84.00	65.00	68.00	83.00	-1.84	1.87	-0.61	0.99	2.00	4.00
29	222.00	76.00	63.00	98.00	63.00	-1.99	0.20	1.57	0.28	3.00	1.00
30	223.00	49.00	93.00	97.00	61.00	0.25	0.03	1.49	-2.12	3.00	3.00
31	227.00	67.00	103.00	76.00	54.00	0.99	-0.55	-0.03	-0.52	1.00	2.00
32	230.00	90.00	90.00	67.00	44.00	0.02	-1.39	-0.68	1.53	4.00	2.00
33	231.00	87.00	88.00	56.00	69.00	-0.12	0.70	-1.48	1.26	4.00	2.00
34	232.00	67.00	94.00	57.00	82.00	0.32	1.78	-1.40	-0.52	2.00	2.00
35	236.00	52.00	84.00	103.00	61.00	-0.42	0.03	1.93	-1.85	3.00	1.00
36	240.00	88.00	69.00	64.00	79.00	-1.54	1.53	-0.90	1.35	2.00	2.00
37	243.00	70.00	102.00	65.00	63.00	0.92	0.20	-0.82	-0.25	1.00	3.00
38	301.00	78.00	98.00	44.00	81.00	0.62	1.70	-2.35	0.46	2.00	99.00
39	304.00	75.00	88.00	81.00	56.00	-0.12	-0.39	0.33	0.19	3.00	1.00
40	306.00	64.00	111.00	69.00	56.00	1.59	-0.39	-0.53	-0.79	1.00	5.00
41	308.00	71.00	77.00	82.00	70.00	-0.94	0.78	0.41	-0.16	2.00	5.00
42	310.00	72.00	111.00	71.00	46.00	1.59	-1.22	-0.39	-0.07	1.00	2.00
43	313.00	61.00	112.00	65.00	62.00	1.67	0.11	-0.82	-1.05	1.00	4.00
44	314.00	76.00	69.00	98.00	56.00	-1.54	-0.39	1.57	0.28	3.00	2.00
45	315.00	65.00	91.00	82.00	62.00	0.10	0.11	0.41	-0.78	3.00	1.00
46	318.00	69.00	112.00	74.00	45.00	1.67	-1.31	-0.17	-0.34	1.00	3.00
47	319.00	76.00	86.00	70.00	68.00	-0.27	0.61	-0.46	0.28	2.00	1.00
48	321.00	66.00	82.00	76.00	74.00	-0.57	1.11	-0.03	-0.43	2.00	5.00
49	326.00	72.00	120.00	71.00	37.00	2.26	-1.97	-0.39	-0.07	1.00	3.00
50	331.00	65.00	90.00	98.00	47.00	0.02	-1.14	1.57	-0.70	3.00	4.00
51	333.00	65.00	77.00	87.00	71.00	-0.94	0.86	0.77	-0.70	2.00	3.00
52	335.00	97.00	86.00	75.00	42.00	-0.27	-1.56	-0.10	2.15	4.00	2.00
53	336.00	91.00	73.00	77.00	59.00	-1.24	-0.14	0.04	1.62	4.00	5.00
54	337.00	53.00	92.00	103.00	52.00	0.17	-0.72	1.93	-1.76	3.00	4.00
55	340.00	84.00	80.00	86.00	50.00	-0.72	-0.89	0.70	0.99	4.00	3.00
56	341.00	81.00	79.00	80.00	60.00	-0.80	-0.05	0.26	0.73	4.00	3.00
57	343.00	77.00	95.00	74.00	54.00	0.40	-0.55	-0.17	0.37	1.00	2.00

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CASE-N	ID	HI	IN	FL	DE	DDS	DBU	DNS
1	106.00	25.40	42.80	0.0	37.30	2.00	1.00	2.00
2	107.00	61.70	18.70	-10.00	36.50	1.00	4.00	1.00
3	108.00	22.55	16.00	70.00	23.82	3.00	1.00	3.00
4	113.00	27.15	38.00	10.00	34.95	2.00	1.00	2.00
5	115.00	24.70	35.80	0.0	40.00	2.00	1.00	2.00
6	117.00	50.50	41.55	10.00	26.00	5.00	4.00	1.00
7	121.00	22.60	19.20	0.0	46.07	4.00	1.00	4.00
8	123.00	20.60	10.70	50.00	33.00	3.00	1.00	3.00
9	124.00	32.50	25.05	0.0	40.82	1.00	2.00	4.00
10	127.00	26.40	7.75	0.0	48.62	4.00	1.00	4.00
11	129.00	37.40	38.15	0.0	34.80	5.00	4.00	1.00
12	130.00	11.50	11.50	10.00	49.00	4.00	99.00	4.00
13	131.00	17.50	38.60	-30.00	51.30	2.00	4.00	4.00
14	132.00	21.60	11.70	0.0	48.90	4.00	1.00	4.00
15	133.00	25.00	15.60	0.0	46.47	4.00	1.00	4.00
16	135.00	13.00	35.35	20.00	37.20	2.00	3.00	2.00
17	138.00	21.40	24.00	-30.00	54.90	4.00	5.00	4.00
18	139.00	43.90	39.00	80.00	5.62	3.00	5.00	3.00
19	141.00	71.80	98.00	-10.00	6.40	2.00	1.00	2.00
20	143.00	37.00	39.40	30.00	24.60	5.00	3.00	2.00
21	201.00	4.85	24.70	50.00	33.48	3.00	2.00	3.00
22	204.00	16.30	13.00	50.00	33.60	3.00	4.00	3.00
23	205.00	13.50	40.80	0.0	41.90	2.00	4.00	2.00
24	209.00	30.80	28.20	40.00	27.00	3.00	5.00	3.00
25	214.00	42.25	39.90	0.0	32.60	5.00	4.00	1.00
26	216.00	11.70	18.80	50.00	33.17	3.00	4.00	3.00
27	217.00	22.00	28.60	20.00	36.50	4.00	5.00	3.00
28	219.00	7.80	10.20	-30.00	64.00	4.00	99.00	4.00
29	222.00	62.00	14.60	-20.00	41.13	1.00	4.00	1.00
30	223.00	20.85	21.00	80.00	19.38	3.00	5.00	3.00
31	227.00	14.10	31.20	10.00	41.60	2.00	4.00	4.00
32	230.00	24.80	31.00	-20.00	48.07	2.00	1.00	4.00
33	231.00	10.15	59.00	-10.00	40.40	2.00	4.00	2.00
34	232.00	30.80	49.40	0.0	33.27	2.00	1.00	2.00
35	236.00	42.00	17.50	10.00	36.83	1.00	4.00	1.00
36	240.00	6.80	32.00	-10.00	50.40	2.00	4.00	4.00
37	243.00	18.55	32.50	60.00	22.98	3.00	2.00	3.00
38	301.00	99.00	99.00	99.00	99.00	99.00	99.00	4.00
39	304.00	42.00	18.00	10.00	36.67	1.00	4.00	1.00
40	306.00	34.60	30.50	10.00	35.00	5.00	4.00	1.00
41	308.00	40.60	34.00	0.0	35.12	5.00	4.00	1.00
42	310.00	55.10	65.30	0.0	19.90	2.00	1.00	2.00
43	313.00	28.20	20.50	0.0	43.80	4.00	5.00	4.00
44	314.00	22.90	58.00	-10.00	36.40	2.00	1.00	2.00
45	315.00	52.20	32.00	40.00	18.60	1.00	3.00	1.00
46	318.00	46.40	38.65	50.00	15.00	3.00	5.00	3.00
47	319.00	60.00	36.60	30.00	17.83	1.00	2.00	1.00
48	321.00	36.00	32.80	-10.00	40.40	5.00	4.00	1.00
49	326.00	28.00	12.00	60.00	26.70	3.00	1.00	3.00
50	331.00	18.00	13.30	-20.00	56.30	4.00	99.00	4.00
51	333.00	25.50	21.20	40.00	31.10	3.00	5.00	3.00
52	335.00	5.10	48.10	30.00	32.27	2.00	3.00	2.00
53	336.00	38.20	35.00	10.00	32.30	5.00	4.00	1.00
54	337.00	25.00	27.60	-10.00	46.00	4.00	5.00	4.00
55	340.00	9.50	22.70	40.00	35.93	3.00	2.00	3.00
56	341.00	29.40	20.10	50.00	26.83	3.00	5.00	3.00
57	343.00	27.70	33.45	0.0	39.60	2.00	1.00	4.00

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CASE-N	DHN	DIN	DFN	DDN	DNS
1	-0.22	0.80	-0.47	0.12	2.00
2	2.13	-0.72	-0.82	0.06	1.00
3	-0.41	-0.89	1.98	-1.02	3.00
4	-0.11	0.50	-0.12	-0.08	2.00
5	-0.27	0.36	-0.47	0.35	2.00
6	1.40	0.72	-0.12	-0.83	1.00
7	-0.41	-0.69	-0.47	0.86	4.00
8	-0.54	-1.22	1.28	-0.24	3.00
9	0.24	-0.32	-0.47	0.42	4.00
10	-0.16	-1.41	-0.47	1.08	4.00
11	0.55	0.50	-0.47	-0.09	1.00
12	-1.13	-1.17	-0.12	1.11	4.00
13	-0.74	0.53	-1.52	1.31	4.00
14	-0.47	-1.16	-0.47	1.10	4.00
15	-0.25	-0.92	-0.47	0.90	4.00
16	-1.03	0.33	0.23	0.11	2.00
17	-0.48	-0.39	-1.52	1.61	4.00
18	0.97	0.56	2.33	-2.55	3.00
19	2.78	4.28	-0.82	-2.49	2.00
20	0.53	0.58	0.58	-0.95	2.00
21	-1.56	-0.34	1.28	-0.20	3.00
22	-0.81	-1.08	1.28	-0.19	3.00
23	-1.00	0.67	-0.47	0.51	2.00
24	0.13	-0.12	0.93	-0.75	3.00
25	0.87	0.62	-0.47	-0.27	1.00
26	-1.11	-0.71	1.28	-0.23	3.00
27	-0.45	-0.10	0.23	0.06	3.00
28	-1.37	-1.26	-1.52	2.38	4.00
29	2.15	-0.98	-1.17	0.45	1.00
30	-0.52	-0.58	2.33	-1.39	3.00
31	-0.96	0.07	-0.12	0.49	4.00
32	-0.26	0.05	-1.17	1.03	4.00
33	-1.21	1.82	-0.82	0.39	2.00
34	0.13	1.21	-0.47	-0.22	2.00
35	0.85	-0.80	-0.12	0.08	1.00
36	-1.43	0.12	-0.82	1.23	4.00
37	-0.67	0.15	1.63	-1.09	3.00
38	4.55	4.34	2.99	5.33	4.00
39	0.85	-0.76	-0.12	0.07	1.00
40	0.37	0.02	-0.12	-0.07	1.00
41	0.76	0.24	-0.47	-0.06	1.00
42	1.70	2.22	-0.47	-1.35	2.00
43	-0.04	-0.61	-0.47	0.67	4.00
44	-0.39	1.76	-0.82	0.05	2.00
45	1.51	0.12	0.93	-1.46	1.00
46	1.14	0.54	1.28	-1.76	3.00
47	2.02	0.41	0.58	-1.52	1.00
48	0.46	0.17	-0.82	0.39	1.00
49	-0.06	-1.14	1.63	-0.77	3.00
50	-0.70	-1.06	-1.17	1.73	4.00
51	-0.22	-0.56	0.93	-0.40	3.00
52	-1.54	1.13	0.58	-0.30	2.00
53	0.60	0.31	-0.12	-0.30	1.00
54	-0.25	-0.16	-0.82	0.86	4.00
55	-1.26	-0.47	0.93	0.01	3.00
56	0.03	-0.63	1.28	-0.76	3.00
57	-0.08	0.21	-0.47	0.32	4.00

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CASE-N	ID	DDS	DBU	RDS	R	DNS
1	106.00	2.00	1.00	1.00	1.00	2.00
2	107.00	1.00	4.00	3.00	0.0	1.00
3	108.00	3.00	1.00	2.00	0.0	3.00
4	113.00	2.00	1.00	2.00	0.0	2.00
5	115.00	2.00	1.00	2.00	0.0	2.00
6	117.00	5.00	4.00	2.00	0.0	1.00
7	121.00	4.00	1.00	4.00	5.00	4.00
8	123.00	3.00	1.00	2.00	0.0	3.00
9	124.00	1.00	2.00	4.00	6.00	4.00
10	127.00	4.00	1.00	2.00	0.0	4.00
11	129.00	5.00	4.00	3.00	3.00	1.00
12	130.00	4.00	99.00	3.00	0.0	4.00
13	131.00	2.00	4.00	4.00	5.00	4.00
14	132.00	4.00	1.00	3.00	3.00	4.00
15	133.00	4.00	1.00	3.00	3.00	4.00
16	135.00	2.00	3.00	2.00	0.0	2.00
17	138.00	4.00	5.00	3.00	0.0	4.00
18	139.00	3.00	5.00	1.00	0.0	3.00
19	141.00	2.00	1.00	3.00	3.00	2.00
20	143.00	5.00	3.00	4.00	0.0	2.00
21	201.00	3.00	2.00	2.00	0.0	3.00
22	204.00	3.00	4.00	1.00	0.0	3.00
23	205.00	2.00	4.00	4.00	6.00	2.00
24	209.00	3.00	5.00	2.00	0.0	3.00
25	214.00	5.00	4.00	4.00	0.0	1.00
26	216.00	3.00	4.00	4.00	0.0	3.00
27	217.00	4.00	5.00	1.00	2.00	3.00
28	219.00	4.00	99.00	2.00	0.0	4.00
29	222.00	1.00	4.00	3.00	4.00	1.00
30	223.00	3.00	5.00	3.00	3.00	3.00
31	227.00	2.00	4.00	1.00	0.0	4.00
32	230.00	2.00	1.00	4.00	0.0	4.00
33	231.00	2.00	4.00	4.00	0.0	2.00
34	232.00	2.00	1.00	2.00	0.0	2.00
35	236.00	1.00	4.00	3.00	0.0	1.00
36	240.00	2.00	4.00	2.00	0.0	4.00
37	243.00	3.00	2.00	1.00	0.0	3.00
38	301.00	99.00	99.00	2.00	0.0	4.00
39	304.00	1.00	4.00	3.00	4.00	1.00
40	306.00	5.00	4.00	1.00	0.0	1.00
41	308.00	5.00	4.00	2.00	0.0	1.00
42	310.00	2.00	1.00	1.00	0.0	2.00
43	313.00	4.00	5.00	1.00	0.0	4.00
44	314.00	2.00	1.00	3.00	4.00	2.00
45	315.00	1.00	3.00	3.00	3.00	1.00
46	318.00	3.00	5.00	1.00	0.0	3.00
47	319.00	1.00	2.00	2.00	0.0	1.00
48	321.00	5.00	4.00	2.00	0.0	1.00
49	326.00	3.00	1.00	1.00	0.0	3.00
50	331.00	4.00	99.00	3.00	0.0	4.00
51	333.00	3.00	5.00	2.00	0.0	3.00
52	335.00	2.00	3.00	4.00	0.0	2.00
53	336.00	5.00	4.00	4.00	0.0	1.00
54	337.00	4.00	5.00	3.00	3.00	4.00
55	340.00	3.00	2.00	4.00	6.00	3.00
56	341.00	3.00	5.00	4.00	6.00	3.00
57	343.00	2.00	1.00	1.00	2.00	4.00

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N	ID	INC	DEHR	PERR	ST	TT	PTS	IE	GIAL	DCS
1	106.	96.	49302.	22512.	164.	90.	149.00	8.00	59.00	2.00
2	107.	171.	16195.	6330.	185.	58.	149.00	15.00	53.00	1.00
3	108.	179.	5662.	2549.	181.	78.	202.00	14.00	34.00	3.00
4	113.	103.	60073.	14346.	88.	95.	143.00	9.00	58.00	2.00
5	115.	110.	75727.	18910.	153.	93.	152.00	3.00	58.00	2.00
6	117.	87.	101624.	6587.	156.	78.	88.00	11.00	46.00	5.00
7	121.	150.	24970.	13096.	164.	85.	169.00	16.00	62.00	4.00
8	123.	163.	34417.	20747.	123.	87.	203.00	12.00	76.00	3.00
9	124.	65.	110723.	6466.	132.	97.	157.00	15.00	46.00	1.00
10	127.	106.	69799.	3792.	92.	90.	119.00	8.00	57.00	4.00
11	128.	93.	69405.	56329.	91.	50.	92.00	99.00	99.00	4.00
12	129.	103.	9155.	54948.	103.	80.	112.00	17.00	66.00	5.00
13	130.	122.	54226.	11255.	136.	95.	184.00	12.00	39.00	4.00
14	131.	159.	41589.	33072.	89.	65.	116.00	9.00	59.00	2.00
15	132.	131.	12189.	24384.	141.	40.	174.00	5.00	46.00	4.00
16	133.	183.	2386.	2976.	145.	73.	190.00	18.00	46.00	4.00
17	135.	101.	75951.	9512.	94.	45.	180.00	14.00	62.00	2.00
18	138.	154.	29151.	2794.	87.	63.	181.00	19.00	48.00	4.00
19	139.	173.	12198.	3708.	168.	98.	184.00	14.00	60.00	3.00
20	141.	156.	11491.	28180.	180.	65.	115.00	18.00	59.00	2.00
21	143.	173.	8474.	12156.	159.	97.	184.00	9.00	54.00	5.00
22	201.	182.	5760.	2625.	122.	85.	198.00	7.00	69.00	3.00
23	204.	178.	11042.	4119.	188.	62.	178.00	15.00	46.00	3.00
24	205.	172.	16998.	7493.	164.	93.	167.00	15.00	66.00	2.00
25	209.	150.	16090.	17360.	183.	72.	113.00	10.00	61.00	3.00
26	214.	111.	30855.	18813.	165.	53.	110.00	18.00	37.00	5.00
27	216.	154.	15679.	12416.	150.	45.	135.00	16.00	66.00	3.00
28	217.	115.	56257.	24974.	142.	68.	175.00	17.00	61.00	4.00
29	219.	94.	87124.	4513.	96.	93.	129.00	5.00	63.00	4.00
30	222.	63.	116414.	8189.	88.	48.	171.00	20.00	51.00	1.00
31	223.	137.	90595.	19875.	120.	53.	90.00	12.00	60.00	3.00
32	227.	120.	65164.	2435.	181.	77.	149.00	13.00	53.00	2.00
33	230.	127.	58585.	11445.	93.	95.	128.00	17.00	64.00	2.00
34	231.	73.	33713.	73794.	185.	57.	111.00	13.00	52.00	2.00
35	232.	145.	28488.	24338.	178.	48.	134.00	15.00	53.00	2.00
36	236.	152.	30553.	15046.	122.	82.	140.00	10.00	57.00	1.00
37	240.	129.	32608.	15096.	113.	85.	116.00	15.00	52.00	2.00
38	243.	106.	56752.	7763.	178.	40.	142.00	8.00	51.00	3.00
39	301.	18.	158048.	3682.	141.	52.				
40	304.	153.	20220.	3168.	140.	90.	161.00	9.00	99.00	1.00
41	306.	130.	44203.	8926.	133.	53.	174.00	18.00	57.00	5.00
42	308.	106.	85300.	23975.	142.	67.	115.00	11.00	69.00	5.00
43	310.	48.	90500.	12214.	166.	58.	150.00	99.00	53.00	2.00
44	313.	56.	142985.	10336.	93.	88.	137.00	16.00	57.00	4.00
45	314.	160.	19443.	5346.	119.	100.	190.00	15.00	68.00	2.00
46	315.	164.	23452.	8960.	158.	98.	123.00	15.00	53.00	1.00
47	318.	-102.	294805.	15178.	111.	58.				
48	319.	120.	68401.	5665.	123.	73.	190.00	9.00	63.00	1.00
49	321.	173.	22274.	9339.	111.	80.	132.00	11.00	39.00	5.00
50	326.	154.	36546.	10397.	140.	40.	150.00	16.00	48.00	3.00
51	331.	134.	38444.	18283.	176.	52.	92.00	16.00	53.00	4.00
52	333.	170.	18851.	8716.	116.	48.	185.00	3.00	49.00	3.00
53	335.	132.	50198.	4619.	94.	97.	186.00	10.00	65.00	2.00
54	336.	124.	48330.	5407.	125.	95.	175.00	11.00	55.00	5.00
55	337.	175.	11258.	8272.	114.	98.	192.00	22.00	55.00	4.00
56	340.	147.	41153.	10085.	158.	73.	129.00	11.00	50.00	3.00
57	341.	136.	48644.	4302.	101.	87.	173.00	14.00	63.00	3.00
58	343.	159.	21481.	10630.	183.	67.	138.00	6.00	45.00	2.00

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ROWE'S
ANALYTIC (RDS = 1)

DECISION FEEDBACK TREATMENT

DECISION STYLE EFFECT	DEC = 0	DEC = 1	TOTAL
0	1/N = 20 INC = 131.0 AYDRG = 0.95 DERR = 48.5 PTS = 151.8 IE = 12.1 GIAL = 57.4 WFT = 18.1	2/N = 25 INC = 135.9 AYDRG = 0.79 DERR = 39.6 PTS = 150.6 IE = 13.2 GIAL = 55.8 WFT = 20.2	3/N = 45 INC = 133.7 AYDRG = 0.86 DERR = 43.6 PTS = 151.1 IE = 12.7 GIAL = 56.5 WFT = 19.3
1	4/N = 7 INC = 74.4 AYDRG = 1.96 DERR = 98.4 PTS = 160.7 IE = 15.8 GIAL = 53.4 WFT = 16.2	5/N = 5 INC = 142.4 AYDRG = 0.77 DERR = 38.4 PTS = 152.6 IE = 11.4 GIAL = 51.4 WFT = 20.0	6/N = 12 INC = 102.8 AYDRG = 1.46 DERR = 73.4 PTS = 157.3 IE = 13.8 GIAL = 52.6 WFT = 17.9
TOTAL	7/N = 27 INC = 116.3 AYDRG = 1.21 DERR = 61.5 PTS = 154.1 IE = 13.0 GIAL = 56.3 WFT = 17.6	8/N = 30 INC = 137.0 AYDRG = 0.79 DERR = 39.4 PTS = 151.0 IE = 12.9 GIAL = 55.0 WFT = 20.2	9/N = 57 INC = 127.2 AYDRG = 0.99 DERR = 49.9 PTS = 152.4 IE = 12.9 GIAL = 55.6 WFT = 19.0

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ROWE'S
BEHAVORIAL (RDS = 2)

DECISION FEEDBACK TREATMENT

		DEC = 0	DEC = 1	TOTAL
DECISION STYLE EFFECT	0	1/ N = 16 INC = 113.7 AYDRG = 1.20 DERR = 60.8 PTS = 156.8 IE = 15.6 GIAL = 55.3 WFT = 16.0	2/ N = 24 INC = 137.3 AYDRG = 0.77 DERR = 38.5 PTS = 149.7 IE = 13.3 GIAL = 54.3 WFT = 19.7	3/ N = 40 INC = 127.9 AYDRG = 0.95 DERR = 47.4 PTS = 152.5 IE = 14.2 GIAL = 54.7 WFT = 18.3
	1	4/ N = 11 INC = 120.2 AYDRG = 1.73 DERR = 62.4 PTS = 150.2 IE = 9.0 GIAL = 57.6 WFT = 19.4	5/ N = 6 INC = 135.7 AYDRG = 0.85 DERR = 43.4 PTS = 156.2 IE = 11.2 GIAL = 58.2 WFT = 22.3	6/ N = 17 INC = 125.6 AYDRG = 1.10 DERR = 55.7 PTS = 152.3 IE = 9.8 GIAL = 57.8 WFT = 20.3
TOTAL		7/ N = 27 INC = 116.3 AYDRG = 1.21 DERR = 61.5 PTS = 154.1 IE = 13.0 GIAL = 56.3 WFT = 17.6	8/ N = 30 INC = 137.0 AYDRG = 0.79 DERR = 39.4 PTS = 151.0 IE = 12.9 GIAL = 55.0 WFT = 20.2	9/ N = 57 INC = 127.2 AYDRG = 0.99 DERR = 49.9 PTS = 152.4 IE = 12.9 GIAL = 55.6 WFT = 19.0

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ROWE'S
CONCEPTUAL (RDS=3)

DECISION FEEDBACK TREATMENT

DECISION STYLE EFFECT	DEC = 0	DEC = 1	TOTAL
0	1/ N = 22 INC = 110.5 AYDRG = 1.32 DERR = 66.5 PTS = 153.0 IE = 12.5 GIAL = 56.3 WFT = 17.2	2/ N = 20 INC = 133.1 AYDRG = 0.89 DERR = 44.7 PTS = 153.0 IE = 11.7 GIAL = 56.1 WFT = 19.9	3/ N = 42 INC = 121.2 AYDRG = 1.11 DERR = 56.1 PTS = 153.0 IE = 12.1 GIAL = 56.2 WFT = 18.5
1	4/ N = 5 INC = 142.2 AYDRG = 0.76 DERR = 39.1 PTS = 158.8 IE = 14.8 GIAL = 56.3 WFT = 21.5	5/ N = 10 INC = 144.7 AYDRG = 0.59 DERR = 28.9 PTS = 147.0 IE = 15.3 GIAL = 52.9 WFT = 20.8	6/ N = 15 INC = 143.9 AYDRG = 0.65 DERR = 32.3 PTS = 150.9 IE = 15.1 GIAL = 53.9 WFT = 21.0
TOTAL	7/ N = 27 INC = 116.3 AYDRG = 1.21 DERR = 61.5 PTS = 154.1 IE = 13.0 GIAL = 56.3 WFT = 17.6	8/ N = 30 INC = 137.0 AYDRG = 0.79 DERR = 39.4 PTS = 151.0 IE = 12.9 GIAL = 55.0 WFT = 20.2	9/ N = 57 INC = 127.2 AYDRG = 0.99 DERR = 49.9 PTS = 152.4 IE = 12.9 GIAL = 55.6 WFT = 19.0

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ROWE'S

DIRECTIVE (RDS = 4)

DECISION STYLE EFFECT		DECISION FEEDBACK TREATMENT: DEC = 0	DEC = 1	TOTAL
	0	1/ N = 23 INC = 111.0 AYDRG = 1.35 DERR = 68.3 PTS = 155.3 IE = 12.3 GIAL = 56.0 WFT = 18.7	2/ N = 21 INC = 141.6 AYDRG = 0.71 DERR = 35.3 PTS = 151.0 IE = 13.2 GIAL = 54.0 WFT = 21.0	3/ N = 44 INC = 125.6 AYDRG = 1.04 DERR = 52.6 PTS = 153.2 IE = 12.8 GIAL = 55.1 WFT = 19.8
	1	4/ N = 4 INC = 146.8 AYDRG = 0.43 DERR = 22.1 PTS = 147.3 IE = 16.3 GIAL = 57.8 WFT = 12.0	5/ N = 9 INC = 126.2 AYDRG = 0.98 DERR = 49.0 PTS = 151.0 IE = 12.1 GIAL = 57.3 WFT = 18.6	6/ N = 13 INC = 132.5 AYDRG = 0.81 DERR = 40.8 PTS = 149.8 IE = 13.3 GIAL = 57.5 WFT = 16.6
	TOTAL	7/ N = 27 INC = 116.3 AYDRG = 1.21 DERR = 61.5 PTS = 154.1 IE = 13.0 GIAL = 56.3 WFT = 17.6	8/ N = 30 INC = 137.0 AYDRG = 0.79 DERR = 39.4 PTS = 151.0 IE = 12.9 GIAL = 55.0 WFT = 20.2	9/ N = 57 INC = 127.2 AYDRG = 0.99 DERR = 49.9 PTS = 152.4 IE = 12.9 GIAL = 55.6 WFT = 19.0

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Rowe's Decision Style in the N=58 Sample Broken Down by Ryan's 2X2 Model (Decision Error Feedback versus Prediction Error Feedback)

No Decision Error Feedback, and No Prediction Error Feedback

Analytic N=4

ID	INC	
106	96	INC=113
204	178	S=54.86
304	130	
310	48	

Conceptual N=2

ID	INC	
107	171	INC=162
304	153	S=17.73

Directive N=1

ID	INC	
205	172	INC=172
		S=0

Behavioral N=5

ID	INC	
108	179	INC=127.0
201	182	S=68.2
209	150	
301	18	
308	106	

With Decision Error Feedback, but No Prediction Error Feedback

Analytic N=2

ID	INC	
227	120	INC=137
326	154	S=24.0

Conceptual N=6

ID	INC	
129	103	INC=135.0
130	122	S=26.53
132	131	
133	183	
223	137	
331	134	

Directive N=4

ID	INC	
124	65	INC=106
131	159	S=44.8
230	127	
231	73	

Behavioral N=4

ID	INC	
123	163	INC=146.?
127	106	S=28.67
232	145	
333	170	

No Decision Error Feedback, but With Prediction Error Feedback

Analytic N=3

ID	INC	
217	115	INC=23.0
313	56	S=112.20
318	-102	

Conceptual N=3

ID	INC	
222	63	INC=129
314	160	S=57.2
315	164	

Directive N=3

ID	INC	
121	150	INC=138.3
214	111	S=23.76
216	154	

Behavioral N=6

ID	INC	
113	103	INC=114.5
115	110	S=30.92
117	87	
219	94	
319	120	
321	173	

With Decision Error Feedback, and With Prediction Error Feedback

Analytic N=3

ID	INC	
139	173	INC=146.0
243	106	S=35.34
343	159	

Conceptual N=4

ID	INC	
138	154	INC=159.?
141	156	S=10.6
236	152	
337	175	

Directive N=5

ID	INC	
143	173	INC=142.4
335	132	S=17
336	124	
340	147	
341	136	

Behavioral N=2

ID	INC	
135	101	INC=115
240	129	S=19.8

Variables	Definition
N	Number of subjects in cell
INC	Average income over last six periods
ID	Identification number

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Analytic Style (12 cases)

ID	INC	DERR	PTS	RD	RA	RC
1.	96.0	49.3	149.0	61.0	105.0	83.0
2.	173.0	12.2	184.0	56.0	110.0	70.0
3.	178.0	11.0	178.0	[illegible]	[illegible]	63.0
4.	115.0	56.0	175.0	80.0	102.0	[illegible]
5.	120.0	65.2	149.0	67.0	103.0	76.0
6.	106.0	56.8	142.0	70.0	102.0	65.0
7.	130.0	44.2	174.0	64.0	111.0	69.0
8.	48.0	90.5	150.0	72.0	111.0	71.0
9.	56.0	14.3	137.0	61.0	112.0	65.0
10.	-102.0	294.8	162.0	69.0	112.0	74.0
11.	154.0	36.5	150.0	72.0	120.0	71.0
12.	159.0	21.5	138.0	77.0	95.0	74.0

Attributes of Analytic Style — Attributes of N=57 Sample

Mean	Std.Dev.	Var.	Mean	Std.Dev
102.75	76.7	INC	127.2	48.6
73.4	78.6	DERR	49.9	48.1
11.1	7.0	PERR	13.3	12.4
153.9	30.3	ST	137.8	31.9
66.6	18.8	TT	73.7	18.8
157.3	16.6	PTS	152.4	31.0
1.46	1.55	AYDR6	0.99	0.93
0.88	0.51	AYPR6	0.95	0.79
1.32	1.13	APDR6	1.01	0.68
1.01	0.46	APPR6	0.99	0.54
1.25	1.13	AEQDR6	0.99	0.70
0.98	0.38	AEQPR6	0.98	0.50
1.16	0.83	ACDR6	1.01	0.93
0.82	0.74	ACPR6	0.94	0.98
1.46	1.46	AOR6	0.99	0.86
69.3	5.9	RD	72.8	11.2
107.9	6.7	RA	69.7	13.4
70.3	5.9	RC	76.4	13.8
52.5	7.2	RB	60.6	12.0
13.8	4.7	IE	12.9	4.4
52.6	6.5	GIAL	55.6	9.1

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BEHAVIORAL STYLE (17 cases)

	INC	DERR	PTS	RD	RA	RC
1.	179.0	5.6	202.0	68.0	93.0	65.0
2.	103.0	60.1	143.0	76.0	86.0	57.0
3.	110.0	75.7	152.0	65.0	88.0	78.0
4.	87.0	101.6	98.0	74.0	82.0	73.0
5.	163.0	34.4	203.0	75.0	73.0	74.0
6.	106.0	69.8	119.0	61.0	91.0	69.0
7.	101.0	76.0	180.0	62.0	94.0	77.0
8.	182.0	5.8	198.0	72.0	93.0	66.0
9.	150.0	16.1	113.0	58.0	100.0	53.0
10.	94.0	87.1	129.0	84.0	65.0	68.0
11.	145.0	28.5	134.0	67.0	94.0	57.0
12.	129.0	32.6	116.0	88.0	69.0	64.0
13.	18.0	158.0	190.0	78.0	98.0	44.0
14.	106.0	85.3	115.0	71.0	77.0	82.0
15.	120.0	68.4	190.0	76.0	86.0	70.0
16.	173.0	22.3	132.0	68.0	82.0	76.0
17.	170.0	18.7	185.0	65.0	77.0	87.0

Attributes of Behavioral Style			Attributes of N = 57 Sample	
Mean	Std.Dev.	Var.	Mean	Std.Dev.
125.65	42.4	INC	127.2	48.6
55.7	40.6	DERR	49.9	48.1
11.3	75.8	PERR	13.3	12.4
130.1	31.4	ST	137.8	31.9
74.6	17.0	TT	73.7	18.8
152.3	37.7	PTS	152.4	31.0
1.10	0.75	AYDR6	0.99	0.93
0.78	0.49	AYPR6	0.95	0.79
1.06	0.60	APDR6	1.01	0.68
0.99	0.48	APPR6	0.99	0.54
1.09	0.60	AEQDR6	0.99	0.70
0.93	0.41	AEQPR6	0.98	0.50
1.32	1.21	ACDR6	1.01	0.93
0.64	0.70	ACPR6	0.94	0.98
0.99	0.67	AOR6	0.99	0.86
71.1	8.1	RD	72.8	11.2
85.3	10.3	RA	89.7	13.4
68.5	11.2	RC	76.4	13.8
75.2	6.7	RB	60.6	12.0
9.8	3.9	IE	12.9	4.4
57.8	11.5	GIAL	55.6	9.1

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Conceptual Styles (15 cases)

	INC	DERR	PTS	RD	RA	RC
1.	171.0	16.2	149.0	73.0	88.0	89.0
2.	103.0	9.2	112.0	68.0	98.0	90.0
3.	122.0	54.2	184.0	47.0	94.0	92.0
4.	131.0	12.2	174.0	62.0	92.0	95.0
5.	183.0	2.4	190.0	73.0	93.0	108.0
6.	154.0	29.2	181.0	72.0	76.0	108.0
7.	156.0	11.5	115.0	72.0	92.0	83.0
8.	63.0	116.5	171.0	76.0	63.0	98.0
9.	137.0	90.6	90.0	49.0	93.0	97.0
10.	152.0	30.6	140.0	52.0	84.0	103.0
11.	153.0	20.2	161.0	75.0	88.0	81.0
12.	160.0	19.4	190.0	76.0	69.0	98.0
13.	164.0	23.5	123.0	65.0	91.0	82.0
14.	134.0	38.4	92.0	65.0	90.0	98.0
15.	175.0	11.3	192.0	53.0	92.0	103.0

Attributes of Conceptual Style			Attributes of N=57 Sample	
Mean	Std.Dev.	Var.	Mean	Std.Dev.
143.9	30.8	INC	127.2	48.6
32.3	32.0	DERR	49.9	48.1
14.5	13.7	PERR	13.3	12.4
134.3	31.1	ST	137.8	31.9
73.0	20.4	TT	73.7	18.8
150.9	36.5	PTS	152.4	31.0
0.65	0.60	AYDR6	0.99	0.93
1.04	0.96	AYPR6	0.95	0.79
0.87	0.47	APDR6	1.01	0.68
0.93	0.42	APPR6	0.99	0.54
0.73	0.50	AEQDR6	0.99	0.70
0.98	0.54	AEQPR6	0.98	0.50
0.59	0.59	ACDR6	1.01	0.93
1.21	1.32	ACPR6	0.94	0.98
0.70	0.52	AOR6	0.99	0.86
65.2	10.3	RD	72.8	11.2
86.8	9.9	RA	89.7	13.4
93.6	8.2	RC	76.4	13.8
54.2	7.4	RB	60.6	12.0
15.1	4.0	IE	12.9	4.4
53.9	7.9	GIAL	55.6	9.1

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Breakout of Twelve Analytic Subjects by Decision Error Feedback Treatment and by Prediction Error Feedback Treatment

X \ DEC	0	1	
0	N=20 INC=131.0 (S=43.9) DERR=48.5 (S=43.0) PERR=9.6 (S= 6.2) PTS=151.8 (S=32.4)	N=25 INC=135.9 (S=29.9) DERR=39.6 (S=28.3) PERR=17.2 (S=16.6) PTS=150.6 (S=35.6)	N=45 INC=133.7
1	N=7 INC=74.4 (S=89.5) DERR=98.4 (S=96.1) PERR=14.0 (S=7.5) PTS=160.7 (S=15.8)	N=5 INC=142.4 (S=28.2) DERR=38.4 (S=22.5) PERR=7.0 (S=3.8) PTS=152.6 (S=18.2)	N=12 INC=102.7
	N=27 INC=116.3 (S=62.4)	N=30 INC=137.0 (S=29.2)	

X \ PRED	0	1	
0	N=22 INC=134.0 (S=42.4) DERR=42.2 (S=39.7) PERR=17.5 (S=17.9) PTS=149.5 (S=39.7)	N=23 INC=133.4 (S=30.6) DERR=44.9 (S=30.2) PERR=10.5 (S=6.0) PTS=152.7 (S=30.6)	N=45 INC=133.7
1	N=6 INC=121.0 (S=45.5) DERR=49.5 (S=26.8) PERR=10.1 (S=7.1) PTS=158.3 (S=13.8)	N=6 INC=184.5(S=100.4) DERR=97.4 (S=107.2) PERR=12.1 (S=7.3) PTS=156.3 (S=20.3)	N=12 INC=102.7
	N=28 INC=131.3 (S=42.6)	N=29 INC=123.3 (S=54.2)	

Variables	Definition
DEC	Decision Error Feedback Treatment
PRED	Pediction Error Feedback Treatment
0	No Feedback Reports for this Treatment
1	With Feedback Reports for this Treatment
INC	Mean of Six-Period Average Income for Subjects in Cell

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Breakout of Seventeen Behavioral Subjects by Decision Error Feedback Treatment and By Prediction Error Feedback Treatment

X \ DEC	0	1	
0	N=16 INC=113.7 (S=71.8) DERR=60.8 (S=73.6) PERR=11.4 (S= 6.3) PTS=156.8 (S=20.6)	N=24 INC=137.3 (S=30.0) DERR=38.5 (S=26.7) PERR=16.0 (S=17.2) PTS=149.7 (S=32.7)	N=40
1	N=11 INC=120.2 (S=48.8) DERR=62.4 (S=47.1) PERR=10.0 (S=7.5) PTS=150.2 (S=39.3)	N=6 INC=135.7 (S=28.8) DERR=43.4 (S=23.6) PERR=13.7(S=7.8) PTS=156.2 (S=37.6)	N=17 INC=125.6
	N=27 INC=116.3	N=30 INC=137.0	

X \ PRED	0	1	
0	N=19 INC=129.3 (S=38.6) DERR=42.2 (S=30.6) PERR=17.6 (S=18.7) PTS=146.4 (S=30.3)	N=21 INC=126.6 (S=61.8) DERR=52.1 (S=65.1) PERR=12.0 (S=9.5) PTS=158.0 (S=25.9)	N=40
1	N=9 INC=135.4 (S=52.3) DERR=46.9 (S=50.0) PERR=12.0 (S=9.5) PTS=162.1 (S=40.5)	N=8 INC=114.6 (S=27.2) DERR=65.5 (S=26.7) PERR=11.0 (S=6.6) PTS=141.3 (S=33.2)	N=17 INC=125.6
	N=28 INC=116.3	N=29 INC=137.0	

Variables	Definition
DEC	Decision Error Feedback Treatment
PRED	Pediction Error Feedback Treatment
0	No Feedback Reports for this Treatment
1	With Feedback Reports for this Treatment
INC	Mean of Six-Period Average Income for Subjects in Cell

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Breakout of Fifteen Conceptual Subjects by Decision Error Feedback Treatment and By Prediction Error Feedback Treatment

X \ DEC	0	1	
0	N=22 INC=110.5 (S=65.2) DERR=66.5 (S=66.5) PERR=11.8 (S=7.0) PTS=153.0 (S=30.4)	N=20 INC=133.1 (S=31.3) DERR=44.7 (S=24.1) PERR=14.0 (S=16.0) PTS=153.0 (S=28.8)	N=42
1	N=5 INC=142.2 (S=44.8) DERR=39.1 (S=43.3) PERR=6.4 (S=2.3) PTS=158.8 (S=25.0)	N=10 INC=144.7 (S=24.2) DERR=28.9 (S=26.9) PERR=18.6 (S=15.3) PTS=147.0 (S=41.8)	N=15 INC=143.9
	N=27	N=30	

X \ PRED	0	1	
0	N=20 INC=127.1 (S=47.5) DERR=49.0 (S=39.0) PERR=15.0 (S=16.4) PTS=154.4 (S=31.6)	N=22 INC=115.0 (S=57.3) DERR=62.6 (S=61.1) PERR=10.8 (S=5.5) PTS=151.7 (S=27.8)	N=42
1	N=8 INC=144.8 (S=426.1 DERR=30.4 (S=29.6) PERR=17.7 (S=17.1) PTS=144.0 (S=40.7)	N=7 INC=146.3 (S=37.5) DERR=34.5 (S=36.9) PERR=7.7 (S=11.0) PTS=158.9 (S=32.3)	N=15 INC=143.9
	N=28	N=29	

Variables	Definition
DEC	Decision Error Feedback Treatment
PRED	Pediction Error Feedback Treatment
0	No Feedback Reports for this Treatment
1	With Feedback Reports for this Treatment
INC	Mean of Six-Period Average Income for Subjects in Cell

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VARIABLE	CASES	MEAN	STD DEV
INC	57	127.1930	48.5881
DERR	57	49868.9298	48118.1918
PERR	57	13283.7544	12405.6659
ST	57	137.7544	31.8968
PTS	57	152.4386	31.0340
RD	57	72.8421	11.2421
RA	57	89.6667	13.4102
RC	57	76.3860	13.8057
RB	57	60.6491	11.9829
HI	56	28.8902	15.5671
IN	56	30.3402	15.9404
FL	56	14.2857	28.2107
DE	56	35.5059	11.6725
IE	55	12.9091	4.3643
GIAL	56	55.6250	9.1205
RD	57	72.8421	11.2421
DE	56	35.5059	11.6725
WFT	40	18.9750	5.4419
AYDR3	57	1.0880	1.2172
AYDR6	57	0.9906	0.9332
AEQDR3	57	1.0526	0.9664
AEQDR6	57	0.9854	0.7068
ADR3	57	1.1413	1.0820
ADR6	57	0.9890	0.8563
TT	57	73.7193	18.7890
PTS	57	152.4386	31.0340
AYDR6	57	0.9906	0.9332
AYPR6	57	0.9527	0.7942
APDR6	57	1.0065	0.6795
APPR6	57	0.9849	0.5424
AEQDR6	57	0.9854	0.7068
AEQPR6	57	0.9760	0.4953
ACDR6	57	1.0086	0.9316
ACPR6	57	0.9484	0.9769
ADR6	57	0.9890	0.8563

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N	ID	INC	AYDR6	AYPR6	APDR6	APPR6	AEQDR6	AEQPR6	ACDR6	ACPR6	AOR6
1	106.	96.	0.46	1.68	0.76	1.55	0.92	1.28	0.90	2.38	1.52
2	107.	171.	0.35	0.46	1.00	0.80	0.57	0.76	0.31	0.40	0.27
3	108.	179.	0.12	0.22	0.84	0.32	0.32	0.37	0.00	0.23	0.11
4	113.	103.	1.17	1.08	1.14	1.14	1.31	1.25	1.47	1.02	1.47
5	115.	110.	1.56	1.24	1.32	1.59	0.73	1.26	2.42	0.77	1.30
6	117.	87.	1.98	0.39	1.23	0.94	1.59	0.76	3.03	0.19	1.64
7	121.	150.	0.48	0.97	0.69	0.66	0.79	0.86	0.41	1.31	0.51
8	123.	163.	0.72	1.31	1.13	1.84	0.72	1.58	0.44	0.37	0.41
9	124.	65.	2.10	0.64	1.10	0.34	2.07	0.28	3.17	1.78	1.90
10	127.	106.	1.23	0.26	1.09	0.50	1.18	0.48	1.61	0.29	1.16
11	128.	93.	1.54	3.70	0.63	1.86	1.83	2.37	0.51	3.94	1.63
12	129.	103.	0.20	3.87	0.87	1.86	0.39	2.53	0.08	4.67	1.49
13	130.	122.	1.18	0.81	0.66	1.22	0.90	1.03	1.62	0.58	1.18
14	131.	159.	0.79	2.19	0.57	1.02	0.64	1.60	1.24	3.25	0.52
15	132.	131.	0.26	1.67	0.45	0.59	0.22	0.98	0.39	3.37	0.94
16	133.	183.	0.05	0.21	0.29	0.47	0.21	0.51	0.05	0.19	0.65
17	135.	101.	1.52	0.72	3.15	1.31	1.20	1.18	1.38	0.21	1.46
18	138.	154.	0.62	0.22	0.83	0.55	1.07	0.53	0.49	0.25	0.60
19	139.	173.	0.24	0.25	0.44	0.54	0.48	0.56	0.22	0.21	0.21
20	141.	156.	0.24	1.79	0.46	1.35	0.57	1.40	0.07	2.36	0.45
21	143.	173.	0.18	0.89	0.81	1.30	0.40	1.26	0.10	0.44	0.23
22	201.	182.	0.11	0.25	0.58	0.43	0.35	0.45	0.03	0.43	0.07
23	204.	178.	0.25	0.40	0.61	0.53	0.21	0.53	0.32	0.54	0.17
24	205.	172.	0.33	0.62	0.90	0.40	0.60	0.84	0.07	0.32	0.26
25	209.	150.	0.33	1.42	0.50	1.61	0.37	1.42	0.36	0.55	0.63
26	214.	111.	0.59	1.28	1.07	0.63	0.63	0.98	0.74	2.39	1.25
27	216.	154.	0.34	0.85	0.66	0.67	0.42	0.75	0.14	1.40	0.60
28	217.	115.	1.07	1.60	1.78	1.21	1.33	1.26	0.89	2.09	1.15
29	219.	94.	1.75	0.37	0.40	0.67	1.74	0.61	2.63	0.35	1.57
30	222.	63.	2.16	0.64	1.53	0.61	2.28	0.71	1.66	0.71	1.94
31	223.	137.	1.77	1.34	1.62	0.98	1.09	1.29	1.70	1.26	0.83
32	227.	120.	1.32	0.20	0.74	0.41	0.91	0.37	2.22	0.39	1.13
33	230.	127.	1.12	1.05	0.63	1.00	1.60	0.81	0.91	2.20	1.12
34	231.	73.	0.59	4.46	1.36	3.54	0.76	2.97	0.49	0.74	1.48
35	232.	145.	0.57	1.62	0.99	1.17	0.97	1.57	0.19	2.43	0.68
36	236.	152.	0.61	0.97	0.62	1.15	0.68	0.88	0.66	0.88	0.56
37	240.	129.	0.66	1.01	0.87	0.39	0.62	0.66	0.87	2.23	0.96
38	243.	106.	1.10	0.70	1.67	0.74	1.38	0.61	1.17	0.95	1.34
39	301.	18.	2.76	0.22	0.81	0.50	2.48	0.44	4.17	0.02	2.47
40	304.	153.	0.41	0.21	0.95	0.63	0.41	0.56	0.48	0.12	0.50
41	306.	130.	0.88	0.61	1.08	0.86	0.68	0.90	1.31	0.32	0.92
42	308.	106.	1.86	1.43	1.08	1.35	1.76	1.12	1.88	1.03	1.36
43	310.	48.	1.88	0.88	2.04	1.34	0.97	1.23	2.56	0.41	2.44
44	313.	56.	2.84	0.78	0.56	0.69	2.69	0.93	1.88	0.57	2.20
45	314.	160.	0.39	0.32	0.38	0.57	0.60	0.47	0.36	0.29	0.37
46	315.	164.	0.51	0.90	0.48	0.72	0.87	0.72	0.36	1.59	0.38
47	318.	-102.	5.82	1.51	4.50	1.83	4.20	1.60	1.96	0.26	5.48
48	319.	120.	1.44	0.40	0.79	0.60	1.49	0.70	1.57	0.34	1.14
49	321.	173.	0.46	0.57	1.19	1.27	0.98	0.90	0.16	0.10	0.19
50	326.	154.	0.78	1.10	0.68	0.97	0.78	1.11	0.25	1.40	0.56
51	331.	134.	0.75	1.61	1.75	1.59	0.61	1.51	0.54	1.27	0.81
52	333.	170.	0.41	0.72	0.83	1.20	0.62	1.14	0.29	0.34	0.23
53	335.	132.	1.08	0.29	0.34	0.31	0.94	0.45	1.33	0.38	0.59
54	336.	124.	1.00	0.55	1.07	0.94	1.20	0.90	1.07	0.29	1.07
55	337.	175.	0.23	0.53	1.21	0.84	0.55	0.87	0.05	0.21	0.13
56	340.	147.	0.94	0.81	0.52	1.17	0.81	0.90	1.19	0.50	0.74
57	341.	136.	1.00	0.30	0.82	0.80	0.82	0.72	1.32	0.15	0.85
58	343.	159.	0.40	0.96	0.92	1.42	0.46	1.27	0.29	0.32	0.40

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N	WFT	RDS	AYDR6	AYPR6	APDR6	APPR6	AEUDR6	AEUPR6	ACDR6	ACPR6	AUR6
1	23.00	1.00	0.96	1.68	0.76	1.55	0.92	1.28	0.90	2.38	1.52
2	99.00	3.00	0.35	0.46	1.00	0.83	0.57	0.76	0.31	0.40	0.27
3	25.00	2.00	0.12	0.22	0.84	0.32	0.32	0.37	0.00	0.23	0.11
4	99.00	2.00	1.17	1.08	1.14	1.14	1.31	1.25	1.47	1.02	1.47
5	6.00	2.00	1.56	1.24	1.32	1.59	0.73	1.26	2.42	0.77	1.30
6	15.00	2.00	1.98	0.39	1.23	0.94	1.59	0.76	3.03	0.19	1.64
7	17.00	4.00	0.48	0.97	0.69	0.66	0.79	0.86	0.41	1.31	0.51
8	22.00	2.00	0.72	1.31	1.13	1.84	0.72	1.58	0.44	0.37	0.41
9	11.00	4.00	2.10	0.64	1.10	0.34	2.07	0.28	3.17	1.78	1.90
10	22.00	2.00	1.23	0.26	1.09	0.50	1.18	0.48	1.61	0.29	1.16
11	15.00	0.0	1.54	3.70	0.63	1.86	1.83	2.37	0.51	3.94	1.63
12	21.00	3.00	0.20	3.87	0.87	1.86	0.39	2.53	0.08	4.67	1.49
13	99.00	3.00	1.18	0.81	0.66	1.22	0.90	1.03	1.62	0.58	1.18
14	24.00	4.00	0.79	2.19	0.57	1.02	0.64	1.60	1.24	3.25	0.52
15	15.00	3.00	0.26	1.67	0.45	0.59	0.22	0.98	0.39	3.37	0.94
16	23.00	3.00	0.05	0.21	0.29	0.47	0.21	0.51	0.05	0.19	0.05
17	25.00	2.00	1.52	0.72	3.15	1.31	1.20	1.18	1.38	0.21	1.46
18	20.00	3.00	0.62	0.22	0.83	0.55	1.07	0.53	0.49	0.25	0.60
19	18.00	1.00	0.24	0.25	0.44	0.54	0.48	0.56	0.22	0.21	0.21
20	99.00	3.00	0.24	1.79	0.46	1.35	0.57	1.40	0.07	2.36	0.45
21	16.00	4.00	0.16	0.89	0.81	1.30	0.40	1.26	0.10	0.44	0.23
22	25.00	2.00	0.11	0.25	0.59	0.43	0.35	0.45	0.03	0.43	0.07
23	99.00	1.00	0.25	0.40	0.61	0.53	0.21	0.53	0.32	0.54	0.17
24	11.00	4.00	0.31	0.62	0.90	0.90	0.60	0.84	0.07	0.32	0.26
25	99.00	2.00	0.33	1.42	0.50	1.61	0.37	1.42	0.36	0.55	0.63
26	8.00	4.00	0.59	1.28	1.07	0.63	0.63	0.98	0.74	2.39	1.25
27	99.00	4.00	0.24	0.85	0.66	0.67	0.42	0.75	0.14	1.40	0.60
28	23.00	1.00	1.07	1.60	1.78	1.21	1.33	1.26	0.89	2.09	1.15
29	20.00	2.00	1.75	0.37	0.40	0.67	1.74	0.61	2.63	0.35	1.57
30	19.00	3.00	2.16	0.64	1.53	0.61	2.28	0.71	1.66	0.71	1.94
31	99.00	3.00	1.77	1.34	1.62	0.98	1.09	1.29	1.70	1.26	0.83
32	21.00	1.00	1.32	0.20	0.74	0.41	0.91	0.37	2.22	0.39	1.13
33	13.00	4.00	1.12	1.05	0.63	1.00	1.60	0.81	0.91	2.20	1.12
34	18.00	4.00	0.59	4.46	1.36	3.54	0.76	2.97	0.49	0.74	1.48
35	20.00	2.00	0.57	1.62	0.99	1.17	0.97	1.57	0.19	2.43	0.68
36	22.00	3.00	0.61	0.97	0.62	1.15	0.66	0.88	0.66	0.88	0.56
37	99.00	2.00	0.66	1.01	0.87	0.39	0.62	0.66	0.87	2.23	0.96
38	99.00	1.00	1.10	0.70	1.67	0.74	1.38	0.61	1.17	0.95	1.34
39	22.00	2.00	2.76	0.22	0.81	0.50	2.48	0.44	4.17	0.02	2.47
40	24.00	3.00	0.41	0.21	0.95	0.63	0.41	0.56	0.48	0.12	0.50
41	99.00	1.00	0.88	0.61	1.08	0.86	0.68	0.90	1.31	0.32	0.92
42	22.00	2.00	1.86	1.43	1.38	1.35	1.76	1.12	1.88	1.03	1.36
43	3.00	1.00	1.08	0.88	2.04	1.34	0.97	1.23	2.56	0.41	2.44
44	19.00	1.00	2.84	0.78	0.56	0.69	2.69	0.93	1.88	0.57	2.20
45	99.00	3.00	0.39	0.32	0.38	0.57	0.60	0.47	0.36	0.25	0.37
46	99.00	3.00	0.51	0.90	0.48	0.72	0.87	0.72	0.36	1.59	0.38
47	13.00	1.00	5.82	1.51	4.50	1.83	4.20	1.60	1.96	0.26	5.48
48	23.00	2.00	1.44	0.40	0.79	0.60	1.49	0.70	1.57	0.34	1.14
49	17.00	2.00	0.46	0.57	1.19	1.27	0.98	0.90	0.16	0.10	0.19
50	20.00	1.00	0.78	1.10	0.68	0.97	0.78	1.11	0.25	1.40	0.56
51	99.00	2.00	0.75	1.61	1.75	1.59	0.61	1.51	0.54	1.27	0.81
52	99.00	2.00	0.41	0.72	0.83	1.20	0.62	1.14	0.29	0.34	0.23
53	99.00	4.00	1.08	0.29	0.34	0.31	0.94	0.45	1.33	0.38	0.59
54	24.00	4.00	1.00	0.55	1.07	0.94	1.20	0.90	1.07	0.29	1.07
55	24.00	3.00	0.23	0.53	1.21	0.84	0.55	0.87	0.05	0.21	0.13
56	24.00	4.00	0.94	0.81	0.52	1.17	0.81	0.90	1.19	0.50	0.74
57	99.00	4.00	1.00	0.30	0.82	0.80	0.82	0.72	1.32	0.15	0.85
58	21.00	1.00	0.40	0.96	0.92	1.42	0.46	1.27	0.29	0.32	0.40

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SIMPLE REPORTS

NO.	STYLE	ID	PTS	INC	AYDRG	DEFR	ADRG	TT
1	DIRECTIVE	205	167	172	.33	17.0	.26	93
2		121	169	150	.48	25.0	.51	85
3		214	118	111	.59	30.9	1.25	53
4		216	135	154	.34	15.7	.60	45
5	BEHAVIORAL	108	202	179	.12	5.7	.11	78
6		201	198	182	.11	5.8	.07	85
7		209	113	150	.33	16.1	.63	72
8		301	190	18	2.76	152.0	2.47	52
9		308	119	106	1.86	85.3	1.36	67
10		113	143	103	1.17	60.1	1.47	95
11		115	152	110	1.56	75.7	1.30	93
12		117	88	87	1.98	101.6	1.64	78
13		219	129	94	1.75	87.1	1.57	93
14		319	190	170	1.44	68.4	1.14	73
15		321	182	173	.46	23.3	0.19	80
1	ANALYTIC	106	149	96	.96	49.3	1.52	90
2		204	178	178	.25	11.0	.17	62
3		306	174	130	.88	44.2	.92	53
4		310	150	48	1.88	90.5	2.44	58
5		217	175	115	1.07	56.3	1.15	68
6		313	137	56	2.84	143.0	2.20	88
7		318	162	-182	5.82	294.8	5.48	58
8	CONCEPTUAL	107	149	171	.35	16.2	.27	58
9		304	161	153	.41	20.2	.50	90
10		222	171	63	2.16	116.4	1.94	48
11		314	190	160	.39	19.4	.37	100
12		315	123	164	.51	23.5	.38	98

COMPLEX REPORTS

NO	STYLE	ID	PTS	INC	AYDRG	DFRR	ADRG	TT
1	DIRECTIVE	124	157	65	2.10	110.7	1.90	97
2		131	116	159	.79	41.6	.52	65
3		230	128	127	1.12	58.6	1.12	95
4		231	111	73	.59	33.7	1.48	57
5		143	184	173	.18	8.5	.23	97
6		335	186	132	1.08	58.2	.99	97
7		336	175	124	1.00	48.3	1.07	95
8		340	129	147	.94	41.2	.74	73
9		341	173	136	1.00	48.6	.85	87
10	BEHAVIORAL	123	203	163	.72	34.4	.41	87
11		127	~~115~~ 119	106	1.23	69.8	1.16	90
12		232	134	145	.57	28.5	.68	48
13		333	185	170	.41	18.9	.23	48
14		135	180	101	1.52	76.0	1.46	45
15		240	116	129	.66	32.6	.96	85
1	ANALYTIC	139	184	173	.24	12.2	.21	98
2		243	142	106	1.10	58.8	1.34	40
3		343	138	159	.40	21.5	.40	67
4		227	149	120	1.32	65.2	1.13	77
5		326	158	154	.78	36.6	.56	40
6	CONCEPTUAL	129	112	103	.20	9.2	1.49	80
7		130	184	122	1.18	54.2	1.18	95
8		132	174	131	.26	12.2	.94	40
9		133	190	183	.05	2.4	.05	73
10		223	98	137	1.77	90.6	.83	53
11		331	92	134	.75	38.4	.81	52
12		138	181	154	.62	29.2	.60	63
13		141	115	156	.24	11.5	.45	65
14		236	140	152	.61	30.6	.56	82
15		337	192	175	.23	11.3	.13	98

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T-TESTS OF N=30 SAMPLE OF DIRECTIVES AND BEHAVIORALS AND N=27 SAMPLE OF ANALYTICS AND CONCEPTUALS VERSUS N=57 SAMPLE

		SIMPLE REPORTS		COMPLEX REPORTS		T-TEST		
		$\bar{X}$	S	$\bar{X}$	S	t	$t_{5\%}$	SIG.
DIRECTIVE	INC	146.75	25.682	126.22	36.072	1.018	2.201	NO
	AYDRG	.435	.124	0.978	0.514	2.039		
	DERR	22.15	7.137	49.044	27.136	1.907		
	AORG	.655	.422	.989	.496	1.165		
	TT	69	23.551	84.718	15.667	1.446		
	PTS	147.25	24.958	151.0	30.100	0.243		
BEHAVIORAL	INC	120.19	48.773	135.67	28.773	0.707	2.132	NO
	AYDRG	1.231	.873	0.852	0.429			
	DERR	62.37	47.116	43.367	23.578	.918		
	AORG	1.086	0.757	0.817	0.465			
	TT	78.73	17.822	67.167	22.176			
	PTS	150.35	38.783	155.5	38.443			
TOTAL DIRECTIVE & BEHAVIORAL	INC	137.37	44.591	130.0	32.591	0.192	2.048	NO
	AYDRG	1.019	.825	.927	.470			
	DERR	51.647	43.775	46.773	25.052			
	AORG	0.971	.677	0.92	0.475			
	TT	76.133	16.004	77.73	19.891			
	PTS	149.27	34.746	152.8	32.415			
ANALYTIC	INC	74.43	89.528	142.4	28.166			
	AYDRG	1.957	1.896	.768	.455			
	DERR	98.44	96.076	38.46	22.539			
	AORG	1.983	1.723	.728	.485			
	TT	68.14	14.971	64.4	24.926			
	PTS	160.71	15.787	152.6	18.243			
CONCEPTUAL	INC	143.2	44.752	144.7	24.194			
	AYDRG	.764	.783	0.591	0.535			
	DERR	39.14	43.268	28.96	26.919			
	AORG	0.692	0.702	.704	.445			
	TT	78.8	24.108	70.1	19.000			
	PTS	158.6	25.024	147.0	41.767			
TOTAL ANALYTIC & CONCEPTUAL	INC	102.67	79.480	143.93	24.581	1.908	1.708*	YES
	AYDRG	1.46	1.60	0.65	0.500			
	DERR	73.78	81.536	32.127	25.149			
	AORG	1.445	1.497	0.712	0.441			
	TT	72.583	19.071	68.2	20.428			
	PTS	159.92	19.095	148.87	34.985			
OVERALL TOTAL	INC	116.33	62.441	136.967	29.784	1.624	1.671*	NO (1)
	AYDRG	1.215	1.225	.789	.497			
	DERR	67.463	63.087	39.45	25.765	1.757		YES
	AORG	1.182	1.126	0.816	0.463			
	TT	74.556	17.176	72.967	20.395			
	PTS	154.22	28.962	150.83	33.199			

$t = 1.897$

$t_{5\%} = 2.179$

$t_{10\%} = 1.782$

* one-tailed test

(1) SPSS ANOVA SIG. LEVEL = 0.052

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IE > 17

DECISION FEEDBACK TREATMENT

DECISION STYLE EFFECT	DEC = 0	DEC = 1	TOTAL
0	1 N = 21 INC = 136.8 AYDRG = 0.89 DERR = 44.0 PTS = 152.1 IE = 11.8 GIAL = 57.6 WFT = 19.3	2 N = 26 INC = 132.3 AYDRG = 0.87 DERR = 43.4 PTS = 148.1 IE = 11.9 GIAL = 55.5 WFT = 19.8	3 N = 47 INC = 134.3 AYDRG = .88 DERR = 43.7 PTS = 149.9 IE = 11.8 GIAL = 56.4 WFT = 19.6
1	4 N = 4 INC = 50.5 AYDRG = 2.36 DERR = 121.6 PTS = 156.3 IE = 19.3 GIAL = 46.5 WFT = 13.3	5 N = 4 INC = 167.0 AYDRG = 0.28 DERR = 13.6 PTS = 169.5 IE = 19.3 GIAL = 52.0 WFT = 22.3	6 N = 8 INC = 108.8 AYDRG = 1.32 DERR = 67.6 PTS = 162.9 IE = 19.3 GIAL = 49.3 WFT = 17.8
TOTAL	7 N = 25 INC = 123.0 AYDRG = 1.13 DERR = 56.4 PTS = 152.8 IE = 13.0 GIAL = 55.7 WFT = 18.2	8 N = 30 INC = 137.0 AYDRG = 0.79 DERR = 39.4 PTS = 151.0 IE = 12.9 GIAL = 55.0 WFT = 20.2	9 N = 55 INC = 130.6 AYDRG = .94 DERR = 47.2 PTS = 151.8 IE = 12.9 GIAL = 55.3 WFT = 19.3

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WFT > 22

DECISION FEEDBACK TREATMENT

DECISION STYLE EFFECT	DEC = 0	DEC = 1	TOTAL
0	N = 13 INC = 83.5 AYDRG = 1.88 DERR = 96.0 PTS = 144.6 IE = 13.4 GIAL = 55.1 WFT = 14.8	N = 16 INC = 130.7 AYDRG = 0.78 DERR = 39.4 PTS = 149.3 IE = 12.9 GIAL = 55.0 WFT = 18.4	N = 29 INC = 109.6 AYDRG = 1.27 DERR = 64.7 PTS = 146.1 IE = 13.1 GIAL = 55.0 WFT = 16.8
1	N = 6 INC = 179.2 AYDRG = 0.69 DERR = 34.3 PTS = 179.2 IE = 10.7 GIAL = 57.2 WFT = 23.8	N = 6 INC = 148.2 AYDRG = 0.76 DERR = 36.8 PTS = 163.7 IE = 14.2 GIAL = 55.8 WFT = 24.0	N = 12 INC = 144.5 AYDRG = 0.72 DERR = 35.5 PTS = 171.4 IE = 12.4 GIAL = 56.5 WFT = 23.9
TOTAL	N = 19 INC = 101.6 AYDRG = 1.50 DERR = 76.5 PTS = 155.5 IE = 12.4 GIAL = 55.7 WFT = 17.6	N = 22 INC = 135.4 AYDRG = 0.77 DERR = 38.7 PTS = 151.7 IE = 13.2 GIAL = 55.2 WFT = 20.0	N = 41 INC = 119.8 AYDRG = 1.11 DERR = 56.2 PTS = 153.5 IE = 12.9 GIAL = 55.4 WFT = 18.9

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WITKINSEFT

WFT > 23

DECISION FEEDBACK TREATMENT

DECISION STYLE EFFECT	DEC = 0	DEC = 1	TOTAL
0	1/ N = 16 INC = 88.6 AYDRG = 1.75 DERR = 88.8 PTS = 149.6 IE = 12.9 GIAL = 56.2 WFT = 16.3	2/ N = 17 INC = 133.8 AYDRG = 0.74 DERR = 37.2 PTS = 149.8 IE = 13.2 GIAL = 54.4 WFT = 18.7	3/ N = 33 INC = 111.8 AYDRG = 1.23 DERR = 62.2 PTS = 149.7 IE = 13.1 GIAL = 55.3 WFT = 17.5
1	4/ N = 3 INC = 171.3 AYDRG = 0.21 DERR = 10.5 PTS = 187.0 IE = 10.0 GIAL = 51.5 WFT = 24.7	5/ N = 5 INC = 141.2 AYDRG = 0.90 DERR = 43.7 PTS = 158.4 IE = 13.4 GIAL = 57.8 WFT = 24.2	6/ N = 8 INC = 152.5 AYDRG = 0.64 DERR = 31.2 PTS = 169.1 IE = 12.1 GIAL = 56.0 WFT = 24.4
TOTAL	7/ N = 19 INC = 101.6 AYDRG = 1.50 DERR = 76.5 PTS = 155.5 IE = 12.4 GIAL = 55.7 WFT = 17.6	8/ N = 22 INC = 135.5 AYDRG = 0.77 DERR = 38.7 PTS = 151.7 IE = 13.2 GIAL = 55.2 WFT = 20.0	9/ N = 41 INC = 119.8 AYDRG = 1.11 DERR = 56.2 PTS = 153.5 IE = 12.9 GIAL = 55.4 WFT = 18.9

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DRIVER's
HIERARCHIC (DDS=1)

DECISION FEEDBACK TREATMENT

DECISION STYLE EFFECT	DEC = 0	DEC = 1	TOTAL
0	N = 21 INC = 116.8 AYDRG = 1.20 DERR = 59.8 PTS = 151.2 IE = 12.8 GIAL = 55.7 WFT = 16.5	N = 29 INC = 137.4 AYDRG = 0.78 DERR = 38.3 PTS = 149.1 IE = 12.9 GIAL = 55.3 WFT = 20.3	N = 50 INC = 128.7 AYDRG = 0.95 DERR = 47.4 PTS = 150.0 IE = 12.9 GIAL = 55.5 WFT = 18.7
1	N = 5 INC = 134.2 AYDRG = 0.97 DERR = 48.9 PTS = 158.8 IE = 13.6 GIAL = 55.0 WFT = 22.0	N = 2 INC = 108.5 AYDRG = 1.35 DERR = 70.6 PTS = 148.5 IE = 12.5 GIAL = 51.5 WFT = 16.5	N = 7 INC = 126.9 AYDRG = 1.08 DERR = 55.1 PTS = 155.9 IE = 13.3 GIAL = 53.8 WFT = 19.8
TOTAL	N = 26 INC = 120.1 AYDRG = 1.16 DERR = 57.7 PTS = 152.7 IE = 13.0 GIAL = 55.6 WFT = 17.4	N = 31 INC = 135.5 AYDRG = 0.81 DERR = 40.4 PTS = 149.1 IE = 12.9 GIAL = 55.0 WFT = 20.0	N = 57 INC = 128.5 AYDRG = 0.97 DERR = 48.3 PTS = 150.7 IE = 12.9 GIAL = 55.3 WFT = 18.8

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DRIVER'S

INTEGRATIVE (DDS=2)

DECISION STYLE EFFECT	DECISION FEEDBACK TREATMENT DEC = 0	DEC = 1	TOTAL
0	1/ N = 20 INC = 121.7 AYDRG = 1.19 DERR = 59.5 PTS = 151.0 IE = 13.7 GIAL = 54.1 WFT = 19.3	2/ N = 21 INC = 138.1 AYDRG = .81 DERR = 39.7 PTS = 154.7 IE = 12.8 GIAL = 54.4 WFT = 19.8	3/ N = 41 INC = 130.1 AYDRG = 0.99 DERR = 49.3 PTS = 152.9 IE = 13.3 GIAL = 54.2 WFT = 19.6
1	4/ N = 6 INC = 114.8 AYDRG = 1.05 DERR = 52.0 PTS = 158.5 IE = 10.0 GIAL = 60.3 WFT = 10.8	5/ N = 10 INC = 130.1 AYDRG = 0.83 DERR = 41.9 PTS = 137.3 IE = 13.0 GIAL = 56.4 WFT = 20.3	6/ N = 16 INC = 124.4 AYDRG = .91 DERR = 45.7 PTS = 145.3 IE = 12.0 GIAL = 57.9 WFT = 16.8
TOTAL	7/ N = 26 INC = 120.1 AYDRG = 1.16 DERR = 57.7 PTS = 152.7 IE = 13.0 GIAL = 55.6 WFT = 17.4	8/ N = 31 INC = 135.5 AYDRG = 0.81 DERR = 40.4 PTS = 149.1 IE = 12.9 GIAL = 55.0 WFT = 20.0	9/ N = 57 INC = 128.5 AYDRG = 0.97 DERR = 48.3 PTS = 150.7 IE = 12.9 GIAL = 55.3 WFT = 18.8

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DRIVER'S
FLEXIBLE(DDS=3)

DECISION FEEDBACK TREATMENT

DECISION STYLE EFFECT	DEC = 0	DEC = 1	TOTAL
0	N = 20 INC = 119.1 AYDRG = 1.15 DERR = 57.6 PTS = 149.1 IE = 12.7 GIAL = 56.5 WFT = 16.7	N = 23 INC = 131.1 AYDRG = 0.79 DERR = 39.7 PTS = 146.3 IE = 13.5 GIAL = 53.9 WFT = 19.7	N = 43 INC = 125.5 AYDRG = 0.96 DERR = 48.0 PTS = 147.6 IE = 13.1 GIAL = 55.1 WFT = 18.3
1	N = 6 INC = 123.5 AYDRG = 1.16 DERR = 58.2 PTS = 164.7 IE = 13.8 GIAL = 52.9 WFT = 21.0	N = 8 INC = 148.3 AYDRG = .87 DERR = 42.4 PTS = 157.0 IE = 11.3 GIAL = 58.1 WFT = 21.0	N = 14 INC = 137.6 AYDRG = 0.99 DERR = 49.2 PTS = 160.3 IE = 12.4 GIAL = 55.9 WFT = 21.0
TOTAL	N = 26 INC = 120.1 AYDRG = 1.16 DERR = 57.7 PTS = 152.7 IE = 13.0 GIAL = 55.6 WFT = 17.4	N = 31 INC = 135.5 AYDRG = 0.81 DERR = 40.4 PTS = 149.1 IE = 12.9 GIAL = 55.0 WFT = 20.0	N = 57 INC = 128.5 AYDRG = 0.97 DERR = 48.3 PTS = 150.7 IE = 12.9 GIAL = 55.3 WFT = 18.8

(ID # 301)

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DRIVER'S
DECISIVE (DDS = 4)

DECISION FEEDBACK TREATMENT

DECISION STYLE EFFECT	DEC = 0	DEC = 1	TOTAL
0	1/N = 22 INC = 123.1 AYDRG = 1.09 DERR = 54.1 PTS = 153.7 IE = 12.9 GIAL = 54.6 WFT = 16.7	2/N = 23 INC = 135.0 AYDRG = .84 DERR = 42.0 PTS = 147.7 IE = 12.3 GIAL = 56.8 WFT = 20.0	3/N = 45 INC = 129.2 AYDRG = .96 DERR = 47.9 PTS = 150.2 IE = 12.5 GIAL = 55.8 WFT = 18.5
1	4/N = 4 INC = 103.8 AYDRG = 1.53 DERR = 77.8 PTS = 152.5 IE = 13.5 GIAL = 60.8 WFT = 19.8	5/N = [illegible] INC = 137.3 AYDRG = .73 DERR = 35.9 PTS = 153.0 IE = 14.9 GIAL = 49.1 WFT = 19.8	6/N = 12 INC = 126.1 AYDRG = 1.00 DERR = 49.8 PTS = 152.8 IE = 14.4 GIAL = 54.4 WFT = 19.8
TOTAL	7/N = 26 INC = 120.1 AYDRG = 1.16 DERR = 57.7 PTS = 152.7 IE = 13.0 GIAL = 55.6 WFT = 17.4	8/N = 31 INC = 135.5 AYDRG = 0.81 DERR = 40.4 PTS = 149.1 IE = 12.9 GIAL = 55.0 WFT = 20.0	9/N = 57 INC = 128.5 AYDRG = 0.97 DERR = 48.3 PTS = 150.7 IE = 12.9 GIAL = 55.3 WFT = 18.8

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DRIVER'S COMPLEX (DDS=5)

DECISION FEEDBACK TREATMENT

DECISION STYLE EFFECT	DEC = 0	DEC = 1	TOTAL
0	N = 21 INC = 119.8 AYDRG = 1.16 DERR = 58.0 PTS = 159.2 IE = 12.8 GIAL = 57.1 WFT = 17.9	N = 28 INC = 135.8 AYDRG = 0.85 DERR = 42.7 PTS = 148.2 IE = 12.9 GIAL = 54.7 WFT = 19.9	N = 49 INC = 128.9 AYDRG = 0.98 DERR = 49.1 PTS = 152.9 IE = 12.9 GIAL = 55.7 WFT = 19.1
1	N = 5 INC = 121.4 AYDRG = 1.15 DERR = 56.9 PTS = 125.4 IE = 13.8 GIAL = 49.6 WFT = 15.5	N = 3 INC = 133.3 AYDRG = 0.46 DERR = 22.0 PTS = 157.0 IE = 12.3 GIAL = 58.3 WFT = 20.3	N = 8 INC = 125.9 AYDRG = 0.89 DERR = 43.8 PTS = 137.3 IE = 13.3 GIAL = 52.9 WFT = 17.6
TOTAL	N = 26 INC = 120.1 AYDRG = 1.16 DERR = 57.7 PTS = 152.7 IE = 13.0 GIAL = 55.6 WFT = 17.4	N = 31 INC = 135.5 AYDRG = 0.81 DERR = 40.4 PTS = 149.1 IE = 12.9 GIAL = 55.0 WFT = 20.0	N = 57 INC = 128.5 AYDRG = 0.97 DERR = 48.3 PTS = 150.7 IE = 12.9 GIAL = 55.3 WFT = 18.8

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PEARSON CORRELATION COEFFICIENTS

	INC	DERR	PERR	ST	PTS	RD	RA	RC	RB
INC	1.0000 (57) P=0.0	-0.9165 (57) P=0.000	-0.1703 (57) P=0.103	0.2094 (57) P=0.059	0.1534 (57) P=0.127	-0.0172 (57) P=0.449	-0.1862 (57) P=0.083	0.2033 (57) P=0.065	-0.0065 (57) P=0.481
DERR	-0.9165 (57) P=0.000	1.0000 (57) P=0.0	-0.0746 (57) P=0.291	-0.3042 (57) P=0.011	-0.0845 (57) P=0.266	-0.0578 (57) P=0.335	0.1709 (57) P=0.102	-0.1359 (57) P=0.157	0.0323 (57) P=0.405
PERR	-0.1703 (57) P=0.103	-0.0746 (57) P=0.291	1.0000 (57) P=0.0	0.1218 (57) P=0.183	-0.4465 (57) P=0.000	0.0154 (57) P=0.455	0.0598 (57) P=0.329	-0.0781 (57) P=0.282	-0.0046 (57) P=0.487
ST	0.2094 (57) P=0.059	-0.3042 (57) P=0.011	0.1218 (57) P=0.183	1.0000 (57) P=0.0	-0.1307 (57) P=0.166				
PTS	0.1534 (57) P=0.127	-0.0845 (57) P=0.266	-0.4465 (57) P=0.000	-0.1307 (57) P=0.166	1.0000 (57) P=0.0	0.0331 (57) P=0.404	0.0492 (57) P=0.358	0.0273 (57) P=0.420	-0.0810 (57) P=0.275
IE	-0.1568 (55) P=0.127	0.1323 (55) P=0.168	0.0497 (55) P=0.359	-0.0223 (55) P=0.436	0.0513 (55) P=0.355				
GIAL	0.0531 (56) P=0.349	-0.0246 (56) P=0.429	0.0900 (56) P=0.255	-0.2379 (56) P=0.039	0.0687 (56) P=0.307				
RD	-0.0172 (57) P=0.449	-0.0578 (57) P=0.335	0.0154 (57) P=0.455	-0.0115 (57) P=0.466	0.0331 (57) P=0.404				
DE	0.0635 (56) P=0.321	-0.0934 (56) P=0.247	0.0229 (56) P=0.433	-0.3226 (56) P=0.008	-0.0644 (56) P=0.319				
WFT	0.3369 (40) P=0.017	-0.2521 (40) P=0.058	-0.0634 (40) P=0.349	-0.2111 (40) P=0.096	0.2392 (40) P=0.069				
HI	-0.1890 (56) P=0.081	0.1812 (56) P=0.091	-0.0280 (56) P=0.419		-0.1130 (56) P=0.203	-0.1169 (56) P=0.196	0.0766 (56) P=0.287	0.1247 (56) P=0.180	-0.1312 (56) P=0.168
IN	-0.1593 (56) P=0.120	0.0147 (56) P=0.457	0.3643 (56) P=0.003		-0.1888 (56) P=0.082	0.2035 (56) P=0.066	0.0568 (56) P=0.339	-0.1566 (56) P=0.125	-0.1018 (56) P=0.228
FL	0.1148 (56) P=0.200	0.0083 (56) P=0.476	-0.2187 (56) P=0.053		0.2505 (56) P=0.031	-0.1349 (56) P=0.161	0.3186 (56) P=0.008	-0.2415 (56) P=0.036	0.0674 (56) P=0.311
DE	0.0635 (56) P=0.321	-0.0934 (56) P=0.247	0.0229 (56) P=0.433		-0.0644 (56) P=0.319	0.0677 (56) P=0.310	-0.3165 (56) P=0.009	0.2104 (56) P=0.060	0.0507 (56) P=0.355

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	INC	DERR	PERR	ST	PTS
INC	1.0000 (57) P=0.0	-0.9165 (57) P=0.000	-0.1703 (57) P=0.103	0.2094 (57) P=0.059	0.1534 (57) P=0.127
DERR	-0.9165 (57) P=0.000	1.0000 (57) P=0.0	-0.0746 (57) P=0.291	-0.3042 (57) P=0.011	-0.0845 (57) P=0.266
PERR	-0.1703 (57) P=0.103	-0.0746 (57) P=0.291	1.0000 (57) P=0.0	0.1218 (57) P=0.183	-0.4465 (57) P=0.000
ST	0.2094 (57) P=0.059	-0.3042 (57) P=0.011	0.1218 (57) P=0.183	1.0000 (57) P=0.0	-0.1307 (57) P=0.166
TT	0.1756 (57) P=0.098	-0.1187 (57) P=0.190	-0.2137 (57) P=0.055	-0.2242 (57) P=0.047	0.1660 (57) P=0.109
PTS	0.1534 (57) P=0.127	-0.0845 (57) P=0.266	-0.4465 (57) P=0.000	-0.1307 (57) P=0.166	1.0000 (57) P=0.0
AYDR6	-0.9084 (57) P=0.000	0.9971 (57) P=0.000	-0.0777 (57) P=0.283	-0.3042 (57) P=0.011	-0.0855 (57) P=0.264
AYPR6	-0.2098 (57) P=0.059	-0.0329 (57) P=0.404	0.9844 (57) P=0.000	0.1227 (57) P=0.182	-0.4743 (57) P=0.000
APDR6	-0.6496 (57) P=0.000	0.6480 (57) P=0.000	0.1118 (57) P=0.204	-0.1030 (57) P=0.223	-0.0443 (57) P=0.372
APPR6	-0.2426 (57) P=0.035	0.0785 (57) P=0.281	0.7840 (57) P=0.000	0.1866 (57) P=0.082	-0.3314 (57) P=0.006
AEQDR6	-0.8538 (57) P=0.000	0.9436 (57) P=0.000	-0.0991 (57) P=0.232	-0.3745 (57) P=0.002	-0.0584 (57) P=0.333
AEQPR6	-0.2072 (57) P=0.061	0.0164 (57) P=0.452	0.9022 (57) P=0.000	0.1076 (57) P=0.213	-0.3956 (57) P=0.001
ACDR6	-0.7013 (57) P=0.000	0.7504 (57) P=0.000	-0.1686 (57) P=0.105	-0.2252 (57) P=0.046	-0.1247 (57) P=0.178
ACPR6	-0.0115 (57) P=0.466	-0.1704 (57) P=0.103	0.6017 (57) P=0.000	-0.0131 (57) P=0.462	-0.4192 (57) P=0.001
ADR6	-0.9897 (57) P=0.000	0.9250 (57) P=0.000	0.1378 (57) P=0.153	-0.2289 (57) P=0.043	-0.1400 (57) P=0.149

	ST	PTS	WFT
AYDR3	-0.2865 (57) P=0.015	0.0405 (57) P=0.382	-0.2107 (40) P=0.096
AYDR6	-0.3042 (57) P=0.011	-0.0855 (57) P=0.264	-0.2595 (40) P=0.053
AEQDR3	-0.3120 (57) P=0.009	0.0456 (57) P=0.368	-0.0872 (40) P=0.296
AEQDR6	-0.3745 (57) P=0.002	-0.0584 (57) P=0.333	-0.1567 (40) P=0.167
ADR3	-0.2450 (57) P=0.033	-0.0807 (57) P=0.275	-0.2400 (40) P=0.068
ADR6	-0.2289 (57) P=0.043	-0.1400 (57) P=0.149	-0.3489 (40) P=0.014

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	INC	DERR	PERR	AYDR6	AEQDR6	AQR6
INC	1.0000 (57) P=0.0	-0.9165 (57) P=0.000	-0.1703 (57) P=0.103	-0.9084 (57) P=0.000	-0.8538 (57) P=0.000	-0.9897 (57) P=0.000
DERR	-0.9165 (57) P=0.000	1.0000 (57) P=0.0	-0.0746 (57) P=0.291	0.9971 (57) P=0.000	0.9436 (57) P=0.000	0.9250 (57) P=0.000
PERR	-0.1703 (57) P=0.103	-0.0746 (57) P=0.291	1.0000 (57) P=0.0	-0.0777 (57) P=0.283	-0.0991 (57) P=0.232	0.1378 (57) P=0.153
AYDR6	-0.9084 (57) P=0.000	0.9971 (57) P=0.000	-0.0777 (57) P=0.283	1.0000 (57) P=0.0	0.9381 (57) P=0.000	0.9243 (57) P=0.000
AEQDR6	-0.8538 (57) P=0.000	0.9436 (57) P=0.000	-0.0991 (57) P=0.232	0.9381 (57) P=0.000	1.0000 (57) P=0.0	0.8557 (57) P=0.000
AQR6	-0.9897 (57) P=0.000	0.9250 (57) P=0.000	0.1378 (57) P=0.153	0.9243 (57) P=0.000	0.8557 (57) P=0.000	1.0000 (57) P=0.0
RD	-0.0172 (57) P=0.449	-0.0578 (57) P=0.335	0.0154 (57) P=0.455	-0.0640 (57) P=0.318	0.0218 (57) P=0.436	0.0060 (57) P=0.482
DE	0.0635 (56) P=0.321	-0.0934 (56) P=0.247	0.0229 (56) P=0.433	-0.1035 (56) P=0.224	-0.0494 (56) P=0.359	-0.0916 (56) P=0.251
WFT	0.3369 (40) P=0.017	-0.2521 (40) P=0.058	-0.0634 (40) P=0.349	-0.2595 (40) P=0.053	-0.1567 (40) P=0.167	-0.3489 (40) P=0.014

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//* UCC LINES=99
// EXEC SPSS,CASDSN='CBRA100.BAY10.RELPSYNN.DATA',
//    REGION=330K,SPACE=103K
NUMBERED          YES
RUN NAME          BAY10.RELSYDD.CNTL
FILE NAME         RELPSYNN.DATA
VARIABLE LIST     ID,ECON,PRED,DEC,INC,DERR,PERR,ST,TT,IFR,PTS
                  ID5,Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11
                  ID4,MJR,SEX,AGE,YR,IMAG,MATH,ACCT,STAT
                  ID3,RD,RA,RC,RB,IE,GIAL,HI,IN,FL,DE,DDS,DBU
                  E,I,S,N,T,F,J,P
                  ID2,YDR2,YDR3,YDR4,YDR5,YDR6,YDR7
                  YPR2,YPR3,YPP4,YPR5,YPR6,YPR7
                  PDR2,PDR3,PDR4,PDR5,PDR6,PDR7
                  PPR2,PPR3,PPR4,PPR5,PPR6,PPR7
                  EQDR2,EQDR3,EQDR4,EQDR5,EQDR6,EQDR7
                  EQPR2,EQPR3,EQPP4,EQPR5,EQPR6,EQPR7
                  CDR2,CDR3,CDR4,CDR5,CDR6,CDR7
                  CPR2,CPR3,CPR4,CPR5,CPR6,CPR7
                  OR2,OR3,OR4,OR5,OR6,OR7
                  WFT
INPUT MEDIUM      DISK
INPUT FORMAT      FREEFIELD
COMPUTE           RAN=(RA-89.6667)/13.4102
COMPUTE           RBN=(RB-60.6491)/11.9829
COMPUTE           RCN=(RC-76.3860)/13.8057
COMPUTE           RDN=(RD-72.8421)/11.2421
IF                (RA EQ 99)RAN=99
IF                (RB EQ 99)RBN=99
IF                (RC EQ 99)RCN=99
IF                (RD EQ 99)RDN=99
IF                (S LT 99 AND T LT 99) MBT=1
IF                (S LT 99 AND F LT 99) MBT=3
IF                (N LT 99 AND T LT 99) MBT=2
IF                (N LT 99 AND F LT 99) MBT=4
IF                (MBT EQ 0)MBT=99
IF                (RDN GT RAN AND RDN GT RCN AND RDN GT RBN) RDS=4
IF                (RAN GT RBN AND RAN GT RCN AND RAN GT RDN) RDS=1
IF                (RBN GT RAN AND RBN GT RCN AND RBN GT RDN) RDS=2
IF                (RCN GT RAN AND RCN GT RBN AND RCN GT RDN) RDS=3
IF                (E EQ 99) E=-I
IF                (S EQ 99) S=-N
IF                (J EQ 99) J=-P
IF                (T EQ 99) T=-F
IF                (ID EQ 106) X=11
IF                (ID EQ 217) X=11
IF                (ID EQ 313) X=11
IF                (ID EQ 139) X=12
IF                (ID EQ 227) X=12
IF                (ID EQ 326) X=12
IF                (ID EQ 343) X=12
IF                (ID EQ 131) X=2
IF                (ID EQ 231) X=2
IF                (ID EQ 336) X=2
IF                (ID EQ 340) X=2
IF                (ID EQ 222) X=3
IF                (ID EQ 304) X=3
IF                (ID EQ 129) X=4
IF                (ID EQ 133) X=4
IF                (ID EQ 138) X=4
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IF              (ID EQ 236) X=4
IF              (ID EQ 337) X=4
IF              (ID EQ 310) X=5
IF              (ID EQ 318) X=5
IF              (ID EQ 121) X=6
IF              (ID EQ 205) X=6
IF              (ID EQ 214) X=6
IF              (ID EQ 124) X=7
IF              (ID EQ 143) X=7
IF              (ID EQ 230) X=7
IF              (ID EQ 132) X=8
IF              (X EQ 2) X=8
IF              (X EQ 0) X=13
IF              (RDS EQ 3) Y=1
IF              (Y EQ 0) Y=2
IF              (RDS EQ 4) Y=0
IF              (RDS EQ 4) W=1
IF              (W NE 1) W=0
IF              (DDS EQ 1) A=1
IF              (A NE 1) A=0
IF              (DDS EQ 2) B=1
IF              (B NE 2) B=0
IF              (DDS EQ 3) C=1
IF              (C NE 1) C=0
IF              (DDS EQ 4) D=1
IF              (D NE 1) D=0
IF              (MBT EQ 2) G=1
IF              (G NE 1) G=0
IF              (MBT EQ 3) H=1
IF              (H NE 1) H=0
MISSING VALUES  RA(99)/RB(99)/RC(99)/RD(99)/IE(99)/GIAL(99)/
                HI(99)/IN(99)/FL(99)/DE(99)/DDS(99)/DBU(99)/E(99)/
                I(99)/S(99)/N(99)/T(99)/F(99)/J(99)/P(99)/
                YR(99)/IMAG(99)/MATH(99)/ACCT(99)/STAT(99)/
                RAN(99)/RBN(99)/RCN(99)/RDN(99)/MBT(99)/
                RDS(0)/WFT(99)
COMPUTE         AYDR2=(YDR6+YDR7)/2
COMPUTE         AYDR3=(YDP5+YDR6+YDR7)/3
COMPUTE         AYDR4=(YDR4+YDR5+YDR6+YDR7)/4
COMPUTE         AYDR5=(YDR3+YDR4+YDR5+YDR6+YDR7)/5
COMPUTE         AYDF6=(YDR2+YDP3+YDR4+YDP5+YDR6+YDP7)/6
COMPUTE         AYPR2=(YPR6+YPR7)/2
COMPUTE         AYPR3=(YPR5+YPR6+YPR7)/3
COMPUTE         AYPF4=(YPR4+YPP5+YPR6+YPR7)/4
COMPUTE         AYPR5=(YPR3+YPR4+YPR5+YPR6+YPR7)/5
COMPUTE         AYPR6=(YPR2+YPR3+YPR4+YPR5+YPR6+YPR7)/6
COMPUTE         APDR2=(PDR6+PDR7)/2
COMPUTE         APDR3=(PDR5+PDR6+PDR7)/3
COMPUTE         APDR4=(PDR4+PDR5+PDR6+PDR7)/4
COMPUTE         APDR5=(PDR3+PDR4+PDP5+PDR6+PDR7)/5
COMPUTE         APDR6=(PDR2+PDR3+PDR4+PDR5+PDR6+PDR7)/6
COMPUTE         APPR2=(PPR6+PPR7)/2
COMPUTE         APPR3=(PPR5+PPR6+PPR7)/3
COMPUTE         APPR4=(PPR4+PPR5+PPF6+PPR7)/4
COMPUTE         APPR5=(PPR3+PPR4+PPR5+PPR6+PPR7)/5
COMPUTE         APPR6=(PPR2+PPR3+PPR4+PPR5+PPR6+PPR7)/6
COMPUTE         AEQDR2=(EQDR6+EQDR7)/2
COMPUTE         AEQDR3=(EQDR5+EQDR6+EQDR7)/3
COMPUTE         AEQDR4=(EQDR4+EQDR5+EQDR6+EQDR7)/4
COMPUTE         AEQDP5=(EQDR3+EQDR4+EQDF5+EQDR6+EQDP7)/5
COMPUTE         AEQDR6=(EQDR2+EQDR3+EQDR4+EQDR5+EQDR6+EQDR7)/6
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COMPUTE        AEQPR2=(EQPR6+EQPR7)/2
COMPUTE        AEQPR3=(EQPR5+EQPR6+EQPR7)/3
COMPUTE        AEQPR4=(EQPR4+EQPR5+EQPR6+EQPR7)/4
COMPUTE        AEQPR5=(EQPR3+EQPR4+EQPR5+EQPR6+EQPR7)/5
COMPUTE        AEQPR6=(EQPR2+EQPR3+EQPR4+EQPR5+EQPR6+EQPR7)/6
COMPUTE        ACDR2=(CDR6+CDR7)/2
COMPUTE        ACDR3=(CDR5+CDR6+CDR7)/3
COMPUTE        ACDR4=(CDR4+CDR5+CDR6+CDR7)/4
COMPUTE        ACDR5=(CDR3+CDR4+CDR5+CDR6+CDR7)/5
COMPUTE        ACDR6=(CDR2+CDR3+CDR4+CDR5+CDR6+CDR7)/6
COMPUTE        ACPR2=(CPR6+CPR7)/2
COMPUTE        ACPR3=(CPR5+CPR6+CPR7)/3
COMPUTE        ACPR4=(CPR4+CPR5+CPR6+CPR7)/4
COMPUTE        ACPR5=(CPR3+CPR4+CPR5+CPR6+CPR7)/5
COMPUTE        ACPR6=(CPR2+CPR3+CPR4+CPR5+CPR6+CPR7)/6
COMPUTE        AOR2=(OR6+OR7)/2
COMPUTE        AOR3=(OR5+OR6+OR7)/3
COMPUTE        AOR4=(OR4+OR5+OR6+OR7)/4
COMPUTE        AOR5=(OR3+OR4+OR5+OR6+OR7)/5
COMPUTE        AOR6=(OR2+OR3+OR4+OR5+OR6+OR7)/6
VAR LABELS     ID       ID NUMBER/
               ECON     TIME SERIES FOR ECONOMY/
               PRED     PREDICTION ERROR IS/
               DEC      DECISION ERROR IS/
               INC      AVG INCOME OVER LAST 6 PERIODS/
               DERP     AVG DECISION ERROR OVER LAST 6 PERIODS/
               PERR     AVG PREDICTION ERROR OVER LAST 6 PERIODS/
               ST       START TIME/
               TT       TOTAL TIME/
               IRR      INTERNAL RATE OF RETURN/
               PTS      POINTS ACHIEVED IN CLASS/
               RA  ROWE'S ANALYTIC/        RB  ROWE'S BEHAVIORAL/
               RC  ROWE'S CONCEPTUAL/      RD  ROWE'S DIRECTIVE/
               IN  DRIVER'S INTEGRATIVE/   HI  DRIVER'S HEIRARCHIC/
               FL  DRIVER'S FLEXIBLE/      DE  DRIVER'S DECISIVE/
               DDS DRIVER'S DECISION STYLE/
               DBU  DRIVER'S BACKUP/
               YDR6     % INC DEC ERRS REL TO OVERALL AVG/
               YPR6     % INC PRED ERRS REL TO AVERALL AVG/
               PDR6     % PRICE DEC ERRS RELATIVE TO AVG/
               PPR6     % PRICE PRED ERRS RELATIVE TO AVG/
               EQDR6    % EQ DEC ERRS RELATIVE TO AVG
               EQPR6    % EQ PRED ERRS RELATIVE TO AVG/
               CDR6     % UNIT COST DEC ERRS RELATIVE TO AVG/
               CPR6     % UNIT COST PRED ERRS REL TO AVG/
               OR6      % ACTUAL VS OPT INC RELATIVE TO AVG/
               AYDR6    6 PER AVG REL % INC DEC ERRS/
               AYPR6    6 PER AVG REL % INC PRED ERRS/
               APDR6    6 PER AVG REL % PRICE DEC ERRS/
               APPR6    6 PER AVG REL % PRICE PRED ERRS/
               AEQDR6   6 PER AVG REL % EQ DEC ERRS/
               AEQPR6   6 PER AVG REL % EQ PRED ERRS/
               ACDR6    6 PER AVG REL % UNIT COST DEC ERRS/
               ACPR6    6 PER AVG REL % UNIT COST PRED ERRS/
               AOR6     6 PERIOD AVG REL % ACTUAL VS OPT INC/
               WFT      WITKIN EMBEDDED FIGURES TEST
VALUE LABELS   PRED  (0) NOT PROVIDED (1) PROVIDED/
               DEC   (0) NOT PROVIDED (1) PROVIDED/
               ECON  (1) FIRST (2) SECOND (3) THIRD/
               SEX   (0) FEMALE (1) MALE/
               IMAG  (0) NOT TAKEN (1) TAKEN/
```

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              X      (1) SELECTED STYLE (0) CONTROL GROUP (2) OTHERS          00001840
              Y      (1) BEHAVIORAL STYLE  (0) CONTROL GROUP/                 00001850
              W      (1) DIRECTIVE STYLE   (0) CONTROL GROUP/                 00001870
              A      (1) HIERARCHIC STYLE  (0) CONTROL GROUP/                 00001880
              B      (1) INTEGRATIVE STYLE (0) CONTROL GROUP/                 00001890
              C      (1) FLEXIBLE STYLE    (0) CONTROL GROUP/                 00001900
              D      (1) DECISIVE STYLE    (0) CONTROL GROUP/                 00001910
              G      (1) MBT 2  S-F STYLE  (0) CONTROL GROUP/                 00001920
              H      (1) MBT 3  N-T STYLE  (0) CONTROL GROUP/                 00001930
SELECT IF     (ID NE 128)                                                     00001940
LIST CASES    CASES=57/VARIABLES=ID,DEC,X,Y,RDS                               00001950
PEARSON CORR  INC,DERR,AYDR6,AOR6,TT,WFT,RA,RB,RC,RD WITH                     00001960
              INC,DERR,AYDR6,AOR6,TT,WFT,RA,RB,RC,RD                          00001970
STATISTICS    1                                                               00001980
T-TEST        GROUPS=Y(0,1)/VARIABLES=INC,DERR,AYDR6                          00001990
OPTIONS       2                                                               00002000
T-TEST        GROUPS=Y(0,1)/VARIABLES=AOR6,TT                                 00002010
OPTIONS       2                                                               00002020
T-TEST        GROUPS=Y(0,1)/VARIABLES=WFT                                     00002030
OPTIONS       2                                                               00002040
ANOVA         INC,DERR,AYDR6 BY Y(0,1) WITH ST,PTS/                           00002050
              AOR6,TT BY Y(0,1) WITH ST,PTS/                                  00002060
OPTIONS       6                                                               00002070
STATISTICS    1,2                                                             00002080
ANOVA         INC,DERR,AYDR6 BY Y(0,1),DEC(0,1) WITH ST,PTS/                  00002090
              AOR6,TT BY Y(0,1),DEC(0,1) WITH ST,PTS/                         00002100
OPTIONS       6                                                               00002110
STATISTICS    1,2                                                             00002120
CROSSTABS     TABLES=SEX,RDS,X BY Y                                           00002130
STATISTICS    ALL                                                             00002140
CROSSTABS     TABLES=SEX,RDS,X BY DEC                                         00002150
STATISTICS    ALL                                                             00002160
ONEWAY        INC,DERR,AYDR6,AOR6,TT BY X(6,8)/                               00002170
              CONTRAST=1 -.5 -.5/                                             00002181
STATISTICS    ALL                                                             00002190
ONE WAY       INC,DERR,AYDR6,AOR6,TT BY X(6,8)/                               00002191
              RANGES=LSD(.10)/                                                00002260
              RANGES=SCHEFFE(.10)/                                            00002270
              RANGES=TUKEY(.05)/                                              00002280
STATISTICS    ALL                                                             00002290
FINISH                                                                        00002300
```

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APPENDIX K

GLOSSARY OF TERMS

ACDR6 Six-period average relative impact of decision error on standard unit variable production cost. (Units: Decimal percent.)

ACPR6 Six-period average relative impact of prediction error on standard unit variable production cost. (Units: Decimal percent.)

AEQDR6 Six-period average relative impact of decision error on total variable production cost per unit. (Units: Decimal percent.)

AEQPR6 Six-period average relative impact of prediction error on total variable production cost per unit. (Units: Decimal percent.)

AOR6 Six-period average ratio of Actual to Optimal income. (Units: Decimal percent.)

APDR6 Six-period average relative impact of decision error on price. (Units: Decimal percent.)

APPR6 Six-period average relative impact of prediction error on price. (Units: Decimal percent.)

AYDR6 Six-period average relative impact of decision error on income. (Units: Decimal percent.)

AYPR6 Six-period average relative impact of prediction error on income. (Units: Decimal percent.)

DBU Driver's backup style. (See DDS.)

DE Raw score for Decisive scale for Driver's IST test.

DEC Decision treatment: No decision error feedback versus decision error feedback.

DERR Six-period average decision error. (Units: $1,000.)

DDS Driver's decision styles: 1=Hierarchic; 2=Integrative; 3=Flexible; 4=Decisive; 5=Complex.

DS Decision style.

ECON Economy treatment (three different economies were used by Ryan).

FL Raw score for Flexible scale for Driver's IST test.

GIAL Raw score for the Perdue-Rutgers Prior Experience test.

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HI Raw score for Hierarchic scale for Driver's IST test.

ID Identification number.

IE Raw score for Rotter Internal/External Locus of Control test.

IN Raw score for Integrative scale for Driver's IST test.

INC Six-period average income. (Units: $1,000.)

MBT Myers-Briggs Type Indicator test results.

PERR Six-period average prediction error. (Units: $1,000.)

PRED Prediction treatment: No prediction error feedback versus prediction error feedback.

PTS Grade points achieved in Ryan's class.

RA Raw score on Rowe's analytic score.

RB Raw score on Rowe's behavioral score.

RC Raw score on Rowe's conceptual score.

RD Raw score on Rowe's directive score.

RDS Rowe's decision style: 1=Analytic; 2=Behavioral; 3=Conceptual; 4=Directive.

ST Starting time for each subject. (Units: Start of experiment = 0; Hour = 100)

TT Total decision time for each subject.

WFT Raw score for Witkin Embedded Figures test.

X Decision style treatment: X=1 for selected decision style(s); X=2 for rest of sample.

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APPENDIX L

ANALYSIS OF OTHER DECISION STYLE TESTS

If time had permitted, there were a number of other avenues of research which we might have pursued in greater depth using the other decision style test results available in this study, and certainly several of these tests should be pursued in any future study of a similar nature. The Pearson Correlation Coefficients for a number of the key relationships which were observed follows:

	Income	Decision Error	Grade Points
IE	-0.16	0.13	0.05
(Significance)	(0.13)	(0.17)	(0.36)
GIAL	0.05	-0.02	0.07
(Significance)	(0.35)	(0.43)	(0.31)
WFT	0.33	-0.25	0.24
(Significance)	(0.02)	(0.06)	(0.07)

From the above summary of Pearson Correlation Coefficients, we can see the following relationships:

Witkin Embedded Figures Test (WFT)

- There appeared to be a very strong positive correlation between the WFT score and INC (Six-period average income) and PTS (Class Grade Points). The strong positive correlation with INC is naturally associated with a strong negative correlation with decision error (DERR).
- An alternative set of covariates (instead of starting time (ST)

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and grade points) was WFT and grade points. In a number of ANOVA runs these covaiates were used often with a significant improvement over similar runs using ST and PTS. The one important drawback of using WFT as a covariate is the reduction in sample size down to only the 41 subjects who took the WFT test.

- o WFT was a significant determinant in categorizing subjects into the high-analytic and low-analytic groupings which were used in testing the null hypotheses in Chapter 6 above. Again the drawback was that there was the extremely small sample size (because only 41 of the 57 subjects completed WFT).

- o Several ANOVA runs using the two-way decision style model used herein produced significant results. One such run is summarized below:

	Simple Reports	Complex Report
Subjects whose WFT Score is greater than 22	N=6 INC= 179.2 DERR= 34.3 AYDR6 = 0.69	N=6 INC=148.2 DERR= 36.8 AYDR6 = 0.76
Rest of the subjects	N=13 INC= 83.5 DERR= 96.0 AYDR6= 1.88	N=16 INC= 130.7 DERR= 39.4 AYDR6= 0.78
Total Group	N=19 INC= 101.6 DERR= 76.5 AYDR6= 1.50	N=22 INC= 135.4 DERR= 38.7 AYDR6= 0.77

Clearly, the Witkin Embedded Figures test should be studied further.

Rotter Internal/External Locus of Control (IE) Test

- o There was a slight negative correlation (-0.16) between the IE score and INC (average six-period income). This means that the subjects who have an internal locus of control also tended to do better in the exercise as opposed to those subjects who have an external locus of control (persons who believe that external factors influence or control them as opposed to their feeling they are in charge).

- o The Rotter I/E scores also were used to produce some noteworthy levels of significance using the two-way ANOVA decision style model used throughout this study. One such analysis was a two-way ANOVA run using IE scores greater

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than "17" which produced the following breakout for those 55 subjects who took the IE test•

	Simple Report	Complex Report
Subjects whose IE Score is greater than 17	N=4 INC= 50.5 DERR= 121.5 AYDR6 = 2.36	N=4 INC= 167.0 DERR= 13.6 AYDR6 = 0.29
Rest of the subjects	N=21 INC= 136.8 DERR= 44.0 AYDR6= 0.89	N=26 INC= 132.3 DERR= 43.4 AYDR6= 0.87
Total Group	N=25 INC= 123.0 DERR= 56.4 AYDR6= 1.13	N=30 INC= 137.0 DERR= 39.4 AYDR6= 0.79

Clearly, the Rotter Locus of Control test should be studied further.

General Incongruity Adaptation Level (GIAL) Test

o There was a slight positive correlation between income performance and GIAL scores. This means that those subjects who have a high tolerance for ambiguity also tended to perform better in the exercise.

o One two-way ANOVA analysis of those subjects who had a low GIAL score (i.e., who had a low tolerance for ambiguity) showed the following profile (group) attributes:

Low Tolerance	Total Group
N = 11	56
INC = 116.9	126.7
DERR = 60.6	50.4
PTS = 156.6	152.3
IE = 13.7	13.0
GIAL = 42.2	55.6
WFT = 16.4	18.8
Analytics = 3	12
Directives = 2	13
Conceptuals = 3	15
Behaviorals = 3	17
Males = 4	
Females = 7	

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A number of researchers have found the GIAL test to be a discrimating instrument. It was not found to be very significant in this study; however, clearly the above results look inteesting and certainly more research using the GIAL test is worth pursuing.

Myers-Briggs Model

Mann (1982) in his Ph.D. dissertation found a strong relationship between the Myers-Briggs model and Rowe's Decision Style Model. In particular, he found that the Analytic style resembles not only the Intuitive-Thinking (NT) type, but also the Sensing-Thinking (ST) type. This also was one of my findings. The 12 analytics in this study could be categorized by the following Myers-Briggs types·

	Number
Sensing-Thinking (ST) Type	5
Intuitive-Thinking (NT) Type	5
Sensing-Feeling (SF) Type	1
Intuitive-Feeling (NF) Type	1

Dickel (1983) in his Ph.D. dissertation (1983) also found a strong correlation with the Myers-Briggs model. He found that directives most resemble the ST-Type, and least resemble the NT-Type. What I found was that the eleven directives who also took the Myers-Briggs test could be categorized as follows:

	Number
Sensing-Thinking (ST) Type	6
Intuitive-Thinking (NT) Type	1
Sensing-Feeling (SF) Type	3
Intuitive-Feeling (NF) Type	1

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This correlation between Rowe's DSI and the Myers-Briggs model led Dickel to conclude that the directives most resembles the ST-Type, and least the NT-Type. Furthermore, he felt directives:

> ...have a short-range orientation for a single goal (usually profit), like centralized and well-defined tasks and organizational structures, and are fairly autocratic in decision making.

In contrast with directives, Dickel concludes that Analytics resemble the intuitive-thinking type, as well as the sensing-feeling type. On the other hand, analytics are least like the feeling type. Thus, he felt that the Analytic:

> "is very unemotional in decision making..."

The 15 conceptuals in my sample had a Myers-Briggs profile somewhat like analytics, as shown below:

	Number
Sensing-Thinking (ST) Type	4
Intuitive-Thinking (NT) Type	8
Sensing-Feeling (SF) Type	3
Intuitive-Feeling (NF) Type	0

This did not agree with Dickel who found that conceptuals were predominately NF and NT types, whereas I did not find any NF conceptuals.

An interesting set of relationships emerged when I did a two-way ANOVA selecting only analytics who were ST and NT types, as shown below:

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X \ DEC	0	1
0	N= 22	N= 25
1	N= 5	N= 5

X=1: Analytic and ST/NT types.
X=0: Rest of N=57 sample.

X \ DEC	0	1
0	N= 20	N= 25
1	N= 7	N= 5

X=1: Analytics
X=0: Rest of N=57 sample.

	Significance of F - Values	
	X	DEC
TT	.053	.675
INC	.015	.035
DERR	.008	.018
AYDR6	.006	.018
AEQDR6	.032	.014
AOR6	.006	.028

	Significance of F = Values	
	X	DEC
TT	.214	.582
INC	.007	.061
DERR	.004	.036
AYDR6	.003	.036
AEQDR6	.012	.024
AOR6	.003	.055

Thus, even with the reduced number of degrees of freedom with the smaller sample of 10 analytics who were also ST & NT types, we had some very significant style effects. It also should be noted that the total decision time (TT) for the ST/NT analytics was significantly different from the rest of the population. A closer look at the TT values involved shows a very interesting relationship, as seen below:

	Simple Reports		Complex Reports	
	N	TT	N	TT
All Analytics	7	68.1	5	64.4
Analytics who are ST & NT Types	5	59.8	5	64.4
Rest of Sample	22	77.8	25	74.7
Total	27	74.5	30	73.0

While there was no significant change in the six-period average

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income (INC) as we reduced the sample size from N=7 analytics with simple reports to the smaller groups of 5 analytics who are ST/NT types (change in Income was INC=74.4 versus INC=73.8), the total decision time was reduced significantly to 59.8 from 68.1. This gave a matrix of TT values which produced the significant treatment effect noted above (Significance = .053), as shown below:

	Simple Reports	Complex Reports
Rest of Sample	N=22 INC=126.0 TT=77.8	N=25 INC=135.9 TT=74.7
ST/NT Analy-tics	N=5 INC=73.8 TT=59.8	N=5 INC=142.4 TT=64.4
Total	N=27 INC=116.3 TT=74.5	N=30 INC=137.0 TT=73.0

X = 1 Analytics who are ST & NT types.
X = 0 Rest of N=57 sample.

The Myers-Briggs model strongly correlates with Rowe's Decision Style model, and when it is used in conjunction with Rowe's styles, some of the performance effects like decision time (TT) in this experiment are enhanced. Clearly, of all the alternative models discussed above, the Myers-Briggs model appears to the most promising for future research along with Rowe's Decision Style Inventory and Witkin Embedded Figures Test.

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