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AN EMPIRICAL INVESTIGATION OF DIALECTICAL INQUIRY IN GROUP PROBLEM-SOLVING TECHNOLOGIES FOR STRATEGIC DECISION-MAKING

by

EUGENE STEPHEN SIMKO

A dissertation submitted to the Graduate Faculty in Business in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

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ABSTRACT

AN EMPIRICAL INVESTIGATION OF DIALECTICAL INQUIRY IN GROUP PROBLEM SOLVING TECHNOLOGIES FOR STRATEGIC DECISION-MAKING

by

Eugene S. Simko

Advisor: Professor Michael N. Chanin

The strategic planning process usually requires on-going deliberations of a team or group at top management levels to analyze complex information in order to formulate strategy. As a group problem solving technology(GPST), Dialectical Inquiry(DI) has been tested in the past for its effectiveness as a planning aid. Past experimentation as well as field studies tested either students or managers for comparative planning effectiveness between DI and other non-conflict based GPSTs. This study is the first effort to employ one experimental design to compare the effectiveness of DI with Consensus decision making using undergraduates, graduate students, and managers. An interactive computerized business simulation was used. A new variation of DI, namely Dialectical Exchange(DX), is presented and included in the experimentation. Both DX and DI outperformed Consensus. While there was little significant difference in performance between DI and DX, DX achieved its performance levels with significantly lower levels of percieved conflict in the groups. Methods for using DX as a conflict-reducing tool are discussed, with an application in collective bargaining.

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Finally, this dissertation is dedicated to my wife, Mel Clifford-Simko, and to my children Nicholas and Gemma, without whose loving support it could not have been completed, and to

the memory of my dear parents, Helen Vasily and John A. Simko, who taught me that learning is a treasure beyond value.

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INTRODUCTION

Decision makers steer the helms of complex organizations searching for an appropriate strategies designed to fulfill a pre-determined group of objectives. The search for strategy, often involving a multitude of organizational variables, broadly entails both internal identification and appraisal of resources and relevant external opportunities and threats. Strategic planning involves an ongoing re-evaluation of organizational direction, supported through internal audits and external environmental scanning. The strategies emerging from this process commit sizable capital and labor resources for goal attainment. The word "strategy", derived from the Greek "strategos", reflects this orientation translating as "the art of the general." Just as military commanders have at their disposal vast amounts of soldiers and materiel to reach an objective, so do corporate captains command resources with which to achieve growth.

Over the years, there has been much research, both theoretical and empirical, to examine the relationships among numerous strategy formulation variables. Organizational structure, managerial stance and control, market posturing, and portfolio maintenance, to name only a few, have been afforded the attention of both academicians and practitioners alike. We believe the most challenging aspect of strategic planning involves the process of how decisions are made. Decision makers formulating organizational strategy face the overwhelming task of examining a deep pool of information.

This data must then be evaluated in terms both efficiency and effectiveness. Either implicitly or explicitly, hypotheses are generated linking various causal relationships among and between external environmental variables and internal organizational resources. These planning conceptions, along with their accompanying assumptions, form the foundation upon which strategy is built.

But, only accepted hypotheses generate specific decisions to deal with immediate as well as with longer-term problems. How do organizations know which ideas to support with financial commitment? To what degree are decision makers aware of the implications of their assumptions? How are assumptions accepted or rejected? Clearly, both the quantity and quality of decision candidates affect the outcome of chosen strategic paths. Moreover, heretofore unencountered variables an environments can further complicate the problem definition process.

Several methods to confront these issues in strategic decision making have been used by organizations over the past fifty years, ranging from the singular dictums of autocrats to the participative, democratic process of consensus. During the past ten years, however, considerable attention has been given to a strategic group decision making methodology whose roots lie deep in the science of philosophy. The methodology is dialectics, a philosophy of discourse and thinking attributed to the German philosopher Georg Wilhelm Friedrich Hegel, born at Stuttgart on August 27, 1770. Scholars have attempted to capture the notion of intense, structured

conflict arising in Hegelian dialectics between diametrically opposed thinking - the thesis and the antithesis - in order to test its effectiveness in groups facing complex strategic problems. These attempts took the form of both theoretical and empirical research concerning the role of dialectics (DI) as a group problem solving technology (GPST) in the strategic planning process. Mason's (1969) application of Churchman's (1966) conceptualization of Hegelian DI sparked an interest in the utility of conflict-based decision making approaches. Unfortunately, as Chanin and Shapiro (1985) pointed out, marked differences in operationalization as well as in research methodology created disjointed and non-comparative results. While such a turn of events is normally welcomed in pure scientific inquiry, the resulting chaos stalled chances for a serious, unified investigation of the worth of DI, as well as of other decision making approaches, for strategic planning. Despite such obstacles, however, the common bond of DI research has been pre-occupation with improving the efficiency and effectiveness of strategic decision making.

Review of the DI literature will show that there are many unanswered questions regarding the processes of how groups can effectively approach the development of strategy. Past empirical efforts have generally treated the conflict component of DI (as well as of other GPSTs) as the independent variable, examining its effect upon a host of dependent variables. These have ranged from subjective group member perceptions regarding team operation to objective performance criteria. Our interest in applying DI lies in an

area not previously addressed: the effect of conflict structure in DI and in other GPSTs upon those decisions that affect the continuous and persistent characteristics of successful strategic management. These include the ability of the strategic planning group to differentiate between short-term tactical success and long-range strategic positioning. This implies an experimental approach with DI that would allow the emergence, over time, of strategies designed to position the firm for extended growth. Schweiger (1989), Mitroff (1982), and Chanin and Shapiro (1985) have stressed the need to increase study duration in DI to allow the emergence of comprehensive and complex strategic decision scenarios.

In terms of GPST operationalization, several approaches have been used in past empirical research. As will be shown, many theoretical and applied problems exist with these formulations of DI. We believe these treatments can be improved with a new operationalization of DI.

Finally, as researchers, we became attracted to the debate (ironically a dialectical process itself) concerning the appropriateness of field versus laboratory studies regarding empirical investigation of GPSTs. Arguably, the laboratory trades rigor for relevance, while field studies in actual organizations are burdened by reduced experimental control. Chanin and Shapiro (1985) have suggested the use of business gaming simulations to investigate GPSTs. As they point out, "the use of simulation can be thought of as conducting a field study in a laboratory setting." While it is true that such games are not "real" organizational

settings, their decision environment over time approximates strategy more realistically than the use of case studies, a method popular with DI researchers. This call for the use of simulation to test DI has gone, until now, unheeded. Nevertheless, we recognize the importance of testing samples drawn from populations that have the benefit of actual decision making experience, despite the conceptual richness of business gaming. To this end, we included in our experimentation a comparative analysis between real-world managers, graduate students, and undergraduate students. This is the first experimental comparison of GPSTs to do so.

In light of these interests, we are concerned with three basic research questions:

1. What is the relationship between DI and other group problem solving technologies and effective strategic decision making?

2. What is the relationship between DI and other group problem solving technologies and group members'perceptions of effective strategic decision making?

3. Can dialectics as a group problem solving technology be improved upon?

The purpose, therefore, of this dissertation is to:

FIRST, summarize, compare, and contrast past empirical and theoretical research on the use of dialectics as group problem solving technologies.

SECOND, identify and discuss problems with past operationalizations of dialectical GPSTs.

THIRD, introduce a new operationalization of dialectical GPST.

FOURTH, present and discuss the results of three empirical experiments designed to compare the new dialectical GPST with

other GPSTs.

FIFTH, provide direction for future research.

In Chapter One, we will present the nature of the dialectical process, describing its philosophical core and its application to inquiry systems. Chapter Two will review the literature, summarizing key operationalizations of dialectical research and will present and discuss both theoretical and operational problems of previous dialectical research studies and experiments. In Chapter Three, we will introduce a new model for dialectical GPST. Chapter Four will present our empirical experimental design, to include rationales for our hypotheses, subjects, methodology, and statistical analysis used. Chapter Five presents the findings of our three experiments. Finally, Chapter Six summarizes our research and provides suggestions for further study.

CHAPTER ONE - THE DIALECTICAL PROCESS

The origins of the dialectic can be traced to the philosophical writings of both Aristotle and Plato, almost two thousand years ago. The Greek expression " he dialektike techne" is translated as "the art of argumentative use of language." Philosopher Karl Popper(1940) provides one definition of dialectics:

> One of at least its ancient meanings is very close to what I have described as "scientific method". For it is used to describe the method of constructing explanatory theories and of the critical discussion of these theories, which includes the question whether they are able to account for empirical observations.

John Stuart Mill, in his Inaugural Address as Rector at the University of St. Andrews on February 1, 1867, summarizes a more explicit description of dialectical thinking for our purposes:

> To question all things; - never to turn away from any difficulty; to accept no doctrine either from ourselves or from other people without a rigid scrutiny by negative criticism; letting no fallacy, or incoherence, or confusion of thought, step by unperceived; above all, to insist upon having the meaning of a word clearly understood before using it, and the meaning of a proposition before assenting to it; - these are the lessons we learn from ancient dialecticians.
> (Barlett,1955)

Cosier (1983) pointed out that "both Hegel and Marx used the dialectic to describe movements towards truth and change." Stozewski(1969) supports this interpretation of dialectical goals:

> Particular attention, however, should be paid to that variety of dialectics as a philosophical method which can be detected as a method of showing foundations or even of immediate revealing of the most fundamental principles...Speaking of "showing foundations" and "revealing" I am speaking really of some essential element of thus conceived dialectics. Showing foundations means literally reduction to the ultimate principles, "embedding" or founding" in them as in absolutely primary ones - and constant checking whether they are really primary and cannot be anything else. This is in my opinion the most important and the most fundamental task of dialectics which cannot be performed by any other method.

These two aspects of dialectics, showing foundations and revealing, are seen most clearly in the dialectics of Plato, as interpreted by Tatarkiewicz (1911):

> Dialectics, says Plato, differs once and for all from other sciences in that when the latter use constant principles, no longer rendering any account of them, but only building on them - which means they behave to some extent dogmatically, since their arguments are determined by their assumptions - dialectics investigates those dogmatically accepted assumptions, "abolishes" them, that is subjects them to criticism, in order to confirm them. This means that dialectics is science about assumptions, or principles, or ideas. Every science utilizes ideas, but dialectics is a special science about them.

The student of strategic decision making is easily seduced by the philosophical foundations of dialectics, for it teaches one not to attempt to build a dogmatic system which can or should be defended from every possible avenue of attack. On the contrary, dialectics demand that we challenge the thinking of others and accept criticism of ours in radical ways. Dialectics, then, becomes the strategist's jewel in the crown: a tool with which to hone critical discourse in

strategic decision making. From the broad viewpoint of decision making, the Hegelian dialectic represents a type of Inquiring System (IS). From the broad viewpoint of organizational theory, Chanin and Shapiro (1982) see Hegelian DI as self-enclosed, partial and incomplete from both the theoretical and organizational viewpoints, since it deals only with the decision making process for strategic planning and not with its antecedents (the starting organization) or its outcomes (implementation). Although our primary interest lies in improving the application of dialectical thinking in strategic decision making, we recognize the important problem of "grounding" DI in organizational reality. Chanin and Shapiro's solution is the articulation of dialectical materialism, a broader and more "operative" inquiry system than Hegel's idealistic dialectics. Both will be compared in Chapter Two. Nevertheless, the original impetus for the original application of DI applied Hegel, and this naturally becomes our departure point.

Inquiry Systems (IS) are activities designed to produce knowledge, either in the form of facts or "accepted" assumptions. The Hegelian dialectic represents a type of IS. An IS starts with some assumed raw data set which the decision maker considers to be reflective of the real world. The raw data is then transformed or filtered into a form whereby the decision maker can apply it as input into a problem solving technology. This technology provides the rules to be followed by the decision maker in formulating the decision, and it can range from a highly structured algorithm to a set of heuristic

principles. Finally, the technology manipulates the input to transform it from the state of input data to output information. Churchman's (1966) original interest centered on the application of various philosophical ISs on the decision making process. An important part of this application was the classification of the problem of interest as well-structured, or clear-cut. These problems were differentiated from ill-structured or what Ackoff(1967) called "organizational messes." Mitroff and Mason (1981) described well-structured problems as those where the problem statement and definition are not at issue. For these problems, the decision maker need only "lay down well-informed, invariant criteria for evaluating a solution..."An example of a problem solving technology for well-structured problems are models of operations research. For example, if the problem is defined as minimizing total transportation costs between production origins and demand destinations, the transportation algorithm of linear programming can be readily applied to generate a mathematical optimum. Ill-structured problems often evade such straightforward analysis, because the criteria of their solution is a function of how the problem is formulated. Since the formulation of corporate strategy requires consideration of numerous and complex internal and external variables, strategy generates the conditions for the presence of ill-defined problems. For example, a chronic decline in market share for a corporation may be attributed to a host of complex variables. The reasons for the shifting sales figures must be specifically identified in the problem statement

before major functional strategies are introduced as alternative solutions. A major organizational restructuring in this case, to increase operating cost efficiency, may be the wrong strategy at the wrong time if the problem is due to sales force job satisfaction and motivation.

Our focus is on ill-defined problems. The Hegelian dialectical IS fits strategic scenarios not only because of their complex nature, but also due to their required multiple-perspective analysis. This suggests the ever-present influence of groups in the strategic decision making process. It is important to note that the process we mean here are those that exist within some organizational group specifically designed to investigate strategic direction. In this sense, the group's recommendations for organizational strategy are assumed to be held in high regard by the individual(s) ultimately "signing off" on a given plan. Empirical research, as we shall show, has not generally differentiated between accountability and responsibility for strategic success. For example, a strategic team is responsible for making recommendations to some organizational authority, but the authority is ultimately held accountable for the success or failure of the new direction. In a sense, the authority will embrace the recommendations of the strategic team. Mason and Mitroff(1981) suggest that strategic decisions are not centered "in a single head," but rather are "widely dispersed among the various parties at stake." Our focus on how groups, rather than individuals, use an IS to approach strategic decisions reflects therefore both reality and research. Figure

1, adapted from Mitroff and Turoff(1975), compares the specific problem orientations of five philosophical descriptions of IS. As we can see, the Hegelian IS orientation fits the needs of strategic group problem solving technologies.

The Hegelian Dialectical Inquiry System(HDIS) presents the dialectic triad of the thesis, anti-thesis, and synthesis. Chanin and Shapiro(1982) explained that both the thesis and its anti-thesis emanate from different perceptions or "world views"(Hegel's Weltanschauung) of the inquirer. They further pointed out that both are developed by "reversing the usual data-to-model-to-optimal design procedure to optimal-to-model-to-data." First, there is some idea or hypothesis which is extracted from the inquirer's world view. The next step is the production of the antithesis through a propagation of an opposing world view. The idea of this required opposition lies at the heart of idealistic Hegelian dialectics. Popper(1940) explains the development of the anti-thesis:

> ...the thesis will often produce opposition, because, like most things in this world, it will proably be of limited value and will have its weak spots...the struggle between the thesis and the antithesis goes on until some solution is reached which, in a certain sense, goes beyond both thesis and antithesis by recognizing their respective values and by trying to preserve the merits and to avoid the limitations of both.

This struggle between inquirers' opposition, because it represents what Chanin and Shapiro(1982) call " an uncompromisable and insoluable conflict," will produce the synthesis, the third part of the dialectical triad.

Presumably, this conflict will cause inquirers to be exposed to the validity of the assumptions underlying their world views. This exposure will eventually introduce a higher level of objectivity into the strategic planning process. Mitroff and Turoff(1975) dilineated the formation of the synthesis in the HDIS:

> Hegelian, or Dialectical IS are the epitome of conflictual, synthetic systems. It is intended that out of a dialectical confrontation between opposing interpretations(e.g. the opposing expert views of a situation), the underlying assumptions... will be brought up to the surface for conscious examination by the decision-maker who is dependent upon his experts for advice. It is also hoped that as a result of witnessing the dialectical confrontation between experts or models, the decision -maker will be in a better position to form his own view on the problem that is "a creative synthesis" of the two opposing views.

As we shall show later, the research on operationalizing the dialectic involves different applications and emphasis on certain portions of HDIS, and even modifications of the paradigm itself. Once attained, the synthesis can produce a new dialectical triad, where opposition will be stimulated again, and the cycle continues. From the viewpoint of improving strategic decision making, however, some cautioned is advised. Some interpretations of Hegel(Cosier 1981,Schwenk and Cosier 1980) claimed that the thesis "produces" its antithesis. Chanin and Shapiro(1982) indicated the

> thesis and antithesis have the same status- thesis could be called antithesis and vice-versa. A very important notion is that, in Hegelian terms, antithesis is the "deadliest enemy" of the thesis.

Figure 1
Comparison of Inquiry System Philosophies

Inquiry System	Problem	Orientation
Leibnizian	Well-structured	Can I develop a purely rational model to deduce an assertion?
Lockean	Well-structured	Can I use objective data or statistics to support an assertion?
Kantian	Ill-structured	Is there data and theory to justify an assertion? Which alternatives give me the best support?
Singerian	Ill-structured	Is our approach broad enough and have we asked the right questions?
Hegelian	Ill-structured	Do there exist conflicting world views that permit consideration of a completely opposite set of assertions?

Thus, in organizations, a critical attitude produces the antithesis. If no conflict or challenging ideas or counterplans emerge, an antithesis will not exist. Furthermore, the HDIS assumes the proponents of different world views are accessing identical sets of data in forming their convictions. This may not always be true. For example, as mechanisms designed to govern and run an economy, Capitalism and Communism can be viewed as diametrically opposed opposites in achieving that objective. But they were once deadly enemies not because the proponents of each held opposing world views, but because their subscribers were working from different sets of data. A synthesis between the two could only have been reached after their proponents had access to and agreed upon a standard data set from which to develop their initial positions.

We wish to make two final points before departing on a literature review of past DI research. First, Mure(1940) states that "the principle of Hegel's dialectic in its formal and "prima facie" most prominent shape is the synthesis of opposites". But it is the spirit, attitude, and motivation of the debators that drives the dialectic, as Popper(1940) relates:

> The only "force" which propels the dialectic development is , therefore, our determination not to accept, or to put up with, the contradiction between the thesis and the antithesis...it is purely our decision, our resolution, not to admit contradictions, which induces us to look out for a new point of view which may enable us to avoid them... if two contradictory statements are admitted, any statement whatever must be admitted, for from a

> couple of contradictory statements any statement whatever can be validly inferred.

This interpretation bears important implications for applying the dialectic to the strategic decision making process: not all decision makers will desire to engage in such a high conflict oriented problem solving technology.

Second, Chanin and Shapiro(1982) state that

> the greatest achievement of Hegelian dialectics is that, in contrast to the medieval philosophy of static and isolated objectives, it represents a very insightful and comprehensive view of the universe as being interconnected and constantly changing.

Certainly, strategy can be substituted for the word "universe" in the above statement. Through an examination of Hegelian DI and all of the research controversy it has generated, one begins to appreciate the process of the dialectic as the single most important benefit to studying it. The dialectic demands reflection on the quality of our thinking, on the views and assumptions of others, and on the realization that, if we are to grow, we must constantly change.

CHAPTER TWO - REVIEW OF THE DIALECTICAL LITERATURE AND PROBLEMS OF PAST RESEARCH

Review of the literature on dialectical GPST reveals three chronological epochs as their application evolved. First, the "perculation" period from 1966 to 1975(incubation began with the early Greeks); second, the "Great Debate" from 1976 to 1983; and third, the "boundary-spanning" period from 1984 to the present.

Applying Churchman(1966), Mason(1969) conducted a field study to operationalize a process of strategic inquiry with the Hegelian dialectic. His process basically was to work from a predetermined pool of information confronting decision makers in an organization. This information was the genesis of a plan or thesis, and a counter-plan or antithesis, each with their respective set of assumptions underlying their strategies. The plan and counterplan confronted each other in a structured debate, from which a final plan or synthesis was developed. In the study, Mason found himself in a company where there were two strongly opposed groups of top executives, each with "almost completely contrary views about the fundamental processes and management of their organization." Both views rested upon anumber of different assumptions which, due to time considerations of implementation, could not be tested. In other words, decision deadlines were fast approaching. Mason obtained permission to apply dialectical inquiry to the situation. Mason himself formally presented both sides of the debate, putting

particular emphasis upon the underlying assumptions of each position. Throughout, his focus remained on the planning assumptions, as Mitroff and Turoff(1975) related:

> Mason took a typical set of characteristic operating data on the present state of this company(profit, ROI, etc.) and showed that every piece of data could be used to support either the plan or the counterplan. Hence, the real debate was never really over the surface data, as executives had previously thought, but over the underlying assumptions.

After the executives witnessed the structured debate, they were asked to formulate a new plan based on the contradictions that Mason had exposed. As utilized by Mason, the dialectic was first applied to the efforts of strategic planning research. In his operationalization of dialectical IS, the opposing views were kept apart from the data so that each side could be evaluated on its own merits. New evidence or data was not introduced into the structed debate portion of the GPST. It was Mason's purpose not to detract from the objectivity of each side's argument. On the contrary, his approach promoted objectivity by providing a systematic way to examine opposing views in terms of the assumptions each has embraced from the data.

Mason's efforts were pioneering for dialectical analysis. They were an attempt, in the field, to apply a new interpretation of Hegel's idealistic DI to a new field of endeavor. For the first time, a seemingly obscure and lofty philosophical paradigm was introduced to a science populated by the likes of March, Simon, Thompson, Mintzberg, and Ansoff. Mason's thinking, however, opened the door for others with

new and different ideas concerning dialectical GPST.

During the "Great Debate" from 1976 to 1983, a dialetician's dialectic emerged from the literature. We have witnessed the birth of at least three world views regarding the definition, design, implementation, and usefulness of Hegel's dialectic. Two of these "schools of thought" were described by Chanin and Shapiro(1985) as the "philosophical" or metaphysical approach propagated by Mason, Mitroff, and their associates, and as the "empirical" approach supported by Cosier, Schwenk, and their associates. We shall assume these classifications since the associated terms capture the essecnce of the research orientation. The third school we will take the liberty of calling the "synthetic" approach in the Hegelian sense of the word, due to its conceptualization of both dialectics and materialism that integrates both empirical research and dialectical-philosophy problem solving technologies. This view was introduced by Chanin and Shapiro.

The philosophical school of dialectical inquiry had, at its core, the research efforts of both Mason and Mitroff. Before discussing the research questions and methodologies, it is important to understand the attribution of the word "philosophical" in this context. Mason's original research in the field rested primarily upon Churchman's interpretation of the Hegelian dialectic. Chanin and Shapiro(1985) point out that this interpretation "inherited the the shortcomings of idealistic dialectics." Reviewing Churchman(1966), we see that Hegel viewed the world as an entire series of interconnected variables and events in a closed system. Hegel

viewed, furthermore, the entire dialectical process as a closed system of logical thought, whose ideas, even in the opposition they produce, moves along an evolutionary path. This path is managed or overseen by what Hegel called "The Absolute Mind." Further, Hegel is not explicitly clear concerning the operational dynamics of what Chanin and Shapiro(1985) call a "Superpower." This "Superpower" presumaly has the advantage of a stand-off position, similar to a person having a bird's eye view of the maze. The people in the maze may be lost to conflicting world views, but "The Absolute Mind" can step in to intercede at any moment. Although not explicitly stated by Hegel, this entity approximates conceptualization of the Supreme Being. This superpower, using an inquiry system based upon idealistic dialectics, would be analogous to some nucleus of control forming, guiding, and reforming dialectic GPST in the strategic planning process. Research to date has not hypothesized how this control works, or for that matter, how it is defined. We will return to this point in Chapter Three in a discussion of problems associated with past operationalizations of dialectical GPSTs.

Mason and Mitroff, however, are very specific regarding their philosophical embracement. Their initial explanation involves a description of their perceived domain of dialectics in strategic decision making research:

> Generally speaking, functional fields such as accounting and finance constitute the technical or "engineering" basis of the business school curriculum. In counter-distinction, policy and planning constitute the philosophical or, more

> precisely, the "metaphysical" basis of the curriculum.

As we have already stated, the domain of strategic decisions lies in the realm of the "ill-defined." The eddies and tides of continually changing opportunities and threats of the external environment provide endless permutations of planning scenarios. The philosophical approach to dialectic research asks not how the nuts and bolts fit together to form the machine, but rather whether we have made the right machine. Mason and Mitroff's approach embraces the concept of ill-defined problems, and it includes the posing of questions involving the traditional philosophical orientations of ontology, epistemology, ethics, and metaphysics. In figure 2, adapted from Mason and Mitroff(1981), they summarize the categorizations of their interests. They argue that since such questions have not up to that time been settled through traditional approaches of strategic planning models, their answers lies in the domain of metaphysical argument. They tried to identify an appropriate philosophy of inquiry and method for examining policy and planning issues, and they chose dialectical inquiry as their tool. Chanin and Shaprio(1985) summarized the philosophical school as an evolution from a Hegelian base having ontology, epistimology, and method, to an inquiry system operationalized in a problem solving technology. Both the IS and GPST produced systematic knowledge, which in turn was evaluated in light of the original philosophical base.

Figure 2

Question	Philosophical Orientation
What is the basic subject matter of policy and planning?	Metaphysics
How does it compare with other systems of inquiry?	Ontology
How do we know which business an organization is in?	Epistemology
Which business should an organization be in?	Ethics

Mason an Mitroff's original collaboration on Hegelian DI consisted of two basic steps. First, the confrontation of a plan and counterplan in a structured debate. Second, the creation of a synthesized plan from the outcome of the debate. Their orientation utilized real world managers in field studies conducted in organizations. This method of research was a direct result of their interpretation of the dialectical IS, and we believe it to be entirely consistent with their thinking. As Mitroff(1982) stated:

> For Mason and myself, the dialectical inquiry method is fundamentally not a decision process whereby a single "best" alternative is selected from a prespecified, given set of alternatives. Rather, the dialectical inquiry method is, to us, above all, a learning process whereby through active, heated, and intense debate between and among interested parties(not naive subjects) the parties come to discover and to invent entirely new alternatives as well as elaborate on old ones.

The above suggests, and their research bears out, that the management of conflict plays a vital role in the conduction of their studies. They were concerned not with the final decision choice which was made, but with the process by which it was reached. To Mason and Mitroff(1981), "true dialectic entails two or more groups actively participating in the examination and formulation of a problem from markedly different points of view."

Much of the work of the philosophical school centered around the uncovering and examining of strategic assumptions existing in organizations. This direction emphasized the fact that the strategies embarked upon were as good as the

assumptions upon which they rested. Emshoff and Mitroff(1978) stated that the presence of "information overload" in organizations promoted the conditions of what we can call "strategic proliferation." More specifically, numerous decision paths can be both identified and supported given an overabundance of and access to unlimited information. The vital decision, for the inquirers, is what to leave in and what to leave out to reach final synthesis. Emshoff and Mitroff(1978) introduced a methodology called Strategic Assumption Analysis for the purpose of integrating diverse perspectives among management. This procedure included the four step method of first, assumption specification; second, dialectic analysis; third, assumption integration; and fourth, strategy synthesis. The authors further refined their work in 1979. The assumption specification phase started with an examination of the original strategies, in light of the data upon which they were based. From this examination the assumptions of each strategy were clearly identified. In their dialectical phase, the assumptions of the original strategies were negated or "attacked." Given these negations, the data was re-examined to see if counter-strategies could be generated. Next, in the assumption integration phase, both the original strategies and their counter-strategies were collected in a "strategy pool." The data and the total set of assumptions were then examined to produce a list of acceptable assumptions, from which the "best strategy" was extracted. The underlying assumptions of each strategy was evaluated through the Belief Assessment Procedure of Saaty and Rogers(1976).

This approach basically required the participants to assess assumptions across their levels of perceived importance and certainty. This methodology was an addition to Mason's original field study previously discussed, and helped greatly to focus the structured debate portion of the dialectical IS. It was the dialectical phase of this particular approach, however, that would foreshadow the later efforts of Mason and Mitroff. Mitroff and Emshoff(1979) stated:

> The purpose of the dialectical debate is not for each group to convince the other of the uncontested truth in its position. Rather, it is to show why each group views the situation as it does and what this viewpoint entails. The purpose is to show both parties that there are different ways of viewing the situation and that what each takes as a natural set of "givens", the other takes as an unnatural set of "takens." There is no better way of doing this than conducting a dialectical debate with regard to key assumptions.

Mason and Mitroff(1979) applied "Strategic Assumption Surfacing and Testing", following in general the Strategic Assumption Analysis format. They related how executives in a disguised case, "Majestic Metals", achieved a better understanding of their decision assumptions. Groups from managment were formed, assumptions were "brought to the surface," and two dialectical debates were conducted. The first debate was within each group, the second between groups. Finally, a synthesis was generated and a decision was reached. The authors concluded that managment was aided in this case by reaching a decision based upon the broadest possible knowledge derived from the available data and interpretations.

Other field studies were also conducted. Emshoff and

Finnel(1978) utilized Strategic Assumption Analysis in a case study. Nystrom(1977) utilized dialectical inquiry in a study of faculty decision making in personnel actions. As Chanin and Shapiro(1982) indicated, however, the field studies of the philosophical school did not utilize statistical analysis because there were no attempts to compare DI with other GPSTs. In general, the field studies concluded that DI seemed to improve the ability of the decision maker to systematically structure approaches to ill-defined problems. Unfortunately, the field studies were at the mercy of many variables due to the environments of their application, and under such circumstances it is difficult, at best, to generalize research results. Nevertheless, the researchers claimed that, ripe with all of their group conflict, personalities, functional strengths and weaknesses, and managerial climate, real organizations provided the proper setting for the scrutiny of DI with ill-structured, complex problems. There was no attempt to generalize the dialectic from testing working hypotheses. Rather, DI was tested as a tool designed to aid managers facing the unknown. Mason and Mitroff(1981) stated that "frequently, our studies began at the point of disillusionment with traditional problem solving or planning technologies."

Questions persisted, however, and other researchers would begin to search for empirical evidence of the usefulness of DI as an aid to strategic decision making. More importantly, they would begin to compare DI to other GPSTs, generating our "Great Debate" in the pages of management research journals.

The "empirical" school of the dialectic, so dubbed by Chanin and Shapiro(1985), and associated with Cosier and Schwenk, sparked what Mason and Mitroff(1981) would call "a dialectic of the dialectic." The debate in the pages of the Academy of Management Review provided scholars with a front row seat to an intense point-counterpoint debate regarding the conceptualization, methodology, and usefulness of Hegelian DI. The empirical school departed radically from Mason and Mitroff's interpretation of the dialectic, especially regarding the definition of the dialectic, its dynamics, and its role in the strategic decision-making environment. Furthermore, the empirical school aligned two additional inquiry systems in its investigation of DI, namely the Devil's Advocate(DA) and the planning Expert(E) approach. The efforts of Cosier and his associates really represent an alternative to the metaphysical questions posed earlier by Mason and Mitroff.

The primary investigation method of the empirical school was the controlled laboratory setting. The researchers contended that only carefully controlled laboratory experiments should be employed to test hypotheses concerning the utility of DI for management practitioners. Citing the absence of such experimental control, Cosier et al(1978) conducted two studies which introduced a new model to predict the role of conflict in GPSTs. The first study applied the Brunswik Lens Model in the Social Judgement Theory Paradigm suggested by Brehmer(1976). According the Brunswik, a decision maker is faced with information cues as input for a

given decision scenario. These cues are correlated with a criterion variable. For example, my price-elastic petrochemical product is vulnerable to the price of crude oil(a cue), which can affect my market share(a criterion). The decision maker, when subjectively estimating the criterion, infers weights to the cues. The experimenter can structure the multiple coefficient of determination between the cues and the criterion to provide an environment conducive to generating uncertainty. Cosier had eighty-four MBA students examine three sets of prediction trials between cues and criteria. The trials were structured so that a high and low cognitive conflict condition existed. The high conflict trials were pre-programmed opposing predictions, while the low conflict trials had more or less agreement. The researchers found that

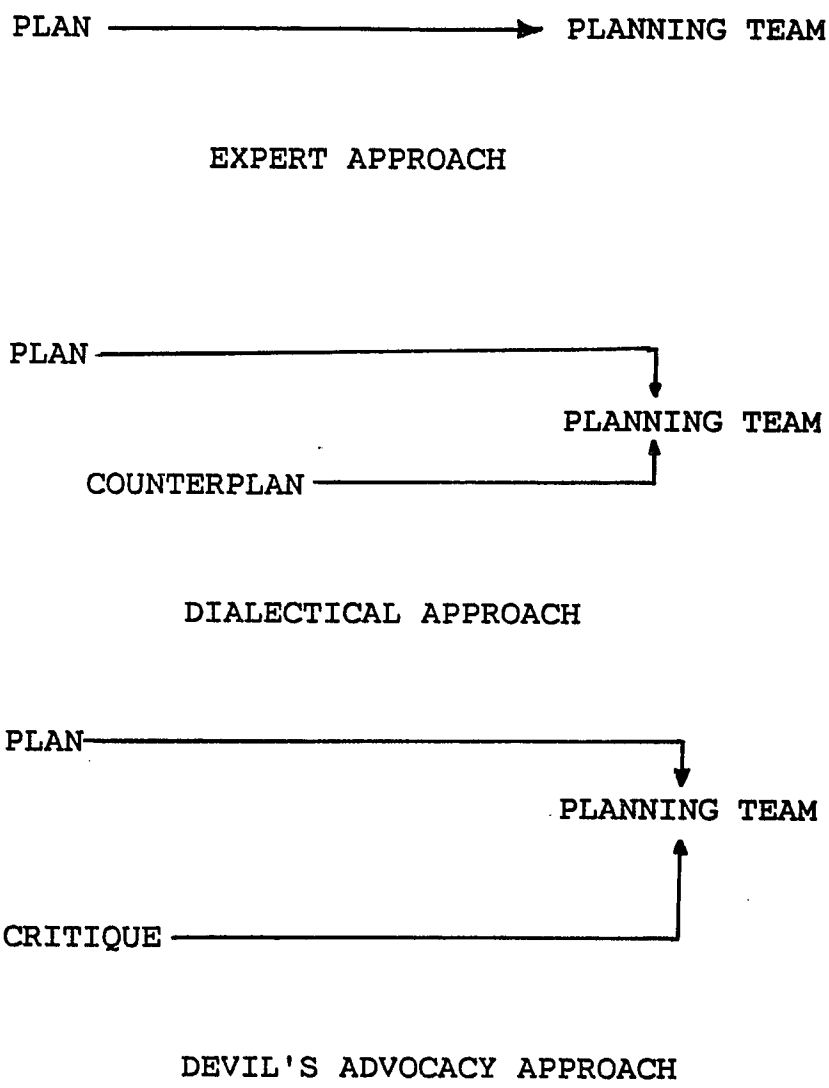
> ...the conflicting advice was percieved as more helpful than the nonconflicting advice, but there were no significant differences in prediction accuracy due to the cognitive conflict factor.

In the second study, one hundred and eight undergraduate business students assumed the position of managing a small retail operation selling two products. Decisions were made for eight trials in four areas: price, product mix, advertising, and sales promotion. The decision environment was purely from the marketing function viewpoint. The students, unknown to them, operated in three different markets characterized by mechanisms installed by the researchers. After the second decision, planning conditions were experimentally introduced. One group received information in

a "DI format," namely a plan and a counterplan. The second group received its data in the Devil's Advocate(DA) format, consisting of a plan and its accompanying critique. The third group received a single plan from an expert(E). These three manipulations of Cosier's experimental GPSTs are illustrated schematically in Figure 3. Finally, the control group was cast adrift without a structured GPST and received no planning information. After eight decision trials, performance was measured in dollar profits for each group. The DA GPST outperformed both the DI and E group in all three markets, and the control group in two of the three markets. Cosier concluded that "the conflict component of DI seems valuable, but the best mode of presenting that conflict may be a system other than DI." We note here , however, that in this second stuy there was no use of a structured debate, a step integral to Mason and Mitroff's DI operationalization.

In a later study, Cosier and Aplin(1980) utilized planners of the United Way of America to evaluate, through the mail, a case and a "committee report." They were then asked to generate a plan based on this information. DI, DA, and E conditions were randomly sent to the participants. In the opinion of judges evaluating the returned plans, the DI condition had the most consistently low ratings. The judges further indicated that the DI condition plans were "characterized by an excessive lack of risk-taking." We do not find this surprising, since each planner was working alone on his planning proposals, devoid of the richness of the Hegelian argumentative process.

FIGURE THREE



Cosier and Schwenk(1980) employed the Multiple-Cue Probability Learning Paradigm(MCPLP) to examine inquiry methods. Ninety-six undergraduate business students were required to predict a price/earnings ratio in situations defined by three cue variables. These cues were the current ratio(liquidity), inventory turnover(activity), and debt/equity(leverage). Again, three treatments were used: a plan(E), a plan/counterplan(DI), and a plan/critique(DA). In summarizing the prediction quality of the students, the authors concluded that

> the DA approach...does not encourage a planner to make a choice between two contradictory plans. Rather, it encourages the planner to examine the assumptions underlying the expert's plan. Subjects using this approach might have a greater tendency to develop assumptions based on data from the environment rather than accepting the assumptions of either a plan or counterplan.

Schwenk(1982) reprised the above experimental conditions in a controlled experiment again with undergraduate business students. An additional treatment, called Devil's Advocate Dialectical Inquiry (DADI) was introduced. DADI offered the participants both a critique and a counterplan. The conclusions indicate a superiority of both DA and DADI to DI and E. But as Chanin and Shapiro(1982) pointed out,

> Cosier and Scwenk create a dialectical inquiry simply by providing subjects with two written proposals: plan and counterplan. They do not include the critique in their operationalization of DI, even though the DA approach is induced by presenting subjects with a plan and critique of this plan. As a result of this ommission, Schwenk can be said to have reinvented the wheel in testing DADI.

Through its research efforts, the empirical school ignited a research dialectic on DI. Cosier(1982) posed the question "should the DI or DA process serve as the best method for introducing critical thought?" Due primarily to Cosier and Schwenk's efforts, the DA approach emerged as an alternative IS in the debate to use the best GPST to produce knowledge concerning strategic decision making. We believe a more useful and ultimately less confusing research direction would have been empirical experimentation by Cosier and Schwenk of Hegelian DI as interpreted by Mason and Mitroff. Nevertheless, it was the empirical school which first attempted to structure inquiry and GPSTs in controlled laboratory experiments, with the rigour of the scientific method. Cosier(1981), after several rounds of unstructured debate in the management journals, stated

> To some degree, the debate transcends the immediate issue of the dialectic versus the devil's advocate. As could be expected, I believe more controlled study is necessary in the strategic planning field. Studies in the "hard" sciences have always involved experimental methods. Where would the field of medicine be if all research was dismissed that did not involve "real" subjects in "real" settings?"

The philosoper Mitroff(1982) rejoined

> As a tool for meta-analysis, dialectical inquiry is at a different level of reality, as it were, than decision analysis and experimentation, which operate at a lower level of analysis. While dialectic inquiry may be best for uncovering new and radically novel alternatives, experimentation may be best for choosing one of the alternatives once one is assured that the set of decision

alternatives is reasonalby complete.

Dialectical Materialism

The synthetic school, primarily the efforts of Chanin and Shapiro(1982,1985), "extended the boundaries" so to speak in the Great Debate by suggesting the use of dialectical materialism(DM). Building on empirical research by Chanin(1980) on the role of conflict modes in strategic decision making, they suggested DM not as an alternative to DI or DA, but as a paradigmmatic change designed to synthesize both theoretical and empirical research efforts up to 1982. According to Chanin and Shapiro(1982), materialism "emphasizes the need for grounding scientific theory in empirical research, and dialectics stresses the never-ending process of revising theories as new facts are found." Their thinking reflected basically a materialistic interpretation of Hegel through Marxian dialectics, in sharp contrast to Hegel's closed system of the Universe, overseen by the Absolute Mind. Chanin and Shapiro were most concerned with the numerous points of confusion between the empirical and philosophical schools. While there were several methodological differences such as the absence of conflict measures, treatment of time horizons, performance criteria, and problem types(to name only a few), their most serious concern was for the empiricists' misstatement of the dialectic, and for the philosophers' reliance upon Hegelian Idealism in their thinking. In 1982

they pointed out that

> Dialectical Materialism deals not with pure concepts but with things, objects of experience, actual human beings in their real environment and circumstance. Combined with consistent materialism, the dialectical method becomes a method of investigation instead of being a pure method of argument.

Dialectical Materialism Inquiry System(DMIS) focused on real, tangible forces whose roles could be measured in the planning framework. Chanin and Shapiro(1982), in explaining DMIS, described its six major principles: change, contradiction, transformation of quantity into quality, negation of the negation, totality and interconnection, and praxis. These are listed in Figure Four. They further explained that, since DMIS unifies both theory and practice, it may be referred to as "dialectical empiricism." DMIS transcends Hegelian DI, DA, and other GPSTsin that it introduces an entirely new philosophical orientation governing inquiry as well as the GPST. In addition, DMIS allows, at least theoretically, the integration of materialism into the decision making process. This allows consideration of those variables not directly addressed by previous DI operationalizations, such as the realities of the organization. These include organization structure, resources, change, functional goals, and performance. We are especially interested in the praxis component of DMIS, since it projects the importance of strategy implementation, follow-up, and control after the DI GPST is used to generate a final set of recommendations. All research on DI GPSTs stop short of explaining "what happens

next" in the ongoing strategic planning process. This reflects, of course, the "terminal" nature of groups used in studying DI. Once the experiment is finished, the groups do not report to work the next morning to continue interpersonal relationships. While our new formulation of DI GPST will not specifically address implementation activities, it will incorporate as dependent variables decision elements that affect future strategic positioning of the group/organization. We will return to this discussion in Chapters Three and Four.

To examine alternate inquiry systems, Chanin and Shapiro(1982,1985) have suggested the use of business gaming simulations. Their experience with free-simulation and computerized business games revealed higher performance rates for groups using DI-based GPSTs than other GPSTs, including DA, the Nominal Group Technique(NGT), and simplfied Delphi. We agree with their claim that " the use of simulation can be thought of as conducting a field experiment in a laboratory setting."(1985) In DMIS GPST, more than two preliminary plans are scrutinized(unlike DI), and the structure of the organization at a given point in time is used as a source for generating alternatives. Chanin and Shapiro(1982) thus suggested that DMIS, being both a conceptual and descriptive model, gives rise to a new strategic planning model:

> The development of a strategic plan is conducted by resolving the existing contradictions between different departments, services and elements inside and outside the organization. The organization then reaches a decision-synthesis through unity of opposites via a "structured debate."

While the formal Great Debate on DI GPST ended in 1985,

FIGURE FOUR

ELEMENTS OF DIALECTICAL MATERIALSIM PHILOSOPHY

Principle	Planning Orientation
Change	Anticipatory thinking about changes in internal/external events: organizations are constantly changing
Contradiction	Stakeholder conflict(i.e. labor vs. owners vs. management);conflict among functional departmental goals
Quantity into Quality	The stage of corporate development:the mode of change(will we be better if we are bigger?)
Negation of the Negation	Problem replacement through the outcome of change(if we get bigger, we won't have some of the problems of being smaller)
Totality and Interconnection	The organization must be treated as one entity consisting of individual, complex components
Praxis	Implementation considerations; the plan producing results; its justification for existing(results drive the plan, and the plan produces results)

efforts have continued to date to evaluate its effectiveness and utility as an aid to strategic decision making. We observe since 1985 that there has been little theoretical and empirical work that directly involves dialectical-GPST. A noteworthy exception, however, have been two laboratory studies. In the first study, Schwieger, Sandburg and Ragan(1986) employed case analysis with MBA students to test the effectiveness of DI, DA, and Consensus. Judges(educators an researchers in management) evaluated group performance by assessing both final recommendations and supporting assumptions concerning the discussed case. Results indicated that both DI and DA generated superior recommendations and assumptions than Consensus. In addition, the authors claimed that DI was more effective than DA in its ability to surface assumptions in the groups' deliberations. They also found that "subjects in the consensus groups expressed more satisfaction and desire to continue to work with their groups and greater acceptance of their groups' decisions than did subjects in either of the two other types of groups studied."(p.51) We are thus presented with the dilemma that structured conflict improves decision quality while simultaneously eroding the group's ability to continue working together. We will return to this dilemma when we introduce a new model of DI-GPST in Chapter Four.

In the second study, Schwieger and Sandburg(1989) employed an identical experimental design to investigate the role of individual capabilities of group members in GPSTs.

Results showed that both DI and DA groups had higher quality recommendations and assumptions than the average of the individuals in each group. Furthermore, the group recommendations and assumptions were of higher quality than the best individual for the respective groups. The Consensus treatment, however, did not exhibit significant differences for either of these findings. The authors concluded by calling for research "to determine whether and how certain aspects of the debate process(e.g. critical questioning, organizing presentation of conflicting ideas) affect strategic decision-making."(p.41)

Other efforts since 1985, while not centrally concentrating on DI-GPST, provided useful knowledge concerning group decision making. Schweiger, Anderson, and Locke(1985) used a computer-simulated, strategy-formulating game to investigate the role of information processing and evaluation thought processes in group decisions of undergraduate and graduate business students. The results suggested that causal analysis linking assumptions to decisions improves decision quality, while negative emotions, blind repetition of past successful decisions, and illogical thinking all contrbute to poor strategic performance. Fredrickson(1985) used case analysis with both graduate students and managers to examine the role of decision motive and current organizational performance level in the way strategic decisions are made. For the students, results were mixed, but for the managers, their decisions were relatively unaffected by the two contextual factors identified. The authors called for more

research to test the generalizability of current strategic decision process theory. Gladstein and Reilly(1985) used graduate students in an experiment employing "The Tycoon Game", a computerized business simulation to test the effects of external threats upon the decision making process. Their results indicated that with increased threat levels there was a restriction in group information processing, accompanied by increased stress in the group itself. Isenberg(1986) used verbal protocols(thinking aloud) to compare managerial and student decisions in a business case. Analysis of the verbal protocols revealed that managers initiated planning frameworks sooner than the students. In addition, the managers made fewer requests for specific information than the students in formulating strategies. We view this study as additional support for including both students and managers in GPST experimentation.

In another study, Hiltz and Turoff(1986) examined the role of face-to-face versus computerized conferences in group decision making. In both modes, they found decision quality equally good, but group decision agreement was less likely reached using computerized conferences. Wanous and Youtz(1986) used the "subarctic" and "mountain" survival exercises with undergraduate students to examine te relationship between solution diversity, group diversity, and decision quality. Their primary conclusion yielded empirical support for the notion that group diversity increases solution diversity, which in turn improves overall decision quality. Gist, Locke, and Taylor(1987) provided a literature review of

organizational behavior with regard to group structure, process, and effectiveness. Figure Five illustrates their heuristic model of small group behavior. Their call for more research on team development influenced our thinking in the formulation of a new model for DI-GPST.

Rosen(1987) discussed the role of praxis(discussed earlier) in managment theory and practice. In identifying praxis as the knowledge gained from the dialectical critique, Rosen illustrated the importance of implementation and control after the dialectical confrontation. Although his essay focused on the academic workplace, we believe his treatment of praxis bears important implications for tracking and evaluating experimentally-produced decisions, especially for DI-GPST. We will return to praxis in Chapter Four.

Bottger and Yetton(1988) used the "moon survival" problem with graduate students and managers to develop a model of group problem solving . The model described performance as " a function of group resources and strategies for their use,"(p.234) and concluded that member task knowledge is a central component of group problem solving. Walsh,Henderson, and Deighton(1988) used graduate students playing the MARKSTRAT simulation to examine the role of negotiated belief structures in group decision performance. These structures was defined as "the politically enacted collection of schemata employed by the group in their deliberations."(p.194) Their findings implied "that political processes must be considered in any attempt to understand information processing at the group level of analysis."(p.207)

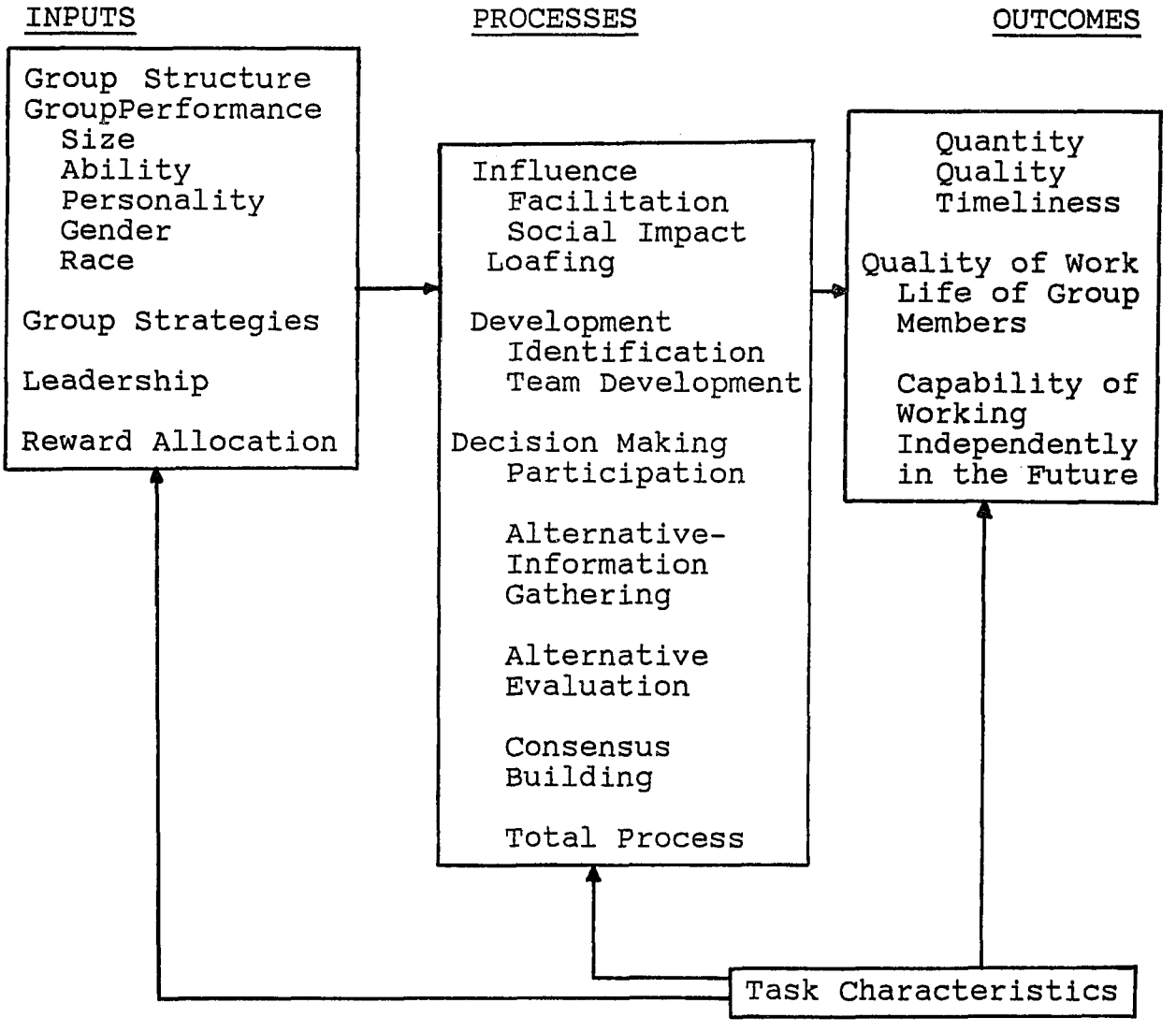
Finally, Schwenk(1989) employed meta-analysis to attempt to resolve, in a throwback to the Great Debate, the dispute between the effectiveness of DI and DA in GPST. He concluded that neither method is superior to the other for introducing conflict in the strategic decision making process. This study persuaded us, at least temporarily, to shelve DA for experimental purposes, and to focus on improving the DI-based GPST. Before we attempt this, however, we turn to a discussion of several operational problems of DI-GPST as revealed by our literature review.

Problems of Past DI-GPST Research

Our motivation in conducting research on DI-GPST stems from the identification of several deficiencies with past efforts. We segregate these problems into two broad areas. First, those problems which deal with external validity issues, and second, those which arise in the operationalization of the DI inquiry system. Both areas are of equal importance to our experimental design in testing a new DI-GPST model. External validity deals with the applicability and appropriateness of experimental conditions to management practice. Since we are interested in top level strategic decision making, the interest of knowledge is best served through close replication of organizational planning environments. Although we are interested in theoretical refinement and extension of past DI-GPST research, to do so at the expense of its practical implementation would be of little value. In addition, we

Figure Five

Heuristic Model of Small Group Interaction



observe from the literature review that problems existed stemming from the operationalization of the dialectical philosophy. As such, these are methodological issues which must be addressed in the development of a new DI prototype. We therefore identify the following problems of past efforts:

External Validity Problems

1. Relevancy To Corporate Planning Environments
2. The Persistence of Group Operation

Operationalization Problems

3. The Use of Subjective Evaluative Methods
4. The Lack of Testing for Strategic Team Effectiveness
5. The Forced-Reactive Mode of DI Treatments

RELEVANCY TO CORPORATE PLANNING ENVIRONMENTS

We believe it doubtful that planning ideas, as they emerge in organizations, would find corporate constituents willing to attack them in terms of complete contradiction. Churchman(1971) stressed that the antithesis goes beyond a simple contradiction of the thesis; indeed, it becomes its deadliest enemy. He sees the antithesis as "an anticonviction of forcefulness at least as great as the conviction."(p.172) In past field studies and laboratory experiments, Hegelian contradiction was attempted through the presentation of a plan, followed by a counterplan, or through the examination

and debate of two simultaneously produced counterplans (Cosier,Ruble and Aplin(1978); Mason(1969); Aplin(1978); Mason(1969);Cosier(1983);Schweiger and Finger(1984). These approaches, while experimentally expedient, began after the birth of the thesis/antithesis, plan/counterplan. More recently, Schweiger and Ragan's(1989) DI manipulation involved the presentation of a plan with supporting assumptions to a subgroup, followed by that subgroup's direct counterplan negating the assumptions of the original plan. Chanin and Shapiro(1985) have indicated that a major drawback of idealistic DI-GPST concerns the origin of the conflicting thesis-antithesis. Not only conflict, but willing and sought-after conflict is necessary for a dialectical IS to function. Debate and confrontation cannot be accidental; they must be nurtured and encouraged. Ramaprasad and Mitroff(1984) pointed out that strategic planning teams are comprised of managers whose skills and experience span several functional areas. Indeed, the earliest strategy forumulation models (Ansoff(1965); Tilles(1977);Mintzberg(1972);Ackoff(1967) all stressed the importance of the corporate viewpoint in the consideration of strategic decisions. Argument for argument's sake in an organizational planning environment can be detrimental to the political survival of a planning team. If the original plan or thesis even hints at top management acceptability, an attempt to negate it may be accompanied by a less than enthusiastic debate. It is more likely that alternative planning recommendations become advanced by teams integrating

a corporate viewpoint, which may include negotiated trade-offs between the "sacred cows" of decision-makers. We suggest that the conflict component of DI-GPST is indeed useful in strategic decision making, but it should be one that thrives not on simple contradiction. Instead, it should focus on critical discourse of both converging and diverging ideas. While most GPST operationalizations of DI stress the debating component, to do so at the expense of more comprehensive and competing planning scenarios defeats the purpose of using DI in the first place.

THE PERSISTENCE OF GROUP OPERATION

Real-world strategic planning teams are ongoing organizational subunits whose mission is to provide top management with strategic intelligence. Their mission is comprehensive. They must present recommendations to those in both authority and responsibility for the organization's strategic posture. Thompson and Strickland(1987) outline these individuals as:

1. The Chief Executive Officer and other senior corporate-level executives who have primary responsibility and personal authority for strategic decisions affecting the entire enterprise.

2. The general managers of subsidiary line-of-business units who have profit-and-loss responsibility for the unit.

3. The functional area managers within a given business unit who have direct authority over a major piece of the

business.

4. The managers of major operating departments and geographic field units who have frontline responsibility for the details of strategic efforts in their areas.

Given the level, focus, and overall importance of strategic planning, we find it reasonable to assume that planning teams spend extended periods of time together, working on continuing projects and analyses as external environmental conditions dictate. These groups are not committees which dissovle with each completed agenda; rather, they persist as an ongoing element vital to the firm's planning infrastructure. We observe in the literature review presented earlier that with one exception(Chanin(1980)), empirical research on DI-GPSTs has employed either case studies limited by static and simplistic design of short duration, or field studies, limited by time constraints imposed by the host organization. We agree with Mitroff(1981) and with Chanin and Shapiro(1985) that such short-term windows of operation do not allow true dialectical inquiry to develop and flourish. While longitudinal studies in actual organizations would provide many logistical problems, we believe that the use of computerized business simulations can produce group longevity requisite to the development of dialectical argumentation. Case studies, while representative of excellent time capsules of organizations facing strategic problems, severely limit the scope of the inquiry process along two dimensions. First, the team using DI-GPST usually can exhaust the discussion potential of the case in, at most, a few hours. The team is

not facing an ongoing series of internal/external environmental threats and opportunities. As such, termination of the case discussion is always in sight. A DI-based planning debate on two counterplans in an organization does not enjoy this luxury. New problems will arise in the future, perhaps as a direct consequence of the decisions made in the present. Teams will advance points and counterpoints, but will do so keeping sight of the long-term impacts strategic decisions may have on the organization. Students debating case issues, with a clear starting and finishing time frame, have no such responsibility or incentive to consider far-reaching effects of their decisions.

Second, cases severely limit the world views possible in the dialectical process. Schweiger and Sandburg(1989), citing the limitations of their own case-driven DI-GPST experiment, stated that

> subjects recieved the information to analyze the situation from one source. In most strategic decision situations, however, decision-makers have to learn what information is needed and where to find it.(p.41)

THE USE OF SUBJECTIVE EVALUATIVE METHODS

We observe through the literature review that past DI-GPST research evaluated DI as a planning aid by measuring either participant perceptions of team behavior, or through the ratings of external judges who evaluated both assumption and recommendation quality. Both of these two general dependent variables, while useful in experimental design,

impose limitations upon research conclusions that may be reached.

We agree with Schweiger and Sandburg(1989) that team member perceptions can provide insight to a number of behavioral variables concerning the use of conflict in GPST, to include satisfaction with the decision process, committment to the decisions reached, and overall desire to continue working with the group. Such perceptions, however, when measured for student participant responses, can generate data that confound the role of the independent variables in the research. Student perceptions at any given time may reflect attitudes formulated by their satisfaction with the course and/or instructor. In addition, as we already observed, knowledge that the course will end and associations will be terminated can affect responses. For example, if we are measuring a desire to continue working with the group, it is difficult to separate "as a fellow classmate" from a fellow "professional planner". Cross-comparisons of real-world managers with students, however, in identical experimental conditions would be useful in minimizing confounding effects upon hypotheses tested. Managerial perceptions, even under controlled laboratory conditions, are tempered by both planning experience and a broader range of intergroup communication exposure. We believe that the addition of managerial participation would profoundly strenghten the generalizability of DI-GPST experimental results.

In addition to the subjective ratings of performance by judges, more objective, unbiased measures would provide better

experimental consistency, especially when comparing DI to other conflict and non-conflict based GPSTs. We believe that business simulation and gaming can provide such measures. Chanin and Shapiro(1985) state that "the free simulation technique creates conditions closer to a real-life setting than is possible in controlled laboratory experimentation"(p.670). In comparing field studies, laboratory experimentation and free simulation in research on DI, they note that the task of simulation involves "the development and implementation of strategic plans through quarterly operational decisions"(Chanin and Shapiro,1985,p.671.) The strength of the simulation approach lies in its ability to combine both subjective opinions of participants and computer-generated economic performance in evaluating GPSTs. Thus, strategy effectiveness can be directly measured through such components as return on investment, production/operating efficiency, investment for future positioning, and research and development, to name a few. Results can "speak for themselves" instead of relying solely on the opinions of "expert judges."

THE LACK OF TESTING FOR TEAM STRATEGIC EFFECTIVENESS

We have found no evidence of past research examining the specific nature of strategic decisions, and hence plans, associated with DI-GPST. One primary reason for studying DI is to see if its structured conflict provides the organizations with those planning elements so crucial to the

emergence and sustainment of strategy. Among these are resource allocations(Vancil and Lorange,1975), competitive strategy(Porter,1985), capital budgeting (Mintzberg,1972), and implementation plans(Steiner 1972). All of these elements are desinged to achieve long-range market posture for the firm. Strategic effectiveness develops over time, because strategies committ major resources of production to fulfill such goals as improved market share and profitability(Steiner,1972). We believe that, due to the relatively short time durations of past experiments with DI-GPST, evaluation of decision recommendations could not reveal longer-term emergence of strategy validation. At best, case recommendations or judged plans could only predict future effectiveness based upon current evaluation of assumptions in their support of decisions. What is needed, therefore, is the accummulation of strategic decisions, over time, to reveal the role of structured conflict in the consideration of trade-offs between short-term results gratification and long-term decision payoffs. Strategic effectiveness may need time to evolve, especially in planning scenarios where "ill-structured" problems are the rule rather than the exception.

THE FORCED-REACTIVE MODE OF DI TREATMENTS

The submitting of a plan to a subgroup for purposes of developing an ensuing counterplan leads to what Churchman(1971) called "blind and narrow alleys." The forced reaction of an antithesis to a thesis can lead to many

strategic alternatives never being addressed, due to experimental pre-occupation with the debating component of DI-GPST. The most recent empirical studies(Schweiger and Sandburg,1989) required a team subgroup to respond to a written plan by formulating a counterplan to negate the assumptions of the original plan. Churchman(1971) asked

> Where does the thesis come from? It is a created episode, terribly exciting, carrying its own commitment. But the "truth of the matter" is that the thesis is only one of a large set of altrnatives that are "mapped" in some "decision-making space." No element of this space need be any more prominent than any other; how did the thesis come to be called out to play its dominating role?(p.177)

We believe that the dialectical debate provides excellent structure for DI-GPST conflict, but the participants should be discouraged in a systematic way from personal bias towards their own world views. Synthesis should not occur due to negotiated compromise of positions. It should be reached after team members can thoroughly appreciate the assumption and planning perspectives of the entire group.

Having examined problems associated with past DI-GPST research efforts, and building upon recent developments in the behavioral study of group decision-making, we turn in the next chapter to the introduction of a new model of DI-GPST.

CHAPTER THREE - DIALECTICAL EXCHANGE: A NEW MODEL FOR GPST

We now consider the research question of improving DI-GPST

in terms of observed deficiencies of past operationalizations. Our objective is to formulate a new problem-solving technology which may be experimentally investigated in light of dialectical inquiry theory. Chanin and Shapiro(1985) illustrated the role of DI-GPST in the process of strategic planning by relating it to a philosophical framework, as adapted in Figure Six. Chanin(1980) defined a problem-solving technology as "a technique or format of problem-solving"(p.1). Our new model retains the tenets of dialectical materialism in its emphasis on real, tangible outcomes in the planning process, but changes the operationalization of the inquiry system by altering the method of group deliberation and argumentation. These changes represent a radical departure from standard dialectical debating procedures, and also from critical thinking in general. We wish to anchor our new model in current research on group decision-making, as well as in dialectical theory. Thus, the logic of our argument will proceed along three avenues of approach. First, the importance of structure in group decision-making will be discussed. Second, the need to control confrontation in group argumentation will be addressed. Third, the importance of information access and flow in DI-GPST deliberations will be highlighted. Discussion of these three factors will integrate

the literature of DI-GPST and group theory in the social sciences. We will finally link this integration to both the external validity and operationalization problems discussed in Chapter Three, and introduce our new Dialectical Exchange model.

THE IMPORTANCE OF STRUCTURE IN GROUP DECISION-MAKING

There is much evidence suggesting that structure is important to both effective and efficient group decision-making. Van de Ven Delbecq(1974) showed that the method of problem solving influences participant attitudes toward intended behavior. This is especially critical to the use of DI, since recent studies claim that participants dislike dialectical conflict, measured by their unwillingness to work with the group in future planning tasks(Schweiger and Sandburg,1989). Cooper and Wood(1974) showed that structured decision-making phases(generation, evaluation, and choice) increased both intragroup member influence and satisfaction, and led to increased participation of the entire group in the decision-making process. Yoshida et al(1978) found that the use of staff roles in the planning team process increased the overall level of participation by individuals in decision-making. White, Dittrich and Lang(1980) tested, in a laboratory experiment, the effects of group problem-solving and problem complexity on decision implementation. Their results showed that "structure in group decision-making processes led to increased rates of implementation at all

levels of problem-solving complexity"(p.428). Rappaport and Borstein(1989) showed that structured group discussion serves to promote a sense of group integrity and social duty, which binds the group together as a formidable entity. Sniezer and Henry(1989), in another experiment, found that high disagreemnt among group members' individual initial judgements concerning problems arose from grouping around tasks. This grouping was associated with increased accuracy in group decisions. Poole, Seibold and McPhee(1985) related that "action"(discussion) in groups must be controlled by structure. This structure requires accountability for the flow of information:

> As we have noted, action is continuous, enabling people to plan, sequence, and correct their activities as they take place. A group member telling a story can add needed information, expand on parts of the story, answer questions, or decide not to finish it...one cannot do everything at once, so one must sequence and assign priorities to what one does, neglecting some things entirely(p.78).

We will show later that in both our pilot study and in our research experiments that the control groups, lacking formal decision-making structure, suffered from a lack of control over their team planning functions. These included research and development strategies, capacity planning, and production efficiency.

Lack of structure in group decision-making also does not provide group participants with a "systematic sense of the structure of problems and their preferred solutions"(Hart et al,1985, p. 595). In addition, it can lead to "social

loafing"(Lantane et al,1979), which occurs when an otherwise productive group member will let other members engage the problem. The loafer benefits from the lack of structure in decision-making, while the group suffers.

On the other hand, too much structure can cause a pre-occupation in the group with unanimity at the expense of decision quality. Janis(1982) defined this phenomenon as Groupthink, a "mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' striving for unanimity overrides their motivation to realistically appraise alternative causes of action"(p.9). Basically, groupthink palces a premium on cohesiveness at the expense of a decline in the quality of decision-making(Whyte,1989). We believe that structure centered on passive conflict can minimize the efforts of Groupthink; this will be reflected in our new model.

We believe that the benefits of structured decision-making vastly outwiegh the costs. As such, we incorporate a formal, systematic structure into our new decision-making technology.

THE NEED TO CONTROL GROUP CONFRONTATION IN ARGUMENTATION

We have observed from the literature review that utilization of the idelaistic thesis/antithesis dialectic by groups can polarize team factions to the extent of compromising unaddressed alternatives. Confrontation of ideas and world views in the dialectical debate traditionally places

into opposition a plan and a counterplan. A serious debator will embrace his thesis and defend it to the extreme limit. In the course of group debate and discussion, there are limitations imposed by interpersonal relationships on outcomes of goal-oriented group activities(Heimovics and Zemelman,1978). It is our intention with our new model to minimize the potential effects of antagonistic argumentation which may arise from emotive and parochial defense of various world views. In stark contrast, we offer non-confrontational problem-solving technologies such as the secret ballot-driven Nominal Group Technique(NGT)(Delbecq and Van de Ven,1968), or Delphi(Dalkey and Helmer,1963), which avoids face-to-face member meeting Confrontation, if managed properly, can provide the vehicle to produce a working, viable decision set representing a true synthesis of group world views.

We view the literature as being supportive of the need to control confrontation. Maier(1952) developed the Problem Centered Leadership(PCL) model to assist a leader in enhancing decision effectiveness. The model basically recommends:

1. State a problem in a such a way that the group does not become defensive, but instead approaches the issues in a constructive way.
2. Supply essential facts and clarify the area of freedom without suggesting a solution.
3. Draw persons out so that all members will participate.
4. Restate expressed ideas and feelings more briefly, accurately, pointedly, and clearly.

5. Ask questions that stimulate problem-solving behavior.

Bairal(1974), in a literature review examining the communications structure of cooperative and competitive groups, concluded that "cooperative groups showed more coordination of effort,diversity in amount of contributions per member, alternatives,orderliness, orientation, productivity, and friendliness than competitive groups"(p.133). Donahue et al(1981) claimed that decision group members strive to preserve cooperativeness when they perceive it necessary to goal attainment. Our goal is to allow them to cooperate in the preservation of confrontation and conflict to generate better decisions with a new DI-GPST.

Confrontation also allows the emergence of the power motive in group discussion. Winter(1973) defines power in this context as a "need to influence and have impact on others and also to acquire recognition for power oriented activities"(p.179). In DI-GPST,the confrontational debate cannot afford to be affected by the power motive. Fodor and Smith(1982) indicated that

> especially pertinent to a discussion about group decision making is the implication that concerns for power may lead to attempts by people in authority to suppress or control information, particularly information that may be considered damaging to their preferred course of action(p.179).

The true dialectician cannot afford such a luxury. In addition, dialectical confrontation increases the propensity of decision problems to arouse feelings in participants.

Argyris(1966) and Maier(1963) found that group decision making effectiveness declines when a decision problem elicits affective reactions. Guzzo(1979) claimed that group decisions involving principles of conduct, ethical values, morals, and social and political beliefs generate strong affective involvement in decision making. Strategic management certainly provides a suitable grwoth medium for all of these topics to evolve, especially in our current complex global environment. Emotive responses in argumentation can hinder the decision maker's capacity to think clearly, and foster misunderstanding and poor communication within the group(Maier,1963). Poole(1983), in an experiment examining decision development in small groups, accomplished a transition from emotional disagreement to enthusiastic discussion by considering the same idea from a not previously considered angle of attack. Figure Six illustrates the comparative treatments of conflict and confrontation in five classical models of the stages of group development. Again, dialectical critical inquiry need not experience the stress of decision making if confrontation is properly managed.

Finally, as stated earlier, Mitroff(1972) argued that "objectivity results from the heated, intense, and biased confrontation between the somewhat biased ideas of somewhat biased individuals"(p.B615). Schwenk(1985) countered that "the sort of confrontation Mitroff advocates may not always lead to a convergence of views or to objectivity"(p.502). Considering the research evidence, we agree with Schwenk.

FIGURE SIX

CONFLICT STAGES OF GROUP DEVELOPMENT MODELS

Schultz's FIRO Model(1958)

Stage 2: Conflict among members; power struggle occurs

Modlin and Faris(1958) Four-Stage Group Developmental Model

Stage 2 : Emergence of friction and interpersonal conflict; personalities cause disharmony

Whittaker's(1970) Integrative Model

Stage 2: Power and Control; power struggle among members; attempt to establish hierarchies;

Hill and Gruner's(1973) Three-Stage Developmental Model

Stage 2: Exploration; interpersonal exploration; individual differences emerge;

Tuckman's Integrative Model(1965)

Stage 2 : Storming; conflict arises because of interpersonal behaviors; group splits;

THE IMPORTANCE OF INFORMATION ACCESS AND FLOW IN DELIBERATIONS

We believe that an inherent danger of classic dialectical discussion stems from the potential of debators to fail to effectively communicate their position to their counterparts. This failure can lead to the wrong assumptions being negated, poorly thought-out ideas being debated, or misunderstanding of the nature of the counter-position being debated. Mutually antagonistic counterpoints can result in a deadlock if either side of the DI debate fails to clearly appreciate its opponent's position. Hewes(1986), in examining research that accounted for decision-making outcomes, suggested that non-interactional group variables such as member predispositions may be more powerful predictors of decision quality than interaction-related variables. Our goal is to minimize the impact of such predispositions upon group debate. In a field study evaluating medical technologies, Vinokur et al(1989) found that strong disagreements among panelists appeared to inhibit the exchange of relevant information and harm the group's recommendation statements. These factors have not been addressed in the DI-GPST literature, and no doubt reflects a research pre-occupation with outcomes versus process.

Much evidence exists, however, suggesting the importance of information access and flow to the functioning of group decision making. DeSanctis and Gallupe(1987) listed the following communications activities as being critical to group

decisions: opinion exploration, analysis, expressions of preference, argumentation, socializing, information seeking, and information giving. Blake and Motten(1964) recognized that interpersonal communications in groups becomes oriented towards either task(getting the job done) or towards socail needs(solidarity/antagonism) , and viewed it as central to effective decision making. Communication drives group activities. Bettenhausen and Murnigham(1985) described that "as the members interact they either tacitly revise their beliefs about appropriate action, or overtly attempt to pull the group toward their own interpretation"(p.350). Dialectical synthesis attempts to do both simulatneously.

For the groupthink phenomenon discussed earlier, Janis and Mann(1977) described two antecedent conditions as insulation from outside sources of information, and a lack of methodical procedures for information search and appraisal. Although DI-GSPT incorporates discussion procedures, the thesis/antithesis subscribers are limited in te structured debate by their own world view.

Bateson(1958) stressed the importance of both communication and information in group decision making, and argued that all communication has a content dimension and a relational dimension. Watzlawick et al(1967) interpreted content as to what is said, and relational as to how it is said. Both are important in the DI-GPST debate, but the relational dimension bears more subtle implications, as described by Sorenson and Savage(1989):

> primarily of nonverbal signals and provides information about how the communicators perceive each other in a relationship. Of significance for participation in decision making, relational messages also control who can talk when about what(p.326).

Traditional DI operationalizations have not addressed this. Researching the effectiveness of computer-aided deliberation, Nunamker et al(1988) tested the effect of anonymous, written communications upon decision making. They found that an absence of rich voice inflections and facial expressions between participants often led to misunderstandings.

Alternately, deterministic or clear-cut decision scenarios need not rely on complete information flow among participants. Nurmi(1984) claimed that strong strategic incentives are less reliant on knowledge of the other persons' preferences for successful implementation. As already stated, however, our interest lies in the realm of ill-structured problems, where the variables and parameters are unique and one of a kind.

We have shown the importance of structure, control of confrontation, and communications in the process of group decision making. All three form the foundation of our new DI-GPST model that we now introduce.

Thomas Kuhn(1962) in The Structure of Scientific Revolutions stated

> Normal science...is a highly cumulative enterprise, eminently successful in its aim, the steady expansion of the scope and precision of scientific knowledge. Yet one standard product of scientific enterprise is missing. Normal science does not aim at novelties of fact or theory and, when successful,

> finds none. New and unsuspected phenomena are, however, repeatedly uncovered by scientific research, and radical new theories have again and again been invented by scientists(p.52.)

We are proposing a new problem-solving technology, which we call Dialectical Exchange(DX). DX was born from our thinking concerning the shortcomings of past DI operationalizations. We believe that DI can be improved along three dimensions in its implementation:

1. Avoidance of the simplistic duality of thesis/antithesis.
2. Increased awareness of the entire teams' assumptions and beliefs concerning the planning environment.
3. Increased objectivity in the debating component of DI.

In addressing the first two improvements, we wished to avoid the forced response mode of the antithesis. As we have already shown, while such narrow contradictions may be argumentatively stimulating, they focus thinking along limited planning corridors. We wish to heighten the groups' awareness of the overall planning posture of the firm. This, after all,is the work of strategic planners. Walsh, Henderson, and Deighton(1988) stated that

> an awareness of the different assumptions and beliefs held by all members o f the decision making group is thougt to contribute to more effective decision making...as each individual shared his or her perspective, it would become clear that these perspectives were quite different. The group as a whole would have to come to terms with these beliefs. As such, low realized consensus would likely prompt naturally occurring dialectical inquiry(p.198).

Since experimental investigation does not have the luxury of

waiting for a "naturally occurring" DI, our new method will allow the creation of subteam initial plans independently. For example, subteam A's plan will confront subteam B's plan; subteam B's plan will not necessarily be a direct counterplan designed to negate subteam A's plan. Contradictions as well as redundancies will surface in debate, which is far closer to approximating real-world planning discourse than the traditional idealisitc approach to DI. Our goal is to tap the entire teams' planning expertise in such a way so that the dialectical debate uncovers not only contradictions, but also points of commonality in strategies. Evidence from different perspectives supporting different assumptions backing similar strategies can only strengthen a given strategy's validity. Likewise, similar assumptions leading to different conclusions can generate more meaningful debate concerning final decisions.

The third improvement in the objectivity of the DI-GPST debating component gives Dialectical Exchange(DX) its name. Smith and Berg(1987) discussed three perspectives of conflict from the literature on group dynamics. Hackman and Morris(1975) and Schwartzman(1986) viewed one perspective of conflict as a problem or "process loss" which needs to be minimized or controlled. In this view of conflict, Smith and Berg relate three strategies for dealing with it:

1. Seek a reduction in the incidence of conflict through cooperation and conflict resolution(Deutsch,1973)
2. Pre-empt potential conflicts by designing the task of the group so that conflicts do not arise.
3. Decompose the group as in the Nominal Group Technique

> and Delphi Models(Delbecq,Van de Ven, and Gustafson,1975), in order to minimize and control group level interaction.

A second view of conflict defines it as an inevitable phase during which hostile emomtions are aired. Conflict here is seen as a necessary stage of group evolution, an as an impairment which can only paralyze the group's operations.

But we are most interested in Smith and Berg's third perspective of conflict as

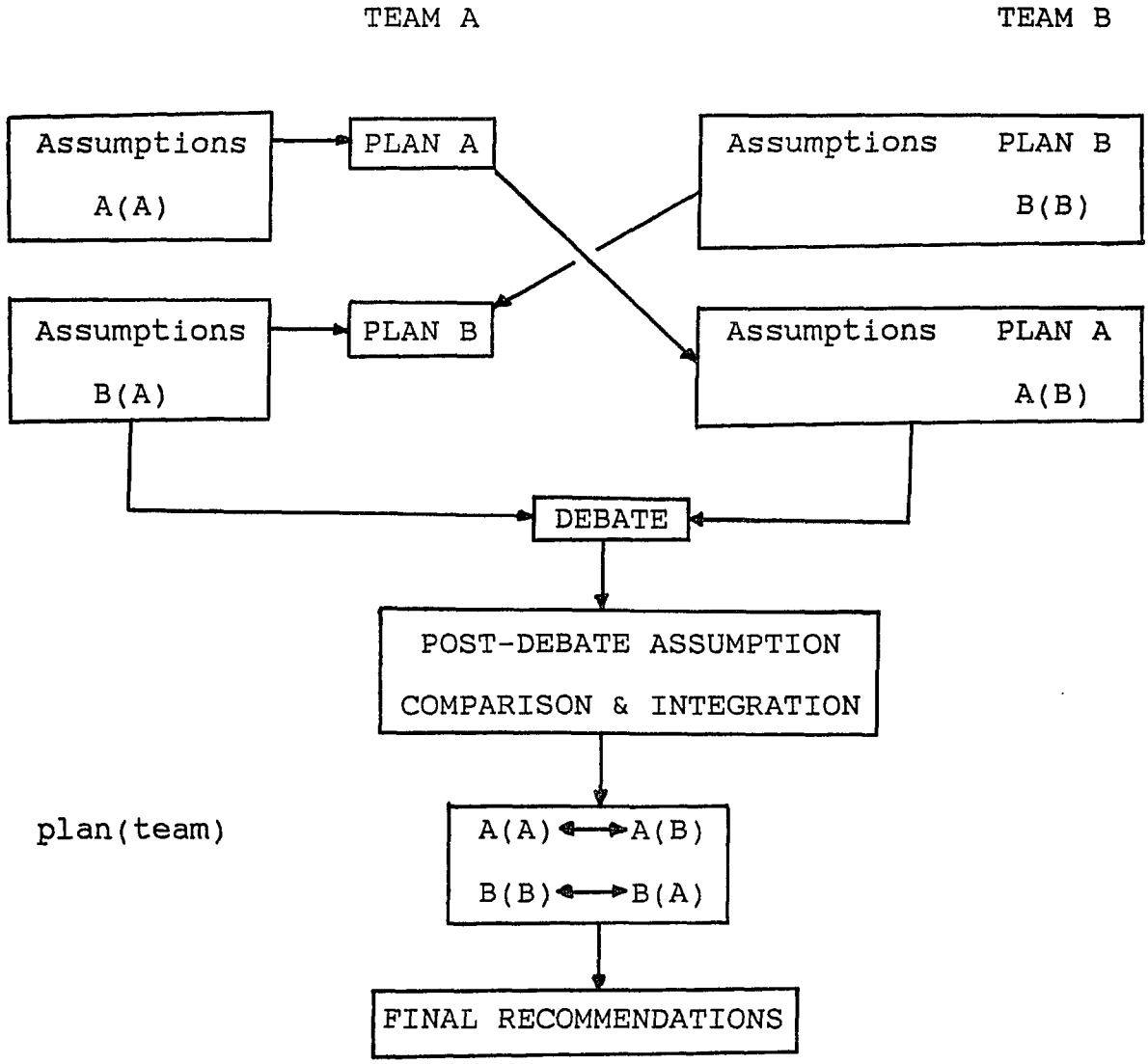
> a concomitant, attendant process of collective life. It is an inveitable and recurring feature of all groups, rooted in both the "differences" represented by bringing people together...In this perspective, paralysis is seen to result from a groups' collective resistance to acknowledging, accepting, and repeatedly confronting these inevitable conflicts(p.637).

Dialectical Exchange seeks to destroy this resistance by increasing the level of objectivity in the planning team through the avoidance of parochial arugment in defense of "sacred cows." We propose that, after initial submission of subteam recommendations, the subteams exchange plans. Each subteam then advances the argument of the other subteam in debate. The original underlying assumptions of the exchanged plans will be retained by the author subteams, and compared later for commonality and contradiction. Each subteam, in essence, will be challenged to uncover the thinking of its opposing subteam. Figure Seven illustrates the schematic process of DX as a problem solving technology. Theoretical justification, in addition to correcting shortcomings of idealistic DI already discussed, can be found in the literature of small group behavior. Clark and Delia(1979)

indicated that "in any interaction situation participants must generate some shared conception of the norms...if interaction is to proceed smoothly"(p.192). Bitzer(1974) showed that accepted logical syllogisms occur "only when speaker and audiences(subteam to subteam in the dialectical debate) jointly produce them", and that "the audience itself helps construct the proofs by which it is persuaded"(p.151). Since DX subteams surrender their strategies and plans for the other subteam to defend and advance, group members can have a better opportunity to see explicitly the values driving another person's perspective. For example, if one team originally recommends expansion, and the other divestiture, each team knows that the other uncovered seemingly logical assumptions leading to its recommendations. The quality of thinking and argumentation lies in the challenge of uncovering the reasons for apparent divergent strategies. We believe DX can increase decision quality by minimizing emotional debate and focusing on facts, assumptions, and issues. Thus, DX emphasizes true synthesis rather than advocacy. The dialectical debate in DX stresses not a confrontation of deadly enemies, but rather an objective chance to challenge one's own thinking in the hands of another person. We agree with Hirokawa and Pace(1983) that "the quality of a group's decision making may be dependent upon the manner in which group members examine and evaluate the validity of opinions and assumptions introduced into the discussion by fellow members"(p.369). The exchanging of plans poses a unique and potentially effective method for maximizing the utility of the dialectical debate. Pepperzak(1985),

FIGURE SEVEN

DIALECTICAL EXCHANGE PROBLEM SOLVING TECHNOLOGY



relating dialectics to discussion, stated

> Our basic perspective keeps us from seeing the truth that can be seen from other perspectives. Only through communication with others do we become acquainted with their perspectives. However, this acquaintance remains exterior and superficial unless we integrate aspects of it into our own perspective or give parts of our perspective up in order to adopt the other's perspective(p.250).

We are suggesting, however, total exchange of plans and strategies to internalize existing subgroups' world views into the deliberations.

The post-debate assumption comparison and integration phase of DX becomes the watershed for attaining synthesis. Assumptions, ideas, and logical relationships supporting strategies which may have not surfaced during the debate can be reconciled, or used as grounds for further debate. Stasser and Titus(1985) noted that the pooling of unshared information in group decision making can perform a corrective function by piecing together an unbiased picture of the relative merits of the decision alternatives.

DX-GPST, therefore, presents a framework for improving strategic decision making along the following dimensions:

1. It applies a simple, easy to implement structure to the dialectical process.
2. It controls group confrontation in argumentation by focusing on ideas and the assumptions supporting them.
3. It removes any ego-motivated defense of one's ideas through direct exchange.
4. It maximizes and encourages information access and flow in

deliberations.

5. It minimizes reliance on a forced reaction between a thesis/antithesis confrontation.

6. It provides systematic inclusion of broader perspectives for the purposes of strategic planning.

7. It encourages systematic critique of one's own thinking.

8. It minimizes destructive, emotional confrontation in deliberations and debate.

In the next chapter, we present an experimental design to empirically test the claims of our new model.

CHAPTER FOUR: THE EXPERIMENTAL DESIGN

Our description of the theoretical foundations of DX in the last chapter sought to correct the operational problems of the forced reactive mode of DI treatments, as well as the external validity problem of DI's relevancy to the corporate planning environment. DX addresses both, as has been shown, through the total exchange of debating positions. The experimental methodology we now describe specifically addresses, in addition to the above deficiencies of past research, the persistence of group operation, the use of subjective evaluation methods, and the lack of testing for strategic team effectiveness. In this chapter, we will present our methodological approach in ten sections:

1. An overview of the experiments.
2. A description and rationale of the Executive Game computerized business simulation.
3. Our hypotheses and their rationale.
4. The dependent variables and their measurements.
5. The GPST manipulations(independent variables).
6. The subject samples.
7. The manipulation check questionnaire.
8. Operational industry structure and contamination precautions.
9. Statistical methodology.
10. The pilot study.

Overview of the Experiments

Three experiments using identical designs(except for play duration) were conducted with three different samples: undergraduate business seniors, upper level MBA students, and experienced "real world" managers. We used Henshaw and Jackson's(1984) The Executive Game computerized simulation to compare a number of dependent variables associated with three GPSTs: DX, DI, and Consensus(CON). Our research questions, as stated earlier, seeked to investigate differences between DI and other problem solving technologies, as well as differences between group member perceptions in those technologies concerning effective strategic team behavior. In addition, we sought to examine DX as an improvement upon traditional DI-GPST. Each experiment, in addition to DX,DI, and CON, also included Control groups(CTL). Figure Eight schematically represents the three experiments. All three experiments were conducted during the Fall of 1990, preceded by a pilot study during the Spring of 1990. They were conducted at Monmouth College in West Long Branch, New Jersey. For both the undergraduate and graduate students, participation in the Executive Game was a course requirement. The students were enrolled in their repsective senior level course in Business Policy. The undergraduates worked on the simulation during regular class time; the MBA students and the managers, for logistical reasons, were invited

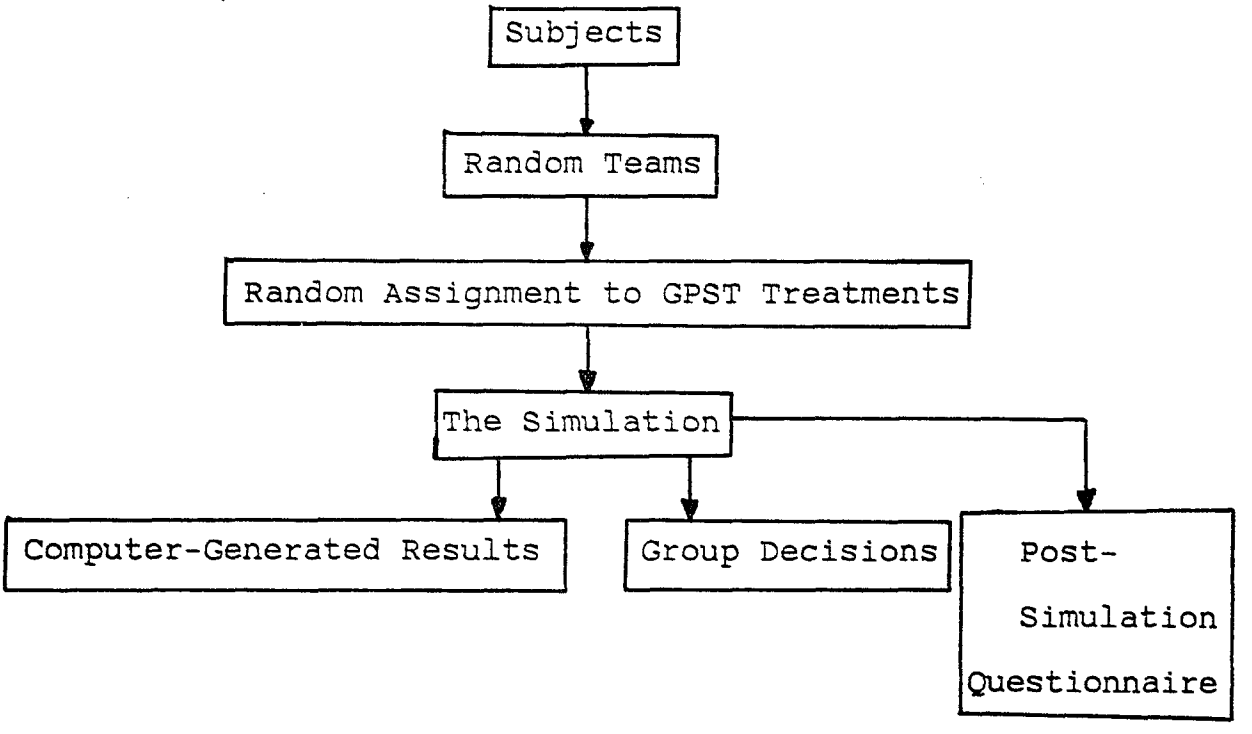
Figure Eight- The Three Experiments

Teams	Individuals	Sample	Treatment	Duration
24	93	Undergraduates	6 DX 6 DI 6 CON 6 CTL	3 years
8	33	MBAs	2 DX 2 DI 2 CON 2 CTL	1 year
8	27	Managers	2 DX 2 DI 2 CON 2 CTL	1 year

to participate in separate Saturday sessions, one full day for each. The undergraduates played a full three years of simulated time over a period of twelve weeks. All three subject samples, competing only against each other, started from ientical positions in the Executive Game. GPST treatments for the respective groups were identical across all three experiments. Each experiment was conducted independently of the others. Due to the fact that experimental design precautions were taken, there was no evidence that any of the subjects knew they were participating in an experiment.

The general experimental procedure is shown in Figure Nine. For each experiment, we grouped subjects randomly into teams; each team was then randomly assigned to either dialectical exchange, dialectical inquiry, consensus, or control treatments. We will present the specifics of each sample's experimental structure in the section on operationalization and contamination precautions. The respective groups then engaged the computerized business simulation. In total, we examined forty groups making 2,856 strategic decisions. Finally, both computer-generated results and post-simulation questionnaires were analyzed to test our hypotheses. We sought, in our experimentation, to test a number of hypotheses(to be presented shortly) predicting the performance of DX in a simulated group setting against the idelaistic DI of past research. In addition, we included as a treatment the traditional consensus approach to decision making as a low structured conflict condition. The consensus

Figure Nine- The General Experimental Procedure



treatment used the manipulation of Schweiger and Sandburg(1989) which we modified slightly, based upon the results of our pilot study. Control groups were present in all three experiments. Thus, our independent variables consisted of the three GPSTs(DX,DI,CON), and the absence of a formal GPST(CTL). We will specify our dependent variables after we present and explain our hypotheses.

As we have stated, we employed a mainframe computerized business simulation to conduct our three experiments. For purposes of classifying our research according to the established norms of traditional behavioral science, we find it to lie in the twilight zone between laboratory and field experimentation. Kerlinger(1986) defines a laboratory experiment as a "research study in which the variance of all or nearly all of the possile influential independent variables not pertinent to the immediate problem of the invesitgation is kept at a minimum"(p.367). Alternately, he defines a field experiment as "a research study in a realistic situation in which one or more independent variables are manipulated by the experimenter under as carefully controlled conditions as the situation will permit"(p.369). As will be shown, we carefully controlled conditions to minimize variance of extraneous variables. We also, however, wished to simulate as close as possible the complexity, stress, and comprehensiveness of the strategic planning process. Due to accessibility and time constraints, we deemed it impractical to conduct our experiments in actual organization settings. Even had we been

provided access to real organizations, the multiplicity of groups required and company time necessary to fulfill experimental requirements would not have been feasible. As such, we chose the next best method: a realistic strategic decision-making simulation providing both complexity and uncertainty, two hallmarks of strategic planning. McGrath(1981) claimed that "experimental simulations reflect an attempt to retain some realism of content"(p.185). We agree with Chanin and Shapiro(1985) in that the use of business simulations provides the best of both worlds, and thus view our research as conducting a field study in a laoratory setting.

Finally, objections have been periodically raised questioning the use of students in research on strategic decision making. Dipboye and Flanagan(1979) stated

> ...the findings indicate that there is no empirical basis for a belief in the inherent external validity of field research. Not only is field research limited in its sampling of actors,behaviors and settings, in some respects laboratory research provides as firm a basis for generalization to the general population of working people and organizations as does field research. For instance, college students may constitute a heterogeous sample as representative of the general working popluation as do the samples of professional, technical, and managerial employees so often utilized in field research(p.147).

We defend the use of students in our research along three dimensions. First, although most undergraduate students ave not been exposed to real organizations for any length of time, senior business undergraduates have been recently exposed to a comprehensive mix of courses designed to provide an overview

of professional business activity: management, accounting, finance, marketing, statistical analysis, economics, and business law. For the vast majority of students, all of these courses have been taken within three years from their participation in our experimental design. Second, the involved students are currently studying strategic planning concepts in a Business Policy course, designed specifically to integrate the concepts of the entire business curriculum. The students also have a vested interest in maximizing their performance and contribution to group effort since they are being graded for their efforts. Third, and probably most important for our purposes, the student's world views concerning decision approaches are not tempered by the familiarity of experience. The student is not hampered or biased by approaches which have worked in the past. In the vernacular, one can teach a new dog to perform new tricks. Despite these arguments, we respect the argument that there is no substitute for experience. To answer this objection, and to enrich the validity of our findings, we included two separate samples of graduate MBA students, and real-world managerial decision-makers. Our research is the first empirical investigation of dialectical inquiry using multiple samples from different populations in a computerized business simulation.

The Executive Game Simulation: Rationale and Description

Over the years, researchers have recognized the use of

business simulations in conducting research on strategic planning. Chanin(1980) used the Executive Game to study the role of conflict mode in group decision making. Sharda et al(1988) also used the Executive Game to empirically study the use of Decision Support Systems(DSS) in small groups facing strategic decisions. They found that DSS groups investigated more alternatives and had greater confidence in their decisions than non-DSS groups. Affisco and Chanin(1989) replicated their study and found conflicting results. They refined their study in later(Affisco and Chanin(1990) using the Business Management Laboratory(BML)(Jensen and Cherrington(1984)), and confirmed the results of their first study. Curran and Hornaday(1990) also used the BML to investigate the role of formal planning in simulation team performance. For investigating managerial decision making, several researchers have touted the use of simulations(Lombardo and McCall(1982); Nees(1983);Pondy(1982); Schweiger,Anderson and Locke(1985); Chanin and Shapiro(1985);Affisco and Chanin(1990). Levi and Mainstone(1989) have noted several advantages of employing simulations in empirical studies on decision-making:

1. Simulations can capture significant aspects of real organizations while simultaneously allowing the investigator substantial control over the decision environment.

2. Well-designed simulations have been shown to elicit behavior representative of that occurring in actual organizational settings.

3. Simulations generate a tremendous amount of rich

decision process data, which can be recorded and measured for exploratory and hypothesis-testing purposes.

4. Multiple runs of a simulation enable the investigator to treat either the individual or the decision issue(or both) as the unit of analysis, allowing exploration of a wide range of research questions.(p.5)

In the spirit of the preceding advantages of using simulations for experimentation, we chose Henshaw and Jackson's(1984) The Executive Game to investigate our research questions regarding DI-GPSTs. The simulation requires the teams in a given industry to make eight decisions in direct competition with other firms: Price, Marketing, Research and Development, Production Quantity, Maintenance, Investment in Plant and Equipment, Materials Purchases, and Dividends. Each computer run, comprising one period of play, simulates one fiscal quarter of business. The undergraduate sample simulated three fiscal years(twelve periods), and both the MBAs and managers one fiscal year(four periods). Teams are provided, after each run, with the following information:

General Economic Information

- Price Index
- Economic Index
- Seasonal Index

Information on Competitors

- Prices
- Dividends
- Sales
- Profits

Operating Statements

- Market Potential
- Sales
- Production Volume
- Carryover Inventory

Production Capacity

Income Statement
- Cash Receipts
- Expenses
- Profits before and after Taxes
- Addition to Owners' Equity

Cash Flow Statement
- Cash Receipts
- Disbursements
- Net Cash Flow

Financial Statements
- Assets and Owner's Equity

At the end of each fiscal year, each firm receives a year-end report detailing average competitor rankings on Owners' Economic Equity and Return on Investment. In addition, each firm is provided with the average amount firms in the industry have been spending on marketing, research and development, plant replacement value, raw materials inventory, and cash balances. Figure 10 shows the actual starting position print-out used by all firms in all three samples in our experiment. Figure 11 shows a typical year-end report. The subjects themselves did not directly interact with the computer system driving the simulation. We collected all the decisions for a given period, and entered them into a mainframe XP-50 computer. During a typical non-experimental run of the Executive Game we used a standard decision form for each team. However, our three experimental treatments and the Control Groups used different sets of decision forms according to their GPST. These will be presented in the section on experimental manipulations.

Uncertainty in the Executive Game can be found along two

dimensions: first, variables controlled by the FORTRAN program, and second, interaction determined by the teams' decisions. In the first category, all firms are provided with forecasts of the General Price Index as a relative measure of the rate of inflation. Since the hypothetical product in the Executive Game is a normal good, purchased from disposable personal income, this becomes a strategic variable with which to contend. In addition, the Price Index can affect the purchase price of raw materials to be used in the prouction process. In addition, firms are provided with an Economic Forecast which yields an appraisal of the expected state of the economy in the simulation. The higher this index, the lower the rate of unemployment and the higher the overall level of productivity and investment. The Economic Index, however, is not an exact forecast: surprises can and do occur. Perhaps the greatest source of uncertainty, however, stems from the interaction of the competing teams decisions. Strategic decisions must not only reflect careful appraisal of the internal and external environment, but must also contend with comptetitors' strategies. These may or may not be, at times, reflective of what economists would term "rational decision making." Of course, we do not expect such behavior of dailectical-based planning teams.

Finally, we have used the Executive Game simulation since 1978 in over one hundred sections of both graduate and undergraduate Business Policy classes. We heartily agree with the simulation's authors when they state in their foreward:

> The Game is a superior means for preventing

> or correcting the parochial points of view often developed by business students, and even professional middle managers, as a result of continuing specialized concern with one or another part of the total business problem. You will have to deal simultaneously with production, marketing, finance, competition, business cycles, inflation, and so on. Practice at coping with these factors in the Game will help you to understand and appreciate the need to consider the company as an integrated system....(p.ix)

The Research Hypotheses and Their Rationale

We formulated, based on the theoretical construction of Dialectical Exchange and past research efforts on traditional DI-GPST, three types of hypotheses to be tested in our empirical study. First, we developed performance-based hypotheses to examine the relationships between our independent decision treatments and improvement in profitability. Since a driving force of the Executive Game is the profit motive, we felt that comparison of DX with other GPSTs on "the bottom line" would indicate its utility as a planning aid. In addition, we tested the complementary dependent variable of production cost per unit to reinforce uncovered relationships between GPSTs an profitability. Chanin(1980) used both improvement in profitability and overall cost per unit ex post facto at different points in an empirical study examining GPSTs and conflict modes with an earlier edition of the Executive Game.

Second, we tested decision-based hypotheses to examine the output of the group sessions on strategy formulation. In a sense, we feel these hypotheses to be central to our

Figure Ten - Starting Position, All Firms

EXECUTIVE GAME

MODEL 1 PERIOD 1 JAS PRICE INDEX 101.0 FORECAST/ANNUAL CHANGE 5.3 0/0
SEAS.INDEX 95. NEXT QTR. 115. ECON.INDEX 101. FORECAST/NEXT QTR. 95.

INFORMATION ON COMPETITORS

	PRICE	DIVICEND	SALES VCLUME	NET PROFIT
FIRM 1	$ 21.99	$ 53000.	127750.	$ 31859.
FIRM 2	$ 21.99	$ 53000.	127750.	$ 31859.
FIRM 3	$ 21.99	$ 53000.	127750.	$ 31859.
FIRM 4	$ 21.99	$ 53000.	127750.	$ 31859.
FIRM 5	$ 21.99	$ 53000.	127750.	$ 31859.
FIRM 6	$ 21.99	$ 53000.	127750.	$ 31859.
FIRM 7	$ 21.99	$ 53000.	127750.	$ 31859.
FIRM 8	$ 21.99	$ 53000.	127750.	$ 31859.

FIRM 1 S

OPERATING STATEMENTS

MARKET POTENTIAL		157698.	
SALES VOLUME		127750.	
PERCENT SHARE OF INDUSTRY SALES		13.	
PRODUCTION/THIS QUARTER		115000.	
INVENTORY/FINISHED GOODS		0.	
PLANT CAPACITY/NEXT QUARTER		104782.	
INCOME STATEMENT			
RECEIPTS/SALES REVENUE			$ 2809223.
EXPENSES/MARKETING	$ 275000.		
RESEARCH AND DEVELOPMENT		100000.	
ADMINISTRATION		333943.	
MAINTENANCE		50000.	
LABOR(COST/UNIT EX.OVERTIME $ 5.87)		705118.	
MATERIALS CONSUMED(COST/UNIT 6.33)		728367.	
REDUCTION/FINISHED GOODS INV.		153000.	
DEPRECIATION(3.125 0/0)		228906.	
FINISHED GOODS CARRYING COSTS		0.	
RAW MATERIALS CARRYING COSTS		60000.	
ORDERING COSTS		50000.	
SHIFTS CHANGE COSTS		0.	
PLANT INVESTMENT EXPENSES		4000.	
FINANCING CHARGES AND PENALTIES		0.	
SUNDRIES		85343.	2773677.
PROFIT BEFORE INCOME TAX			35546.
INCOME TAX(IN.TX.CR. 10. 0/0/SURTAX 0. 0/0)			3687.
NET PROFIT AFTER INCOME TAX			31859.
DIVIDENDS PAID			53000.
ADDITION TO OWNERS EQUITY			-21141.
CASH FLOW			
RECEIPTS/SALES REVENUE			$ 2809223.
DISBURSEMENTS/CASH EXPENSE	$ 1663404.		
INCOME TAX		3687.	
DIVIDENDS PAID		53000.	
PLANT INVESTMENT		200000.	
MATERIALS PURCHASED		750000.	2670091.
ADDITION TO CASH ASSETS			139132.
FINANCIAL STATEMENT			
NET ASSETS/CASH			$ 1161132.
INV. VALUE/FINISHED GOODS			0.
INVENTORY VALUE/MATERIALS			1221633.
PLANT BOOK VALUE(REPLACE.VAL.$ 7607899.)			7296094.
OWNERS EQUITY(ECONOMIC EQUITY 9990664.)			9678859.

Figure Eleven - Typical Year-End Report

EXECUTIVE GAME

END OF FISCAL YEAR 1.

FIRM NO.	NET CASH ASSETS ($)	INVENTORY VALUE FIN.GOODS ($)	INVENTORY VALUE MATERIALS ($)	PLANT REPLACE. VALUE ($)	OWNERS ECONOMIC EQUITY ($)
1 1	1224735.	.	1005682.	7951754.	10182171.
1 2	1794950.	.	641775.	7776755.	10213480.
1 3	1325388.	.	962259.	7901752.	10189399.
1 4	1260421.	.	1093131.	7860932.	10214484.
1 5	1549415.	.	885903.	7758756.	10194074.
1 6	1730359.	.	865994.	7531604.	10127957.
1 7	1354742.	.	1290628.	7532796.	10178166.
1 8	1182338.	.	1075549.	7986755.	10244642.

AVERAGES PER QUARTER FOR FISCAL YEAR 1. ONLY

FIRM NO.	MARKET-ING ($)	R AND D ($)	SALES VOLUME (UNITS)	NET PROFIT ($)	RATE OF RETURN* (0/0)	RANK*
1 1	387500.	150000.	136375.	65754.	12.57	6
1 2	312500.	137500.	137223.	80408.	13.22	3
1 3	312500.	150000.	137223.	68369.	12.69	5
1 4	212500.	137500.	137223.	82237.	13.30	2
1 5	262500.	125000.	137223.	70705.	12.79	4
1 6	275000.	105000.	135160.	37647.	11.34	8
1 7	287500.	110780.	137223.	58751.	12.27	7
1 8	275000.	105000.	137222.	95989.	13.90	1

* RANK AND ANNUAL RATE OF RETURN ARE BASED UPON DIVIDEND PAY-OUT FOR ALL 2 PERIODS AND OWNERS ECONOMIC EQUITY AT THE END OF FISCAL YEAR 1.

preference for dialectical inquiry in general, and to dialectical exchange in specific. While the Executive Game provided the environment for incubation of our GPST treatments, the decisions made by the planning teams reflect the fruits of their problem-solving deliberations. Third, we tested group attitudinal hypotheses dealing with individual perceptions of satisfaction with the decision making process, critical re-evaluation of assumptions, and team commitment. These three dependent variables represent the most recent(Schweiger and Sandburg,1989) behavioral variables tested with traditional DI-GPST and Consensus. All of our hypotheses in the three types address the research questions posed in the Introduction. Each hypothesis will be presented with its accompanying rationale.

Performance-Based Hypotheses

Hypothesis 1 : Improvement In Profitability

We believe that dialectical inquiry leads to better decision making for several reasons, as earlier discussed in detail. One manifestation of decision quality their outcome in terms of profits. Since participation in the Executive Game is a learning experience, and since groups in all treatments will develop different strategic plans to achieve their objectives, we measured the improvement in profitability across the simulated time period. For the undergraduate sample, this measure was taken at the end of each fiscal year; for the MBAs

and managers, at the end of the first fiscal year. Profitability in the Executive Game is computer-generated as return on investment(ROI). The required calculation is

$$\text{Improvement in Profitability} = (ROI(t) - ROI(t-1))/ ROI(t-1)$$

Where ROI(t) = last year's ROI

ROI(t-1) = current ROI

Hypothesis 1 therefore, is:

There will be differences in profitability improvement between groups using different GPSTs:

$$H_o : M_{dx} = M_{di} = M_{con} = M_{ctl}$$

$$H_1 : M_{dx} > M_{di} > M_{con} > M_{ctl}$$

Where M_{dx} is an aggregated mean for groups using Dialectical Exchange GPST

M_{di} is an aggregated mean for groups using Dialectical Inquiry GPST

M_{con} is an aggregated mean for groups using Consensus GPST

M_{cnt} is an aggregated mean for the Control groups

Hypothesis 2 : Cost Efficiency

In addition to improvement in profitability, we predicted that Dialectical Exchange would exhibit the lowest overall cost figures throughout the game. Cost is computer generated based on the relationships between production, production capacity, and plant maintenance. The actual dollar amount is the sum of

cost per unit for materials and labor per unit of production. Hypothesis 2 therefore, is:

There will be differences in total production cost per unit between groups using different GPSTs:

$$H_o : M_{dx} = M_{di} = M_{con} = M_{ctl}$$

$$H_1 : M_{dx} < M_{di} < M_{con} < M_{ctl}$$

Decisional Hypotheses

Hypothesis 3 : Plant Investment

In order to address our research questions posed earlier, we selected the Plant Investment budget as one indicator of the group's intentions towards long-term strategic positioning in the simulation. Plant Investment directly affects the firm's long-run production capacity. Furthermore, there is a two-period lag effect for full production impact. The higher the overall production capacity of the firm, the better position it is in to maximize market potential as the game proceeds. We feel that aggressive strategies associated with the Plant Investment decision reflect the gorup's concern for long-range strategic effectiveness.

Hypothesis 3 therefore, is:

There will be differences in amounts spent on Plant Investment between groups using different GPSTs:

$$H_o \quad M_{dx} = M_{di} = M_{con} = M_{ctl}$$

$$H_1 \quad M_{dx} > M_{di} > M_{con} > M_{ctl}$$

Hypothesis 4 : Research and Development

The Research and Development decision enables the group to command a higher price as the game develops by projecting an image of quality to the marketplace. In effect, this decision allows the firm to manufacture a better mousetrap. Again, we view funds spent on Research and Development as an indication of long-term posturing of the firm. There is a three period lag effect for this decision. As in the case of Plant Investment, this decision reflects a concern for future planning scenario generation.

Hypothesis 4 therefore, is:

There will be differences in amounts spent on Research and Development between groups using different GPSTs:

$$H_o : M_{dx} = M_{di} = M_{con} = M_{ctl}$$

$$H_1 : M_{dx} > M_{di} > M_{con} > M_{ctl}$$

Attitudinal Hypotheses

Schweiger, Sandburg and Ragan(1986) and Schweiger and Ragan(1989) , in their research using case analysis to compare Dialectics, Devil's Advocacy, and Consensus, tested group member perceptions of two inquiry system variables: group member satisfaction with the decision making process, and assumption improvement. While conflict is effective if properly used(Chanin(1980)), it does have afteraffects in the

form of distrust, emotional upheaval, an mental exhaustion. On the other hand, conflict is supposed to aid assumption and thus decision quality by causing individuals to re-assess their thinking. We addressed the second research question, namely the relationship between GPSTs and group member's individual perceptions of their team's long-range planning efforts with the following hypotheses:

Hypothesis 5 : Individual Satisfaction

Past research, as we have indicated, has shown that while DI may improve overall decision quality, it also leaves its participants with ill-feelings and apprehension concerning future decision making. Schweiger and Ragan(1989) predicted that higher structured conflict(DI and DA) would be associated with lower individual satisfaction. For reasons already discussed, we believe that DX overcomes the problem of ill-feelings and dissatisfaction with the decision making process. We replicate, however, the contention that traditional DI-GPST will be associated with the lowest levels of satisfaction. Hypothesis 5 therefore, is:

Among groups using different GPSTs, there will be differences in members' satisfaction and desire to continue working with the same groups on subsequent tasks.

$$H_o : M_{dx} = M_{con} = M_{ctl} = M_{di}$$

$$H : M_{dx} > M_{con} > M_{ctl} > M_{di}$$

Hypothesis 6: Critical Evaluation of Assumptions and Recommendations

We contend that the Dialectical Exchange GPST will produce higher perceived levels of critical thinking and evaluation of both assumptions and recommendations.

Hypothesis 6 therefore, is:

Among members of groups using different GPSTs, there will e differences in perceived levels of critical evaluation of assumptions and recommendations:

$$H_o : M_{dx} = M_{di} = M_{con} = M_{ctl}$$

$$H_1 : M_{dx} > M_{di} > M_{con} > M_{ctl}$$

Hypothesis 7: Comittment to and Acceptance of Assumptions and Recommendations

We believe that DX-GPST will be associated with the highest levels of comittment to the planning process by team members.

Hypothesis 7 therefore, is:

Among groups using different GPSTs, there will be differences in the levels of acceptance of assumptions and recommendations by team members:

$$H_o : M_{dx} = M_{di} = M_{con} = M_{ctl}$$

$$H_1 : M_{dx} > M_{di} > M_{con} > M_{ctl}$$

In each case, we note that we are seeking to reject the null hypothesis; namely, that there are no differences between the

aggregated means for the measures of the dependent variables among the three experimental treatments and the control groups.

Table 1 shows a summary of our hypothetical predictions.

The Dependent Variables and Their Measurement

Table 2 summarizes our dependent variables. Hypothesis 1 requires measurement of improvement in profitability, as measured by return on investment, which we presented in the last section. Hypothesis 2 uses cost per unit. In the Executive Game, this variable is divided into two segments: materials and labor. Both are indirect measures of the firm's production planning efficiency. The materials cost per unit reflects the timing of the materials purchase, and the labor cost per unit reflects the firm's decisions regarding plant maintenance: fewer equipment breakdowns means less idle time. Hypothesis 3 uses the dollar amounts budgeted by the teams for plant investment, and hypothesis 4 uses the research and development budget. Both of these amounts were taken directly from the groups' quarterly decision forms. Hypotheses 5, 6, and 7 use tabulated data obtained directly from the post-experimental questionnaire. Two questionnaire items address each hypothesis. The six questions addressing these attitudinal hypotheses were combined with six other items to comprise our manipulation check questionnaire, which will be

presented elsewhere. The six items for our last three attitudinal hypotheses were taken from Schweiger and Sandburg's(1989) empirical study comparing DI,DA, and Consensus. The specific items, using a five-point response scale of Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree, are as follows:

Satisfaction:

Question 7 - I would be willing to work with this group on other projects in the future.

Question 8 - Working with my group was an enjoyable experience.

Critical Evaluation:

Question 9 - The group decision process made the group critically re-evaluate the validity of the assumptions and recommendations that were made in the initial stages of discussion.

Question 10 - The group decision process uncovered valid recommendations and assumptions that were not considered in the initial stages of discussion.

Table 1- Hypothesis Summary

Prediction rank orders in cells: 1 = highest

Performance

	Profitability Improvement	Cost Per Unit
DX	1	1
DI	2	2
CON	3	3
CTL	4	4

Decisional

	Research + Development	Plant Investment
DX	1	1
DI	2	2
CON	3	3
CTL	4	4

Attitudinal

	Satisfaction	Critical Evaluation	Comittment
DX	1	1	1
DI	4	2	2
CON	2	3	3
CTL	3	4	4

Table 2 - Dependent Variables

Variable	Source	Unit of Analysis
Improvement In Profitability	Computer-Generated	Group
Cost per Unit	Computer-Generated	Group
Plant Investment	Decision Form	Group
Research and Development	Decision Form	Group
Satisfaction	Questionnaire	Individual
Critical Evaluation	Questionnaire	Individual
Comittment	Questionnaire	Individual

Comittment:

Question 11 - I am comitted to my group's recommendations and assumptions.

Question 12 - I am satisfied with my group's recommendations and assumptions.

The measurement procedures for the dependent variables among all three experimental samples - undergraduates, graduates, and managers- were identical. The actual questionnaire is in Appendix I. Reliability checks using Cronbach's Coefficient Alpha (mean = .5) for DX,DI, and Consensus respectively were .62,. 62, .62 for the undergraduates; .83, .82, .73 for the MBAs; and .85, .85, and .83 for the Managers.

The Independent Variables- The GPST Treatments

All subjects received identical lectures on the fundamentals of the Executive Game. After random assignment to a strategic planning team, each experimental group recieved written instructions regarding the problem solving technology they were to use in their decision making deliberations. Manipulation check procedures will be discussed in a following section. The independent treatments were the randomly assigned GPSTs: dialectical exchange, dialectics, and consensus. The control groups received a written summary concerning the highlights of the simulation, with no specific guidelines as to how to approach the decision making process.

We now present the specific operationalizations of the three GPST treatments.

Dialectical Exchange Treatment

The DX treatment was formulated based upon our conceptualization of the new approach and upon our analysis of past problems with idealistic DI. The DX groups received the following written instructions:

In the dialectical exchange appraoch, two recommendations, based on different assumptions, are developed from the same data. The two recommendations(plans) and their respective assumptions are subjected to an in-depth critical evaluation through a debate between the two advocate subgroups. However, after initial formulation of the subgroups' plans, the subgroups exchange their positions, and each subgroup advances the other subgroup's recommendations in a debate. The debate should spell out the implications of the plans and all underlying assumptions. Following the debate, the two subgroups should settle on which assumptions survived the scrutiny of debate and attempt to develop a recommendation based upon them. Proponents of the dialectical exchange decision-making approach believe that sound judgements or recommendations are more likely to result from thorough identification and criticism of proposed decisions and their underlying assumptions. Here are some guidleines to use in using dialectical exchange:

1. Divide your group into two advocate subgroups.

2. Each subgroup should develop recommendations, build arguments for them, supported by key assumptions , facts, and data that underlie them. Write the recommendations ONLY on the RECOMMENDATION FORM provided. On the ASSUMPTION FORM, write all supporting assumptions, facts, and data.

3. Following step 2, each subgroup should give its RECOMMENDATION FORM ONLY, NOT THE ASSUMPTION FORM, to the other sugbgroup.

4. Each subgroup should then study the recommendations of the other group, and prepare arguments to support them.

5. The two subgroups should then debate the exchanged positions and the validity of the assumptions they have made. At the end of the debate, both subgroups should reveal the ASSUMPTIONS FORM of their ORIGINAL plan, to compare with those revealed in the debate.

6. Recommendations and surviving assumptions should then be developed.

7. Record the final recommendations, assumptions, facts, and data on the FINAL RECOMMENDATIONS FORM provided.

Dialectical Inquiry Treatment

The DI treatment was based upon Schweiger, Sandburg, and Ragan(1986) and Schweiger and Sandburg(1989). Their DI manipulation was formulated from two past studies(Mason(1969) and Mason and Mitroff(1981). The DI groups received the following written instructions:

In the dialectical inquiry approach two opposing

recommendations, based on contrary assumptions, are developed from the same data. The two recommendations and their respective assumptions are subjected to an in-depth critical evaluation through a debate between the two advocate subgroups. Using the same data, the debators attempt to spell out the implications of each decision, reveal its underlying assumptions, and challenge(or defend) those assumptions as effectively as possible. In other words, each side is trying to win the debate. Following the debate the two advocate subgroups should settle on which assumptions survived the scrutiny of debate and attempt to develop a recommendation based on them. Proponents of the dialectical inquiry decision-making approach believe that sound judgements or recommendations are more likely to result from thorough identifiaction and criticism of proposed decisions and their underlying assumptions. Here are some guidelines to use in using dialectical inquiry:

1. Divide your group into two advocate subgroups.

2A. One sugroup should develop recommendations and build an argument for them, supported by all key assumptions, facts, and data as completely and lucidly as you can on the SUBGROUP 1 RECOMMENDATIONS FORM provided for this purpose. Return this form to the other subgroup.

2B. The other subgroup should await receipt of the list of key assumptions made by the first group. While waiting, you may discuss the decision scenario only between yourselves.

Upon receiving this list of key assumptions, the second subgroup should develop counter-recommendations and complete the SUBGROUP 2 RECOMMENDATIONS FORM.

3. Following step 2B, both advocate subgroups should present both orally and in writing their assumptions, recommendations, and supporting facts and data to the other subgroup.

4. The two advocate subgroups debate their recommendations and the validity of the assumptions they have made. The objective of this debate is to arrive at a final list of assumptions that is acceptable to both subgroups.

5. Once the debate is completed, you should reach agreement on which assumptions survived. Any new assumptions that arise from the debate should also be included.

6. Using the surviving assumptions, develop recommendations.

7. Record the final recommendations, assumptions, facts, and data on the FINAL RECOMMENDATIONS FORM provided.

Consensus Treatment

In order to address our research questions, we included a consensus treatment as a low-conflict approach to strategic decision-making. Welty(1983) claimed that consensus is associated with less stress than other conflict-oriented approaches in the boardroom. We employed the basic operationalization for consensus as used by Schweiger and Ragan(1989), modifying it based upon the results of our pilot study, to be discussed shortly. The consensus manipulation used was based on Hall(1971) and Nemiroff et al(1976). The consensus groups received the following written guidelines:

The consensus approach relies on a thorough, open, and constructive discussion and examination of the recommendations and underlying assumptions developed individually by group members. In the course of this discussion each group member should have the opportunity to present his recommendations, the underlying assumptions, and relevant facts and data in as clear and logical manner as possible. Through discussion, questioning, and more complete exchange of information and opinion, the group seeks a better recommendation than might be produced by a single person. It is not necessary that each person be completely satisfied with the assumptions and recommendations - only that each person can accept them on the basis of logic and a willingness to consider them as feasible. Consensus is said to exist when all group members can accept the assumptions and recommendations on this basis. Proponents of this decision-making approach believe that better

assumptions and recommendations result from a more complete investigation and airing of data and ideas and a logical resolution of differences within the group. Here are some guidelines to use in achieving consensus:

1. Present your position clearly, logically, and persuasively, but consider carefully the comments and reactions of other group members. If you present the same points again, take comments and reactions into account.

2. It is not necessary that someone wins and loses in the discussion. When impasses occur, look for the next most feasible solution most acceptable for all parties.

3. Withstand pressures to yield which have no logically sound foundation. Strive for enlightened flexibility.

4. Differences of opinion indicate an incomplete exchange of relevant data on someone's part; press for additional sharing of task or emotional data where it seems in order.

5. View differences of opinion as natural and helpful rather than as a hindrance to decision-making. Generally, the more assumptions and recommendations expressed, the greater the likelihood of conflict, and the richer the resources used in solving the problem at hand.

6. View all initial agreements as suspect. Explore the reasons for the apparent agreement. Make sure that people have arrived at similar recommendations either for the same reasons, or for complimentary reasons before incorporating such recommendations into the final set.

7. Record your final decisions and assumptions on the FINAL RECOMMENDATIONS FORM provided.

We spent approximately fifteen minutes with each group answering any questions they raised concerning their GPST instructions. The control groups were basically briefed upon what constitutes systematic decision-making in the Executive Game. This briefing primarily concerned step-by-step procedures for estimating decision budgets, available in the Executive Game Handbook required as a student purchase for the course.

Complimenting the written GPST treatment instructions, we developed specific decision forms for each experimental treatment. These forms reflected the instructions in the groups' guidelines, as follows:

Dialectical Exchange:

Six forms per decision:

Subgroup 1 Assumption Form
Subgroup 2 Assumption Form
Subgroup 1 Decision Form
Subgroup 2 Decision Form

Final Recommendations and Assumptions Form

Dialectical Inquiry:

Subgroup 1 Assumption and Decision Form
Subgroup 2 Assumption and Decision Form

Final Recommendations and Assumptions Form

Consensus:

Final Recommendations and Assumptions Form

Control:

Final Recommendations and Assumptions Form

The Final Recommendations and Assumptions Form was used to input the group decisions for each period of simulated time. All group members were required to sign each decision form for

each period. To further enhance the strategic decision-making environment, the decision forms reflected each group member's area of planning responsibility in the firm. These included marketing, finance, research and development, and production.

The Experimental Subject Samples

Our three independent experiments used three different subject samples : undergraduate business students, graduate MBA students, and full-time managers. The undergraduates were enrolled in four sections of the required course in Business Policy. Three sections were day, and one was held during the evening. The demographic description of the undergraduates is as follows:

90 subjects : 38 Male
52 Female

Mean Age = 24.45 years

Majors:

Management	26
Marketing	27
Economics	2
Finance	15
Accounting	19
International Business	1

Four-year Monmouth College Students	43
Transfer from a Four-year College	26
Transfer from a Two-Year College	21
Part-time Day Students	3
Full-time Day Students	78

Part-time Evening Students	7
Full-time Evening Students	2

33 students had an average of 2.67 years supervisory experience.

The MBA students were enrolled in two sections of the senior graduate course in Business Policy. This course, as are all courses at institution at the graduate level, is offered in the evening. The description of this sample is:

32 subjects : 17 Males
15 Females
Mean Age = 30.07 years

The entire sample had an average of 7.38 years of supervisory experience.

The Manager group consisted of mail-invited persons from an area of thirty miles within the radius of Monmouth College, the site of the experiments. Two hundred invitations were sent, and forty were returned indicating agreement to attend. Of those forty, thirty-two eventually participated in the day-long session. The following describes the sample:

28 subjects : 19 Male
9 Female
Mean Age = 37.38 Years

The subjects had an average of 14.2 years of supervisory experience. The affiliations and positions of the manager participants were as follows:

Nametre Company	Marketing Manager
Charms Candy Company	Personnel Director
Cateret Savings Bank	EDP Audit Manager
Metropolitan Life	Account Representative
Continental Insurance	Systems Analyst
City Savings Bank	Money Market Trader
AT & T	Technical Staff Planner
Public Service Electric+Gas	Audit Supervisor
Lever Brothers	Materials Planning Manager
JMF Associates	President
AT & T Network Systems	Senior Documentation Specialist
AGS, NYNEX	Business Analyst
US Army	Senior Contract Specialist
Kimball Medical Center	Vic President Patient Services
Varityper	Financial Services Administrator
Merril Lynch	Financial Analyst
American Family Publishers	Vice President Finance
Hovnanian Mortgages, Inc.	Controller
Capital Cities/ABC	Program Controller
NJ Highway Authority	Assitant Chief Engineer
Ocean County Landfill Corp.	Controller
Celwave, Division of Alcatez	Customer Service Manager
A T & T	Technical Staff
Molecu-Wire Corp.	Director of Engineering
General Electric Company	Senior Staff Engineer

A T & T Product Manager

Two participants wished to remain unaffiliated.

The Manipulation Check Questionnaire

We employed three methods to ensure that the randomly assigned GPST treatments were actually used by the experimental groups during the entire simulation. First, each group retreated into "breakout" rooms during their decision-making deliberations, which afforded direct observation of their assigned GPST. In short, we deliberately roamed room to room and observed proceedings throughout the class session. This direct observation revealed conformance to all assigned GPST treatments in all firms. Second, as we have previously stated, each experimental group was required to submit different sets of decision input forms. These forms directly reflected the requirements of the specific GPST. For example, the DX groups submitted, in addition to the Final Recommendations Form, all sets of Subgroup recommendations and their suporting assumptions. Third, we used a manipulation check questionnaire modelled after Schweiger,Sandburg, and Ragan(1986)(see Appendix 2), and Schweiger and Sandburg(1989) in their experimental comparison of dialectics, devil's advocacy, and consensus, using case analysis. Our manipulation check consisted of the first six items of a twelve-item questionnaire administered to participants at the end of the simulation. The remaining six items addressed our attitudinal hypotheses, as earlier presented. For purposes of conducting the manipulation check on our experimental

treatments, exactly two of the six questions addressed each GPST treatment.

Again, each question had a five-point response scale of Strongly Agree, Agree, Undecided , Disagree , Strongly Disagree, and were as follows:

DX-GPST

1. The two subgroups initially developed plans, and then exchanged them to argue the opposite subgroup's plan.

2. After the exchange, the group debated which assumptions survived, and original assumptions to integrate a final plan were evaluated.

DI-GPST

3. The two subgroups initially developed a set of recommendations based on opposite sets of assumptions.

4. On the basis of a debate over two sets of assumptions, without exchanging arguments, the group reached a final decision.

Consensus

5. Each group member worked alone and developed his/her own individual recommendations for discussion with the entire group.

6. Subgroups were not used; rather, each person had a chance to present his/her ideas in an open discussion.

Experimental Operationalizations

The Undergraduate Experiment

The undergraduate experiment used four sections of the required Business Policy 490 course at Monmouth College during

the Fall semester of 1990. Participation in the Executive Game was a course requirement, constituting twenty percent of the student's calculated grade. One-half of this grade was based on final cumulative return on investment; the other half on a game-end oral and written defense of the firm's strategic plan. Each firm had approximately two hours of class time per week to work on its decisions. During the first two weeks of class, all four sections received a lecture on the basic workings of the simulation. This lecture in essence reviewed the fundamental calculations required to assess current operating conditions. In the third week of the semester, we conducted a trial run which allowed the students a chance to become acquainted with the "feel" of the game. This trial run was for practice only, and did not become part of the experimental results.

In order to establish a simulated planning environment from the start, each team was required to hand in to the instructor a written statement of corporate missions and goals. In addition, we require each firm to identify functional responsibilities within the group: marketing, production, research and development, and accounting/finance. To further establish a sense of group identity, each team was responsible later in the course for presenting an in-class oral presentation of a case randomly assigned by the instructor. This presentation had no impact on the evaluation of the Executive Game, but rather served to further consolidate the individuals as an ongoing, working planning team.

Table 3 illustrates the structure of the undergraduate experiment. We formed three industries consisting of eight firms in each industry. For the most part, each class section was assigned only one treatment; in two sections, one firm reflected another treatment due to enrollment variations and attrition during the first two weeks of the semester. Each industry had exactly two firms in each treatment. Further, in general, each firm only directly competed with one other firm in its section; the majority of its competitors were in another section.

The students were not told they were participating in an experiment. Each group had the impression that their required GPST was being used by all teams as a course requirement. We emphasized, across all sections, that the decision forms should be carefully completed since they will be graded at the end of the semester. After the last decision was completed, all sections were debriefed. The manipulation check questionnaire was administered just prior to debriefing.

The Graduate and Managerial Experiments

The structure of these experiments were identical. For the graduate MBAs, we used the two sections of Policy 590 that were run during the Fall semester of 1990 at Monmouth College. In order to increase the sample size and overcome difficult logistical problems of distributing evening printouts, we asked both sections to attend a day-long Saturday "competition" on the Executive Game. The invited managers

Table 3 - Undergraduate Industry Structure

	Industry		
	A	B	C
By Treatment			
Dialectical Exchange	1A 2A	1B 2B	1C 2C
Dialectical Inquiry	3A 4A	3B 4B	3C 4C
Consensus	5A 6A	5B 6B	5C 6C
Control	7A 8A	7B 8B	7C 8C
By Sections:			
1	1A 2A	1B 2B	1C 2C
2	3A 4A 5A	3B 4B	3C 4C
3	6A	5B 6B	5C
4	7A 8A	7B 8B	6C 7C 8C

attended the following Saturday for an identical experiment; they also were attracted by a sense of competition and a "hands-on" opportunity to experience strategic planning. Both groups were not told they were participating in an experiment until the day was over. For each day, the sessions lasted from 8:30 AM until 3:30 PM, with a break for lunch(provided by us). Approximately one hour was budgeted for each decision, and both groups simulated four decisions(one year) of business. The experiments for the MBAs and the managers were conducted at the Management Conference Center in the Faculty Club at Monmouth College. Due to the small sample size in each, only one industry was used for each day. Thus, both the MBAs and the managers had eight firms each, with two groups for each GPST treatment, as summarized in Table 4. Both the starting positions and the required decision forms were identical for the MBAs, managers, and undergraduates.

Statistical Methodology

Kerlinger(1986) stated that " unless there is good evidence to believe that populations are rather seriously nonnormal and that the variances are heterogeneous, it is usually unwise to use a nonparametric statistical test in place of a parametric one."(p.267) Gardner(1975) implied that parametric statistics are robust, operating well even under assumption violations. We believe our three populations - undergraduate business seniors, graduate MBA students, and manager practitioners - meet the criteria of

Table 4 - MBA and Manager Industry Structure

Industry A

Dialectical	1
Exchange	2
Dialectical	3
Inquiry	4
Consensus	5
	6
Control	7
	8

parametric analysis. Consequently, we employed parametric statistical analysis in testing our experimental hypotheses.

We used three statistical approaches in analyzing our data:

1. Descriptive Statistics - comparisons of means and standard deviations.

2. Analysis of Variance to test statistical significance:

- F test to detect the presence of relations between the independent and dependent variables;
- T test to examine the differences between means.

3. Correlation and Association ratios to test the strength of association between independent experimental treatment and the dependent variable measure.

The findings of each experiment assume the following form:

1. Analysis of the manipulation check questionnaire, questions 1-6, for internal consistency, followed by tests of significance.

2. Sequential evaluation of each hypothesis.

3. Summary findings of the population sample.

In all three experiments, we applied the .05 level of significance in accepting or rejecting the null hypothesis.

Pilot Study

In order to familiarize ourselves with the logistics of a larger set of experiments described in this dissertation, we conducted a pilot study during the Spring semester of 1990 at Monmouth College. We used sixty-four undergraduate business

seniors enrolled in four sections of the Business Policy course. The students were randomly assigned across two industries of eight firms. Four treatments were used : Dialectics, Devil's Advocacy, Consensus, and Control, with four groups per treatment. We tested hypotheses identical to those of this study, except that a Devil's Advocacy treatment was used instead of Dialectical Exchange, which was still under development. The overall results are shown in Table 5. Two of the seven hypotheses were completely supported. Furthermore, we were encouraged by the performance along several of the dependent variables to include performance measures, decisional factors, and attitudinal measures of Dialectics over Consensus. We sought, therefore, to strengthen the experimental design by adding a third industry, increasing the sample size, and running parallel experiments with MBA students and practitioning managers.

Table 5

Results of the Pilot Study

Predicted	Performance Measures	
	Profit Improvement	Cost/Unit
DI > DA	Supported	Not Supported
DI > CONSENSUS	Supported	Supported
DA > CONSENSUS	Supported	Supported
	Decisional Measures	
	Plant Investment	Research + Development
DI > DA	Supported	Supported
DI > CONSENSUS	Supported	Supported
DA > CONSENSUS	Supported	Not Supported

	Attitudinal Measures		
	Satisfaction	Assumption Re-evaluation	Commitment
CONSENSUS > DI	Not Supported		
CONSENSUS > DA	Not Supported		
DA > DI	Not Supported		
DI > DA		Not Supported	Not Supported
DI > CONSENSUS		Supported	Supported
DA > CONSENSUS		Supported	Supported

CHAPTER FIVE - FINDINGS OF THE UNDERGRADUATE EXPERIMENT

We now turn to a discussion of the findings of the undergraduate experiment. We will proceed in two steps. First, results of the manipulation checks will be analyzed. Second, each of the hypotheses will be discussed.

As earlier discussed, we administered a twelve-item questionnaire to the participants at the end of the simulation. The first six questions were three pairs of questions, two per experimental treatment, to check the actual presence of the randomly assigned GPST approach. In administering this section of the questionnaire, we wished to establish statistical support for the presence of the assigned GPST beyond the required completed decision forms and actual in-class observation of group deliberations. Table 6 shows descriptive statistics for all three GPSTs. Table 7 illustrates Analysis of Variance results to check for experimental differences between groups. Table 8 shows t-tests comparing the mean responses of each treatment group. As can be seen from these tables, DX,DI, and Consensus were clearly differentiated from the other groups statistically. The t-tests reveal that each treatment had significantly lower scores across respondents in other treatments; a lower mean response indicates agreement with the questions addressing the treatment. We interpret this as evidence of the actual presence of all three experimental treatments in the randomly assigned groups.

Table 6

Manipulation Check Descriptive Statistics

DX Treatment-Responses to Questions 1 + 2

Group	N	Mean	S. D.
DX	23	1.8	.88
DI	24	2.2	1.33
CONS	22	4.5	1.23
CTL	21	3.9	1.57

DI Treatment-Responses to Questions 3 + 4

DX	23	3.3	.98
DI	24	2.2	1.15
CONS	22	4.6	.96
CTL	21	4.8	.93

CONSENSUS Treatment- Responses to Questions 5 + 6

DX	23	3.7	1.21
DI	24	3.6	1.41
CONS	22	2.0	1.41
CTL	21	2.6	1.32

Key: 1 = Strongly Agree
2 = Agree
3 = Undecided
4 = Disagree
5 = Strongly Disagree

Table 7

Analysis of Variance

Questions 1 + 2 - DX Treatment

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-value
Treatments	3	227.402	75.801	45.822
Error	176	291.148	1.654	
Total	179	518.55		

Questions 3 + 4 - DI Treatment

Treatments	3	172.432	57.477	54.750
Error	176	184.768	1.05	
Total	179	357.2		

Questions 5 + 6 - CONSENSUS Treatment

Treatments	3	90.406	30.135	16.342
Error	176	324.544	1.844	
Total	179	414.95		

Table 8

T-values of Differences Between Treatment Mean Responses in the Manipulation Check

DX Treatment - Questions 1 + 2

	T-value	Significance
DX versus DI	-1.18	n.s.
DX versus CONSENSUS	-8.31	.001
DX versus CONTROL	-5.41	.001

DI Treatment - Questions 3 + 4

DI versus DX	-3.45	.001
DI versus CONSENSUS	-7.48	.001
DI versus CONTROL	-8.08	.001

CONSENSUS Treatment - Questions 5 + 6

CONSENSUS versus DX	-4.25	.001
CONSENSUS versus DI	-3.76	.001
CONSENSUS versus CONTROL	-1.41	.10

Performance Hypotheses Results

Hypothesis 1 predicted that there would be a rank order in profitability improvement as measured by the computer-generated return on investment(ROI) across the three years of simulated play. Tables 9A through 9E show in varying relationships the cumulative ROI for each firm in each industry, at the end of each fiscal year. In their respective industry rankings, DX-GPST groups occupied four of the six first and second-place positions. Analysis of variance in Table 10 indicates a significant difference in the groups due to the experimental treatments (independent variables) affecting overall profitability improvement for years one through three. Furthermore, Hays' w-squared , a conservative estimate of the strength of association or relation between the independent and dependent variables, is calculated at .389. T-tests in Table 11 indicate that while DX and DI were not significantly different in ROI improvement, DX showed significantly higher improvement than both Consensus and Control. DI differed from Consensus and Control for this measure at the .10 level of significance, and there was no difference between Consensus and Control. Thus, hypothesis 1 was partially supported. We also note from Table 10 that, since all firms started from identical positions, the DX groups had the highest overall improvement in profitability at an average of 62.5 %.

Hypothesis 2 predicted that the DX-GPST groups would exhibit

Table 9A - Return On Investment(%)

Industry	Treatment	Year 1	Year 2	Year 3	Final Rank
A	DX	7.06	7.79	11.81	2
	DX	6.82	10.02	12.44	1
	DI	4.53	6.78	9.79	4
	DI	9.06	8.58	10.20	3
	CONSENSUS	7.17	7.05	9.55	6
	CONSENSUS	8.52	8.00	8.53	7
	CONTROL	8.46	8.32	9.55	5
	CONTROL	7.87	7.84	8.24	8
B	DX	8.78	10.29	12.42	2
	DX	6.60	8.17	10.55	3
	DI	9.50	10.37	8.54	8
	DI	9.63	12.29	14.64	1
	CONSENSUS	8.08	7.41	9.36	6
	CONSENSUS	9.21	10.40	9.36	5
	CONTROL	9.26	9.79	10.33	4
	CONTROL	7.02	7.73	8.92	7
C	DX	3.20	5.83	5.03	8
	DX	6.09	8.19	10.21	2
	DI	8.61	11.37	14.99	1
	DI	7.15	6.49	9.98	4
	CONSENSUS	9.31	8.88	10.09	3
	CONSENSUS	7.67	7.92	8.89	6
	CONTROL	8.68	8.09	8.94	5
	CONTROL	6.02	6.56	7.48	7

Table 9B - Average ROI, All Treatments, Years 1-3

Treatment	N	Mean(%)	S.D.
DX	18	8.40	2.55
DI	18	9.58	2.57
CONS	18	8.63	.953
CTL	18	8.28	1.08

Table 9C - Average ROI, All Treatments, By Individual Year

Treatment		Year 1		Year 2		Year 3	
	N	Mean(%)	S.D.	Mean(%)	S.D.	Mean(%)	S.D.
DX	6	6.43	1.66	8.38	1.48	10.41	2.55
DI	6	8.08	1.78	9.31	2.20	11.35	2.50
CONS	6	8.32	.78	8.27	1.11	9.29	.49
CTL	6	7.88	1.09	8.06	.95	8.91	.91

Table 9D Average ROI By Industry

Industry		Year 1		Year 2		Year 3	
	N	Mean(%)	S.D.	Mean(%)	S.D.	Mean(%)	S.D.
A	8	7.74	1.32	8.04	.93	10.01	1.37
B	8	8.51	1.08	9.55	1.55	10.51	1.92
C	8	7.09	1.85	7.91	1.63	9.45	2.64

Table 9E - Overall Rankings By ROI, All Firms

	Treatment	ROI
1.	DI	14.99
2.	DI	14.64
3.	DX	12.44
4.	DX	12.42
5.	DX	11.81
6.	DX	10.55
7.	CTL	10.33
8.	DX	10.21
9.	DI	10.20
10.	CONS	10.09
11.	DI	9.98
12.	DI	9.79
13.	CONS	9.55
14.	CONS	9.55
15.	CONS	9.36
16.	CONS	9.36
17.	CTL	8.94
18.	CTL	8.92
19.	CONS	8.89
20.	DI	8.54
21.	CONS	8.53
22.	CTL	8.24
23.	CTL	7.48
24.	DX	5.03

Table 10 - Analysis of Variance
Improvement In ROI, Years 1 Through 3

Source	D.F.	Sum of Squares	Mean Square	F-Value
Treatments	3	1.12	.373	6.09
Error	20	1.23	.061	
Total	23	2.35		

Table 11 - T-Values

Improvement In ROI, Years 1 through 3

	T-Value	Significance
DX versus DI	.79	-
DX versus CONSENSUS	6.76	.001
DX versus CONTROL	7.11	.001
DI versus CONSENSUS	1.84	.10
DI versus CONTROL	1.79	.10
CONSENSUS versus CONTROL	-.22	-

lower overall cost per unit of production than the other three treatments. As can be seen from Tables 12, 13, and 14, this hypothesis was completely supported, except that there was no significant difference between Consensus and Control for this measure. Hays' omega-squared for years two and three were .668 and .656 respectively, indicating a strong association between the treatments and the cost per unit incurred. Table 13 shows that DX had the lowest overall dollar cost per unit at the end of the simulation. This variable, as we noted earlier, is computer generated and reflects the overall concern with long-range operational planning. We note that between the DX and Control groups, there was almost a difference of one dollar per unit in cost.

Decision Hypotheses

Hypothesis 3 predicted that there would be significant differences between the groups in the amounts budgeted on plant investment. As earlier discussed, we note that this decision affords the firm an opportunity to slowly expand it's production capacity. Tables 15 and 16 show clearly that there was no statistical difference for this dependent variable among the groups. While the F-Ratios for each year are indicative of differences for this variable between the group at the significance level of .05, Hays' omega-squared measure of association indicating the strength of the difference is

Table 12 - Analysis Of Variance

Cost Per Unit

Year 1

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-value
Treatments	3	.797	.266	6.23
Error	92	3.921	.043	
Total	95	4.718		a<.005

Year 2

Treatments	3	9.653	3.218	65.39
Error	92	4.527	.049	
Total	95	14.180		a<.001

Year 3

Treatments	3	15.822	5.274	62.05
Error	92	7.82	.085	
Total	95	23.642		a<.001

Table 13

Average Cost Per Unit, All Treatments($)

Treatment	Year 1		Year 2		Year 3	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
DX	12.35	.205	12.27	.173	12.65	.242
DI	12.37	.170	12.46	.205	12.82	.292
CONSENSUS	12.55	.215	12.95	.237	13.49	.303
CONTROL	12.53	.231	13.02	.082	13.59	.327

Table 14

T-Values, Cost Per unit

	Year 1		Year 2		Year 3	
	t	sig.	t	sig.	t	sig.
DX versus DI	-.361	no	-3.391	.005	-2.135	.025
DX versus CONS	-3.33	.005	-11.122	.001	-10.381	.001
DX versus CTL	-2.796	.01	-18.503	.001	-10.819	.001
DI versus CONS	-3.257	.005	-7.5	.001	-7.636	.001
DI versus CTL	-2.789	.01	-11.919	.001	-8.437	.001
CONS versus CTL	.289	no	-1.149	no	-1.084	no

weak for each year: .106, .249. and .209 respectively. Based on such weak inferential grounds, differences between group means is of little statistical value. As such, Hypothesis 3 was not supported.

Hypothesis 4 predicted significant differences between the groups in amounts budgeted for Research and Development. This decision allows the group to differentiate their product in terms of quality, allowing them to command a higher profit margin later in the simulation. Tables 17 and 18 show that there was strong statistical differences between the groups for this variable. While Hays' omega-squared was relatively weak for year 1 at .249, for years 2 and 3 it was a very strong .604 and .641 respectively. T-tests in table 19 for years 2 and 3 indicate that, for the most part, hypothesis 5 was supported. Both DX and DI were significantly greater than both Consensus and Control. There was no significant difference between DX and DI, and the Control groups were slightly significantly higher than Consensus for year 3.

Attitudinal Hypotheses

As earlier stated, we used the last six questions of the manipulation check to test three attitudinal hypotheses. Hypothesis 5 predicted that there would be differences in member satisfaction and desire to continue working with the group. Hypothesis 6 predicted that there would be differences in perceived levels of critical evaluation of assumptions and

Table 15

Average Plant Investment, All Firms($000)

Treatment	Year 1		Year 2		Year 3	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
DX	338.2	144.1	472.7	111.3	500.4	92.5
DI	327.1	118.4	519.8	149.01	415.7	183.0
CONSENSUS	268.5	142.0	380.7	165.9	316.0	80.4
CONTROL	217.0	92.7	313.1	93.3	376.6	116.0

Table 16 - Analysis Of Variance

Plant Investment

Year 1

Source	Degrees of Freedom	Sum of Squares	Mean Square	F - value
Treatments	3	227513	75837.7	4.77
Error	92	1461392	15884.7	
Total	95	1688905		a<.025
Year 2				
Treatments	3	616622	205540.7	11.6
Error	92	1628641	17702.6	
Total	95	2245263		a<.001
Year 3				
Treatments	3	429803	143267.7	9.25
Error	92	1425648	15496.2	
Total	95	1855451		a<.001

Table 17

Average Research and Development, All Treatments($000)

Treatment	Year 1		Year 2		Year 3	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
DX	198.2	93.3	353.1	87.6	364.5	53.9
DI	201.1	83.3	346.2	107.5	358.7	102.6
CONSENSUS	126.6	33.1	170.5	44.9	160.1	55.0
CONTROL	114.8	24.5	155.7	34.1	184.6	58.2

Table 18 - Analysis Of Variance

Research and Development

Year 1

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-value
Treatments	3	151386	50462	11.64
Error	92	398882.4	4335.7	
Total	95	550268.4		a<.01

Year 2

Treatments	3	838643.5	279547.9	49.9
Error	92	515135.2	5599.3	
Total	95	1353778.7		<.001

Year 3

Treatments	3	867482.5	289160.9	58.2
Error	92	456988.9	4967.3	
Total	95	1324471.4		a<.001

Table 19

T - Values, Research and Development

	Year 1		Year 2		Year 3	
	t	sig.	t	sig.	t	sig.
DX versus DI	-.112	no	.239	no	.240	no
DX versus CONS	3.467	.001	8.902	.001	12.72	.001
DX versus CTL	4.145	.001	10.076	.001	10.869	.001
DI versus CONS	3.988	.001	7.235	.001	8.181	.001
DI versus CTL	4.769	.001	8.102	.001	7.078	.001
CONS versus CTL	1.374	.10	1.26	no	-1.467	.05

recommendations. Hypothesis 7 predicted that there would be differences in commitment to and acceptance of assumptions and recommendations. For the experimental treatments in each of these attitudinal hypotheses, Hays' omega-squared was .062, 0, and .067 respectively, indicating an absolute minimal amount of shared variance for the dependent variables among the treatments. Tables 20 through 25 show both descriptive statistics and analysis of variance for all three hypotheses. We are forced to conclude, in the presence of such weak variance association, that all three attitudinal hypotheses were not supported: there was no statistical difference between the experimental treatments.

Discussion

Table 26 summarizes the findings of the undergraduate experiment. For the performance hypotheses, the dialectical GPSTs outperformed both the consensus and control groups. The consensus groups, however, did not outperform the control groups for either performance hypothesis. We note that DX-GPST had the lowest overall cost per unit of the three treatments, and this was statistically significant. We believe these findings reflect the pre-occupation of dialectical-based planning systems with the advancement of efficiency-based operational strategies, as earlier stated in our rationale. The decisional hypotheses, measuring the impact of GPST upon Plant Investment and Research and Development, present mixed findings. On the one hand, all firms, regardless of treatment, did not spend significant

Table 20

Satisfaction and Desire To Continue With Group

Treatment	N	Mean	S.D.
DX	46	1.83	.916
DI	48	1.54	.644
CONS	44	1.77	.973
CTL	42	2.43	1.69

Table 21

Analysis Of Variance

Satisfaction and Desire To Continue With Group

Source	Degrees Of Freedom	Sum of Squares	Mean Square	F-value
Treatments	3	18.773	6.258	4.994
Error	176	220.538	1.253	
Total	179	239.311		a<.05

Table 22

Critical Evaluation Of Assumptions and Recommendations

Treatment	N	Mean	S.D.
DX	46	2.065	1.0
DI	48	2.083	.996
CONS	44	1.909	.82
CTL	42	2.238	1.37

Table 23

Analysis Of Variance

Critical Evaluation Of Assumptions and Recommendations

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-value
Treatments	3	2.335	.778	.672
Error	176	203.776	1.158	
Total	179	206.061		

Key: 1 = strongly agree 2 = agree 3 = undecided
4 = disagree 5 = strongly disagree

Table 24

Commitment To and Acceptance Of Assumptions and Recommendations

Treatment	N	Mean	S.D.
DX	46	1.934	.763
DI	48	1.770	.714
CONS	44	1.886	.775
CTL	42	2.52	1.418

Table 25

Analysis Of Variance

Commitment To and Acceptance Of Assumptions and Recommendations

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-value
Treatments	3	14.758	4.919	5.338
Error	176	162.192	.972	
Total	179	176.95		$a<.05$

amounts on Plant Investment, although in nominal amounts the dialectical-based groups outspent both consensus and control. Table 27 shows the Pearson correlation coefficients for treatments versus Plant Investment. On the other hand, both DX and DI spent significantly higher amounts of Research and Development than the other treatments. Research and Development positions the firm for maximum exploitation of high profit margins as the simulation develops. We infer from these results that the dialectical component in these groups developed planning scenarios which stressed long-term development of strategy. We cite as good evidence the fact that both DX and DI enjoyed greater overall profitability improvement as the simulation progressed , as shown in the results of testing Hypothesis 1.

We soberly note that there were no significant differences among the treatment groups for any of the attitudinal hypotheses. We conjecture that the operationalization of the questionnaire could have had an effect upon this result. The first six questions of the questionnaire accomplished their task as a manipulation check; the last six questions were attitudinal. While students were instructed repeatedly that the responses would in no way affect their evaluation in the course, their responses may have ignored this announcement. For example, students may have been reluctant to "abandon" their group at the end of the simulation; or, they may have been unwilling to admit in writing that their group approach did not lead to critical evaluation of assumptions and recommendations, or to a low

Table 26

Summary Of Findings - Undergraduate Experiment

	Profit Improvement	Cost/Unit	R+D	Plant Investment
DX > DI	no	yes	no	no
DX > CONS	yes	yes	yes	no
DX > CTL	yes	yes	yes	no
DI > CONS	yes	yes	yes	no
DI > CTL	yes	yes	yes	no
CONS > CTL	no	no	no	no

No attitudinal hypotheses supported.

Table 27

Pearson Correlation Coefficients - Plant Investment

	DX	DI	CONS	CTL
DX	1.0	.029	.293	.224
DI		1.0	.164	.076
CONS			1.0	.095
CTL				1.0

level of satisfaction and commitment on their part. Clearly, at least for the undergraduate phase of our experiments, the attitudinal instrument needs to be re-evaluated in light of our findings. We now turn to the MBA experimental results.

FINDINGS OF THE MBA EXPERIMENT

The manipulation checks for the MBA experiment all proved to be successful. Tables 28, 29, and 30 show the descriptive statistics for each manipulation, results of analysis of variance , and comparisons of means using the T-test. Again, we replicated the undergraduate experimental conditions with the exception that there was only one industry with two firms per treatment, and that the MBAs simulated one year in one full-day Saturday session.

Performance Hypotheses Results

Hypothesis 1 , which predicted differences in profitability improvement, was not supported. While Table 31 shows that a DX and a DI-GPST occupied year end positions of 3 and 1 respectively, Tables 32 through 34 show that there was little statistical difference between the group treatments.

Hypothesis 2 predicted that there would be differences among the groups concerning operating cost per unit; this hypothesis was also not supported, as we indicate in Tables 35 and 36.

Table 28

Manipulation Check Descriptive Statistics

DX Treatment-Responses to Questions 1 + 2

Group	N	Mean	S.D.
DX	8	1.38	.484
DI	9	2.28	1.14
CONS	7	4.14	1.87
CTL	7	3.71	1.48

DI Treatment-Responses to Questions 3 + 4

DX	8	3.06	1.48
DI	9	2.00	.667
CONS	7	4.21	1.08
CTL	7	4.44	.864

CONSENSUS Treatment-Responses to Questions 5 + 6

DX	8	4.81	.527
DI	9	3.72	1.24
CON	7	2.21	1.37
CTL	7	3.64	1.59

Key: 1 = Strongly Agree
2 = Agree
3 = Undecided
4 = Disagree
5 = Strongly Disagree

Table 29

Analysis of Variance

Questions 1 + 2 - DX Treatment

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-value
Treatments	3	74.342	24.781	18.443
Error	58	77.933	1.344	
Total	61	152.274		a < .001

Questions 3 + 4 - DI Treatment

Treatments	3	63.502	21.167	17.830
Error	60	71.232	1.187	
Total	63	134.734		a <.001

Questions 5 + 6 - CONSENSUS Treatment

Treatments	3	50.574	16.858	10.444
Error	58	93.620	1.614	
Total	61	144.194		a<.005

Table 30

T-Values of Differences Between Treatment Mean Responses in the Manipulation Check

DX Treatment - Questions 1 + 2

	T - Value	Significance
DX versus DI	-1.95	.05
DX versus CONSENSUS	-3.75	.01
DX versus CONTROL	-3.91	.01

DI Treatment - Questions 3 + 4

DI versus DX	-1.82	.05
DI versus CONSENSUS	-4.70	.01
DI versus CONTROL	-5.97	.01

CONSENSUS Treatment - Questions 5 + 6

CONSENSUS versus DX	-4.62	.01
CONSENSUS versus DI	-2.16	.05
CONSENSUS versus CONTROL	-1.67	.10

Table 31 - Return On Investment(%) - MBAs

Treatment	Period				Final Rank
	1	2	3	4	
DX	12.57	10.80	9.00	8.71	3
DX	13.22	9.64	8.23	7.86	6
DI	12.69	10.81	9.77	9.56	1
DI	13.30	9.52	7.40	7.49	8
CONSENSUS	12.79	10.57	9.27	8.60	4
CONSENSUS	11.34	8.53	7.31	7.68	7
CONTROL	12.27	10.42	8.69	8.32	5
CONTROL	13.90	9.50	9.45	9.15	2

Table 32 - Average ROI, All Treatments

Treatment	N	Mean(%)	S.D.
DX	8	10.01	1.87
DI	8	10.07	2.01
CONS	8	9.51	1.78
CTL	8	10.21	1.80

Table 33 - Changes in ROI(%)-MBAs

Treatment	Periods 1-2	Periods 2-3	Periods 3-4
DX	-.141	-.166	-.032
DX	-.271	-.146	-.045
DI	-.148	-.096	-.021
DI	-.284	-.223	+.012
CONS	-.173	-.123	-.072
CONS	-.248	-.143	-.051
CTL	-.151	-.166	-.043
CTL	-.317	-.005	-.032

Table 34 - Analysis of Variance

Changes In ROI, Periods 1 Through 4 - MBAs

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-value
Treatments	3	.001	0	.032
Error	20	.198	.010	
Total	23	.199		

Table 35 - Average Cost Per Unit($), All Treatments,MBAs

Treatment	N	Mean	S.D.
DX	8	12.32	0.22
DI	8	12.26	0.20
CONS	8	12.41	0.19
CTL	8	12.31	0.12

Table 36 - Analysis of Variance, Cost Per Unit, MBAs

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-value
Treatments	3	0.088	0.029	.748
Error	28	1.095	0.039	
Total	31	1.182		

Decision Hypotheses

Hypothesis 3 predicted differences among the groups for amounts spent on Plant Investment. Tables 37 through 39 show our results for this hypothesis. Analysis of Variance indicates that the treatments had an effect upon the groups for this dependent variable at the .01 level of significance, although Hays' omega-squared was calculated at .252 for the single year of the simulation. Investigation using t-tests for the treatment means reveal that both DX and DI were significantly different from Consensus; no other mean combinations were different statistically. Thus, this hypothesis was partially supported.

Hypothesis 4 predicted differences in amounts spent on Research and Development. We show in Tables 40 through 42 that, with the exception of no significant difference between Consensus and Control, this hypothesis was completely supported. Analysis of Variance yielded a Hays' omega-squared of .662 , indicating a strong relationship between the treatments and Research and Development. DX was significantly higher than DI, Consensus and Control, and DI was higher than both Consensus and Control.

Table 37 - Average Plant Investment, All Treatments($000),MBAs

Treatment	N	Mean	S.D.
DX	8	368.75	126.71
DI	8	319.13	66.74
CONS	8	213.50	85.53
CTL	8	494.63	234.70

Table 38 - Analysis Of Variance, Plant Investment, MBAs

Source	Degrees of Freedom	Sum of Squares	Mean Square	F
Treatments	3	326795.750	108931.917	4.599
Error	28	663150.250		
Total	31	989946.000		a <.05

Table 39 - T-Values, Plant Investment , MBAs

	t	significance
DX versus DI	0.917	no
DX versus CONS	2.687	.05
DX versus CTL	-1.249	no
DI versus CONS	2.576	.05
DI versus CTL	-1.903	no
CONS versus CTL	-2.978	no

Table 40 - Average Research and Development, All Treatments($000),MBAs

Treatment	N	Mean	S.D.
DX	8	228.13	45.82
DI	8	171.38	31.54
CONS	8	110.00	21.65
CTL	8	122.63	11.38

Table 41 - Analysis of Variance - Research and Development, MBAs

Source	Degrees of Freedom	Sum of Squares	Mean Square	F
Treatments	3	69214.344	23071.448	21.871
Error	28	29536.625		
Total	31	98750.969		a <.001

Table 42 - T-Values, Research and Development, MBAs

	t	significance
DX versus DI	2.70	.05
DX versus CONS	6.17	.005
DX versus CTL	5.91	.005
DI versus CONS	4.25	.025
DI versus CTL	3.85	.025
CONS versus CTL	-1.37	no

Attitudinal Hypotheses

Hypothesis 5 predicted differences in member satisfaction and desire to continue working with the group. Tables 43 through 45 reveal statistical differences among the responses for two treatment combinations. While analysis of variance indicated a difference between at least two treatment means, Hays' omega-squared showed a relatively weak association between the treatments and the dependent variable at .182.

T-tests revealed that both DX an DI had significantly higher member satisfaction than consensus, but there was no statistical difference between any of the other treatment combinations. Thus, hypothesis 5 for the MBA experiment was partially supported.

Hypothesis 6 predicted differences in the perceived levels of critical evaluation of assumptions and recommendations between the groups. Tables 46 through 48 show significant differences between the treatment groups for this measure. Hays omega-squared was calculated at .25. DX members perceived higher critical evaluation than both Consensus and Control, and DI was higher than Consensus and Control. There was no significant difference between DX and DI, or between Consensus
and Control. Thus, Hypothesis 6 was in large part supported.

Hypothesis 7 predicted there would be differences in perceived levels of commitment to and acceptance of assumptions and recommendations between the groups. Tables 49 through 51

Table 43

Satisfaction and Desire To Continue Working With Group-MBAs

Treatment	N	Mean	S.D.
DX	16	1.19	.390
DI	18	1.11	.314
CONS	14	2.50	1.67
CTL	16	1.63	1.17

Table 44

Analysis Of Variance
Satisfaction and Desire To Continue Working With Group-MBAs

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Value
Treatments	3	18.285	6.095	5.762
Error	60	63.465	1.058	
Total	63	81.750		a < .005

Table 45

T-Values
Satisfaction and Desire To Continue Working With Groups-MBAs

	t	significance
DX versus DI	.610	no
DX versus CONS	-3.02	.05
DX versus CTL	-1.38	no
DI versus CONS	-3.42	.025
DI versus CTL	-1.75	no
CONS versus CTL	1.648	no

Table 46
Critical Evaluation of Assumptions and Recommendations-MBAs

Treatment	N	Mean	S.D.
DX	16	1.53	.776
DI	18	1.73	.77
CONS	14	3.14	1.46
CTL	16	3.00	1.41

Table 47
Analysis of Variance
Critical Evaluation of Assumptions and Recommendations-MBAs

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Value
Treatments	3	32.199	10.733	7.756
Error	57	78.883	1.384	
Total	60	111.082		a < .005

Table 48
T-Values
Critical Evaluation of Assumptions and Recommendations-MBAs

	t	significance
DX versus DI	-.743	no
DX versus CONS	-3.84	.025
DX versus CTL	-3.62	.025
DI versus CONS	-3.19	.025
DI versus CTL	-2.96	.050
CONS versus CTL	.317	no

that there was little significant difference among the groups for this dependent variable. Only the DI treatment was significantly higher than both Consensus and Control.

Discussion

Table 52 summarizes the findings of the MBA experiment. We note that the only difference between the DX and DI treatments was that DX spent significantly more on Research and Development. Both DX and DI, however, measured significantly different than Consensus on several dependent variables : higher Research and Development, higher Plant Investment, and higher perceived critical re-evaluation of assumptions and recommendations. DX also reported higher levels of satisfaction than Consensus. Surprisingly, DI also had greater levels of satisfaction than Consensus, in direct opposition to the findings of Schweiger et al(1989) using case analysis. We also note that, in the MBA experiment, there was no significant difference for any of the dependent variables between the Consensus and Control treatments. Also, the MBAs, unaffected by any direct grading possibility since the experiment was a "practice" Saturday day-long session, apparently responded to the last six questionnaire items with candor. Overall, our conclusion is that for four of our seven hypotheses, the dialectical-based GPSTs performed according to our predictions. We now turn to the results of the Managerial experiment.

Table 49

Commitment To and Acceptance Of Assumptions and Recommendations

MBAs

Treatment	N	Mean	S.D.
DX	16	1.56	.609
DI	18	1.22	.416
CONS	14	2.50	1.68
CTL	16	2.06	1.03

Table 50
Analysis of Variance

Commitment To and Acceptance Of Assumptions and Recommendations

MBAs

Source	Degrees of Freedom	Sum of Square	Mean Square	F-Value
Treatments	3	14.873	4.958	4.542
Error	60	65.486		
Total	63	80.359		a < .01

Table 51
T-Values

Commitment To and Acceptance Of Assumptions and Recommendations

MBAs

	t	significance
DX versus DI	1.86	no
DX versus CONS	-2.037	no
DX versus CTL	-1.630	no
DI versus CONS	-3.031	.05
DI versus CTL	-3.112	.05
CONS versus CTL	.853	no

Table 52

Summary Of Findings - MBA Experiment

	Profit Improvement	Cost/Unit	R+D	Plant Investment
DX > DI	no	no	yes	no
DX > CONS	no	no	yes	yes
DX > CTL	no	no	yes	no
DI > CONS	no	no	yes	yes
DI > CTL	no	no	yes	no
CONS > CTL	no	no	no	no

	Critical Re-evaluation	Commitment
DX > DI	no	no
DX > CONS	yes	no
DX > CTL	yes	no
DI > CONS	yes	yes
DI > CTL	yes	yes
CONS > CTL	no	no

	Satisfaction
DX > DI	no
DX > CONS	yes
DX > CTL	no
CONS > DI	no (DI > CONS)
CTL > DI	no
CONS > CTL	no

FINDINGS OF THE MANAGERIAL EXPERIMENT

The manipulation checks for the manager subjects all proved to be successful, with the exception that the mean responses checking the Consensus treatment revealed little difference between the Consensus and Control groups. Direct experimenter observation , in addition to no provision of systematic Consensus instructions to the Control Groups , support our contention that the Control Groups did not utilize a GPST identical to that of the Consensus Treatment. Supporting data for the managerial manipulation checks are in Tables 53 through 55.

Performance Hypotheses Results

Hypothesis 1 predicted differences among the treatment groups in ROI. While the two DX-GPST groups finished first and second in computer-generated ROI for the entire year of play, overall there was little statistical significance between them and the other groups. Tables 56 through 59 summarize the data for Hypothesis 1; it was not supported in the managerial experiment.

Hypothesis 2 predicted differences among the groups concerning operating cost per unit. Analysis of Variance revealed significant differences between the groups for this hypothesis; furthermore, Hays' omega-squared calculated at .517, reflective of high strength of association between the

Table 53

Manipulation Check Descriptive Statistics

Dx Treatment - Responses To Questions 1 + 2

Group	N	Mean	S.D.
DX	8	1.31	.768
DI	8	2.88	1.90
CONS	6	4.58	.862
CTL	6	4.50	.867

DI Treatment - Responses To Questions 3 + 4

DX	8	4.69	.768
DI	8	2.44	1.41
CONS	6	4.58	.953
CTL	6	5.00	0.00

CONSENSUS Treatment - Responses To Questions 5 + 6

DX	8	4.75	.75
DI	8	4.50	.79
CONS	6	2.17	1.72
CTL	6	2.58	1.11

Table 54

Analysis Of Variance - Managers

Questions 1 + 2 - DX Treatment

Source	Degrees Of Freedom	Sum of Squares	Mean Square	F-Value
Treatments	3	101.753	33.918	20.724
Error	52	85.104	1.637	
Total	55	186.857		a < .001

Questions 3 + 4 - DI Treatment

Treatments	3	62.262	20.754	20.638
Error	52	52.292	1.006	
Total	55	114.554		a < .001

Questions 5 + 6 - CONSENSUS Treatment

Treatments	3	70.970	23.657	17.679
Error	52	69.583	1.338	
Total	55	140.554		a < .001

Table 55
T-Values of Differences Between Treatment
Mean Responses in the Manipulation Check- Managers

	t-value	significance
DX Treatment - Questions 1 + 2		
DX versus DI	-2.03	.05
DX versus CONS	- 6.92	.01
DX versus CTL	- 6.74	.01
DI Treatment - Questions 3 + 4		
DI versus DX	-3.71	.01
DI versus CONS	-2.97	.01
DI versus CTL	-4.12	.01
CONSENSUS Treatment - Questions 5 + 6		
CONS versus DX	-3.51	.01
CONS versus DI	-3.13	.01
CONS versus CTL	-.448	n.s.

Table 56 - Return On Investment(%)- Managers

Treatment	Period				Final Rank
	1	2	3	4	
DX	12.81	9.04	7.49	8.39	1
DX	12.84	8.48	7.85	8.03	2
DI	10.56	9.13	7.88	7.38	5
DI	6.08	7.21	7.13	7.79	3
CONSENSUS	12.98	9.25	7.63	7.63	4
CONSENSUS	11.29	5.55	5.74	5.87	6
CONTROL	11.77	9.30	6.39	4.47	7
CONTROL	12.88	9.17	6.13	4.42	8

Table 57 - Average ROI(%), All Treatments - Managers

Treatment	N	Mean(%)	S.D.
DX	8	9.37	2.18
DI	8	7.90	1.37
CONS	8	8.03	2.36
CTL	8	8.07	3.21

Table 58 - Changes In ROI(%)-Managers

Treatment	Periods 1-2	Periods 2-3	Periods 3-4
DX	-29.4	-17.14	12.01
DX	-33.9	-7.42	2.29
DI	-13.54	-13.69	-6.34
DI	-18.58	-1.1	9.25
CONS	-28.73	-17.31	0
CONS	-50.84	3.42	2.26
CTL	-20.98	-31.29	-30.0
CTL	-28.8	-33.15	-27.89

Table 59 - Analysis of Variance

Changes In ROI, Periods 1 through 4 - Managers

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Value
Treatment	3	1503.216	501.072	2.198
Error	20	4559.969	227.998	
Total	23	6063.185		

GPST and operating cost per unit. T-tests revealed that this association stems from the overall higher costs of the Control groups. All three experimental treatments, DX, DI, and Consensus, had operating costs that were significantly lower than the Control groups. There were no other significant differences uncovered for this variable, so Hypothesis 2 was partially supported. Findings are summarized in Tables 60 through 62.

Decision Hypotheses

Hypothesis 3 predicted differences among the groups for amounts budgeted on Plant Investment. Analysis of Variance indicated a strong significant difference among the groups, with a Hays' omega-squared of .495. Tables 63 through 65 summarize the findings for this hypothesis. While the DX treatment was higher than both DI and Consensus only at the significance level of a = .10 , DX, DI , and Consensus were all strongly significantly higher than the Control groups. There was little difference between DI and Consensus. Thus, this hypothesis was partially supported.

Hypothesis 4 predicted differences in Research and Development. Tables 66 through 68 show significant differences among the treatments. Analysis of Variance revealed a Hays' omega-squared of .572. T-tests showed that DX was significantly higher than all other treatments. In fact, with the exception that there was little difference between DI and Consensus for Research and Development, Hypothesis 4 was

Table 60 - Average Cost Per Unit($), All Treatments, Managers

Treatment	N	Mean	S.D.
DX	8	12.12	.148
DI	8	12.13	.187
CONS	8	12.13	.269
CTL	8	12.68	.204

Table 61 - Analysis Of Variance, Cost Per Unit, Managers

Source	Degrees of Freedom	Sum of Squares	Mean Square	F
Treatments	3	1.821	.607	12.423
Error	28	1.368	.049	
Total	31	3.189		a <.001

Table 62 - T-Values, Cost Per Unit, Managers

	t	significance
DX versus DI	0.00	no
DX versus CONS	-.086	no
DX versus CTL	-5.88	.005
DI versus CONS	-.081	no
DI versus CTL	-5.26	.01
CONS versus CTL	-4.32	.025

otherwise supported.

Attitudinal Hypotheses

Hypothesis 5 predicted differences in the perceived levels of satisfaction and desire to continue working with the group. Tables 69 through 71 summarize the findings for this hypothesis. Analysis of variance was significant between the treatments with a Hays' omega-square of .397. Although the Consensus treatment was not significantly different from either DX or DI, all three treatments were significantly higher for this variable than the Control groups. Also, DX was significantly higher than DI. Thus, Hypothesis 5 was partially supported.

Hypothesis 6 predicted differences in the perceived levels of critical re-evaluation of assumptions and recommendations among the groups. Tables 72 through 74 show significant differences between the groups for this variable. In the analysis of variance, Hays' omega-squared calculated at .558. While there was little significant difference between DX and DI and between Consensus and Control, both DX and DI were significantly higher than both Consensus and Control. Thus, Hypothesis 6 was partially supported.

Hypothesis 7 predicted differences in perceived levels of commitment to and acceptance of assumptions and recommendations. Findings are summarized in Tables 75 through

77.Analysis of Variance shows strong treatment differences for this dependent variable, as evidenced by a Hays' omega-squared

Table 63

Average Plant Investment($000), All Treatments, Managers

Treatment	N	Mean	S.D.
DX	8	421.8	166.6
DI	8	280.0	58.2
CONS	8	298.1	75.2
CTL	8	126.3	65.0

Table 64 - Analysis Of Variance, Plant Investment, Managers

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Value
Treatments	3	352690.8	117563.6	11.462
Error	28	287181.3	10256.5	
Total	31	639872.1		a <.001

Table 65 - T-Values, Plant Investment, Managers

	t	significance
DX versus DI	2.127	.10
DX versus CONS	1.791	.10
DX versus CTL	4.374	.025
DI versus CONS	-.504	no
DI versus CTL	4.662	.01
CONS versus CTL	4.574	.01

Table 66

Average Research and Development($000), All Treatments,Managers

Treatment	N	Mean	S.D.
DX	8	250.0	66.8
DI	8	193.8	54.7
CONS	8	163.1	55.0
CTL	8	73.1	30.9

Table 67

Analysis Of Variance, Research and Development, Managers

Source	Degrees of Freedom	Sum of Squares	Mean Square	F-Value
Treatments	3	131168.8	43722.92	15.287
Error	28	80081.3	2860.05	
Total	31	211250.1		a < .001

Table 68 - T-Values, Research and Development, Managers

	t	significance
DX versus DI	1.72	.10
DX versus CONS	2.66	.05
DX versus CTL	6.36	.001
DI versus CONS	1.04	no
DI versus CTL	5.08	.025
CONS versus CTL	3.78	.05

of .513. The significant differences belie the fact that all three experimental treatments - DX, DI, and Consensus - were all significantly higher than the Control groups for this variable. There was little significant difference between DX, DI, and Consensus. Thus, Hypothesis 7 was partially supported.

Discussion

Table 78 summarizes the findings of the managerial experiment. We note that, with the exception of profitability improvement, both dialectical-based GPSTs had significantly higher measures for every other dependent variable when compared to the Control Groups. There were two significant differences between DX and DI. First, DX had significantly higher amounts budgeted on Research and Development. Second, DX had higher levels of satisfaction than DI. We also note that, unlike previous results(Scwheiger 1989), there was no significant difference for satisfaction between Consensus and DI. In the next chapter we present a comparison of our three experiments.

Table 69
Satisfaction and Desire To Continue Working With Groups-Managers

Treatment	N	Mean	S.D.
DX	16	1.13	.33
DI	16	1.88	1.11
CONS	12	1.50	1.11
CTL	12	3.33	.94

Table 70
Analysis Of Variance
Satisfaction and Desire To Continue Working With Groups
Managers

Source	Degrees Of Freedom	Sum of Squares	Mean Square	F
Treatments	3	36.190	12.063	13.30
Error	52	47.167	.907	
Total	55	83.357		a < .001

Table 71
T-Values
Satisfaction and Desire To Continue Working With Groups
Managers

	t	significance
DX versus DI	-2.51	.05
DX versus CONS	-1.23	no
DX versus CTL	-8.36	.001
DI versus CONS	.852	no
DI versus CTL	-3.53	.025
CONS versus CTL	-4.17	.025

Table 72
Critical Evaluation of Assumptions and Recommendations - Managers

Treatment	N	Mean	S.D.
DX	16	1.31	.582
DI	16	1.88	.599
CONS	12	3.33	1.70
CTL	12	4.25	.722

Table 73
Analysis Of Variance
Critical Evaluation of Assumptions and Recommendations
Managers

Source	Degrees Of Freedom	Sum of Squares	Mean Square	F
Treatments	3	73.824	24.608	24.56
Error	52	52.104	1.002	
Total	55	125.928		a < .001

Table 74
T-Values
Critical Evaluation of Assumptions and Recommendations
Managers

	t	significance
DX versus DI	-2.62	no
DX versus CONS	-4.28	.05
DX versus CTL	-11.50	.001
DI versus CONS	-3.07	.05
DI versus CTL	-9.16	.01
CONS versus CTL	-1.67	no

Table 75
Commitment To and Acceptance Of Assumptions and Recommendations- Managers

Treatment	N	Mean	S.D.
DX	16	1.25	.433
DI	16	1.69	.982
CONS	12	1.92	1.11
CTL	12	3.75	.727

Table 76
Analysis Of Variance
Commitment To and Acceptance Of Assumptions and Recommendations - Managers

Source	Degrees Of Freedom	Sum of Squares	Mean Square	F-Value
Treatments	3	47.235	15.745	20.67
Error	52	39.604	.762	
Total	55	86.839		a < .001

Table 77
T-Values
Commitment To and Acceptance Of Assumptions and Recommendations - Managers

	t	significance
DX versus DI	-1.56	no
DX versus CONS	-2.11	.10
DX versus CTL	-10.98	.005
DI versus CONS	-.542	no
DI versus CTL	-5.92	.025
CONS versus CTL	-4.60	.025

Table 78
Summary Of Findings - Managerial Experiment

	Profit Improvement	Cost/Unit	R+D	Plant Investment
DX > DI	no	no	yes	no
DX > CONS	no	no	yes	no
DX > CTL	no	yes	yes	yes
DI > CONS	no	no	no	no
DI > CTL	no	yes	yes	yes
CONS > CTL	no	yes	yes	yes

	Critical Re-evaluation	Commitment
DX > DI	no	no
DX > CONS	yes	yes
DX > CTL	yes	yes
DI > CONS	yes	no
DI > CTL	yes	yes
CONS > CTL	no	yes

	Satisfaction
DX > DI	yes
DX > CONS	no
DX > CTL	yes
CONS > DI	no
CTL > DI	no
CONS > CTL	yes

COMPARISON OF THE THREE EXPERIMENTS

Hypothesis 1 - Profitability Improvement

The only support for this hypothesis was found in the undergraduate experiment. Both DX and DI outperformed the Consensus and Control treatments. Again, due to logistical considerations, both the MBAs and managers were limited to one full day of four periods of play; the undergraduates simulated twelve periods or three years. We believe that extended play would have uncovered significant differences in profitability improvement among the MBAs and managers. Nominal rankings in return on investment for the dialectical-based treatments in these groups indicated good positioning for profit improvement.

Hypothesis 2 - Cost/Unit

The DX treatment for the undergraduates was more cost efficient than DI, but not for the MBAs or managers. However, both DX and DI were more efficient in operations than the Control groups for both the undergraduates and managers. Consensus was more efficient than Control only in the managerial experiment. For the MBAs, no groups were significantly different in cost per unit.

Hypothesis 3 - Plant Investment

This measure of long-term positioning for plant capacity purposes met with mixed results. For the undergraduates, all treatments spent, on the average, similar amounts. The managers, however, generated almost exactly opposite results

from the MBAs. For example, DX had significantly higher plant investment than Consensus for the MBAs, but not for the managers. On the other hand, DI had higher plant investment than Consensus for the MBAs, but not for the managers. Finally, while there was no significant difference between the three experimental treatments and the Control groups for the MBAs, all three treatments for the managers outspent their respective Control groups.

Hypothesis 4 - Research and Development

The dialectical-based GPSTS in all three experiments significantly outspent Consensus and Control on Research and Development. We restate that, of all the group decisions in the Executive Game, Research and Development has by far the most far-reaching effect upon strategy. It affords product-price differentiation as the simulation proceeds. There was one exception in each of the MBA and managerial experiments. In the MBA experiment, there was no significant difference between Consensus and Control; in the managerial experiment, no significant difference between DI and Consensus. For both the MBAs an managers, DX significantly outspent the DI treatment for Research and Development. This did not occur in the undergraduate experiment, despite the fact that the undergraduates played twelve periods instead of four.

Hypothesis 5 - Satisfaction

Results of the questionnaires for both the MBAs and the managers vindicated earlier comments regarding the lack of any differences for the attitudinal hypotheses(5,6 and 7) in the undergraduate experiment. For the MBAs, there were two

significant differences: both DX and DI registered higher satisfaction with the decision-making process than Consensus. For the managers, DX had higher satisfaction than both DI and the Control group, but not higher than Consensus. For both the managers and the MBAs, Consensus did not lead to higher satisfaction than DI, as was found in other studies cited.

Hypothesis 6 - Critical Re-evaluation

Findings for the perceived amount of critical re-evaluation of assumptions and recommendations were identical for the MBAs and the managers. DX and DI perceived higher re-evaluation occurring than both the Consensus and Control groups in both experiments. Likewise, in both experiments, there was no significant difference between DX and DI, or between Consensus and Control.

Hypothesis 7 - Commitment

The only similarity between the MBAs and the managers for this variable was that there was no difference between DX and DI in both experiments. For the MBAs, there was no difference between DX and Consensus and Control; for the managers, DX had higher satisfaction than both Consensus and Control. For the MBAs, however, DI had higher satisfaction than Consensus; for the managers, there was no significant difference.

Discussion

We did not, in our experimental design, attempt to predict any relationships between the three sample experiments. This would be difficult if not impossible, since both the sample sizes and simulation duration differed among them. Nevertheless, the basic experimental structure was

identical. All started from the same position, all employed the same GPST treatments, and all generated dependent variable measures in the same way. Comparison affords interesting observations, however. For example, the undergraduates in their decision-making process seemed to have stressed operating cost per unit. For them, the higher the structured conflict, the more efficient the firm. This was not the case with either the MBAs or with the managers. Both the MBAs and the managers, perhaps due to their experience and training, recorded marked differences in those questionnaire items dealing with attitudinal perceptions. For the undergraduates, the GPST employed did not appear to affect differences in participant responses. Of the 42 propositions in the rank predictions of our seven tested hypotheses, the undergraduates, MBAs, and managers shared only 6 identical findings. The MBAs and the managers shared 24 identical findings. In total number of hypothesis supported overall in each experiment, the undergraduates had 13 of 42, the MBAs 14 of 42, and the managers 22 of 42.

Our first research question asked if there was a relationship between dialectical inquiry and other group problem solving technologies and effective strategic decision making. Our use of a computerized gaming simulation reflected our desire to replicate the pressures and complexities as much as possible in a laboratory setting. We used two types of dependent variable measures to address this question. First, performance-based measures in terms of profitability improvement and operating costs, and second, decision-based

measures in terms of two ongoing group decisions: Plant Investment and Research and Development. The data suggests that, for all three experiments, the group problem solving technologies did not affect performance. It is possible, of course, that pre-occupation with the second decision-type measures caused the groups to sacrifice short-term payoff for longer-term positioning. Furthermore, our empirical evidence seems to support this contention. Of the 24 possible propositions in the 2 hypotheses concerning the positioning decisions of Plant Investment and Research and Development, the dialectical-based GPSTs were significantly higher in 15 of them than both Consensus and Control. This supports our predictions that the structured argumentation component in both Dialectical Exchange and idealistic Dialectics is associated with a basic tenet of strategic planning: ongoing interest in the future direction of the organization. Overall, our results seem to suggest that the absence of a well-structured group decision-making process leads to poorer positioning than either DX, DI, or Consensus. While there were absolutely no directions given to these Control groups, direct observation, as well as the manipulation check questionnaires revealed no use of any systematic decision approach, let alone structured conflict.

The second research question inquired as to the relationship between DI and other group problem solving technologies and group members' perceptions of effective strategic decision making. Here, both DX and DI had higher attitudinal responses than both Consensus and Control for 16

of the 24 hypothetical propositions. For both the managers and MBAs, the dialectical-based GPSTs perceived higher levels of critical re-evaluation of assumptions and recommendations than either Consensus or Control. This is consistent with other findings already cited. For the perceptions concerning Commitment and Satisfaction, however, results were mixed. Embedded in the attitudinal results may lie an unexpected anomaly. The undergraduates, relatively free of past working experience, spent a total of approximately 14 weeks working with their group on the simulation. No significant differences were found among any of their GPSTs for the attitudinal measures. The managers and MBAs, however, spent approximately 7 hours in a single day working with their randomly assigned teams. Their responses generated a number of already cited attitudinal differences. We offer two possible explanations. First, the duration of time may breed familiarity which generates similar attitudinal perceptions regardless of the the GPST employed. This , we believe, is fertile ground for future research. Second, the more experienced managers and MBAs could have transferred current organizational frustrations to the experiment, or worse, act in a way in which they are not expected to in a more punitive decision environment. The teams were terminal, with no lingering regrets concerning argumentation. Despite these concerns, we feel that a significant finding rests in the fact that the dialectical-based GPSTs for both the managers and MBAs perceived higher quality re-evaluation, and thus thinking, of both assumptions and recommendations.

Our third research question asked if the traditional idealistic dialectical inquiry of Mason and Mitroff could e improved upon. Our Dialectical Exchange Problem Solving Technology outperformed DI in 4 of 21 propositions. For the most part, DX was as good as DI. However, in our earlier criticism of the deficiencies of traditional DI, we stressed its applicability in real, ongoing corporate environments. We not that, for the manager participants in our experiments, DX had higher perceived levels of satisfaction than DI. If experienced managers can feel comfortable with arguing their opponents' position, then we feel DX holds much promise for extended research.

Our research can be improved along several dimensions. First, the sample size of the managers needs to be increased. We were indeed fortunate to obtain 28 managers willing to devote half of their weekend to experimental participation. Ideally, several planning teams from different organizations would be required to effectively expand our research design. It would be difficult at best obtaining participating organizations which would be willing to be observed for times approximating the simulated play of a computer simulation. Alternately, managers can be obtained to participate in a number of sessions spanning several days. Unless they were willing to sacrifice many weekends, it would be difficult in obtaining a sizable number on company time.

Second, other computer-based simulations could be tested using our basic research design. Only two of our dependent variable measures - profitability improvement and operating

cost- were computer generated. Perhaps more sophisticated models using personal computers and spreadsheet analysis could be examined for their role in GPST effectiveness.

Third, experimenter support personnel and overall logistics limited our attitudinal data gathering to the completion of a simulation-end questionnaire. More ambitious studies could employ longitudinal videotaping and interviews to correlate perceptions with GPSTs.

Finally, we believe that Dialectical Exchange holds great promise as a methodology providing unbiased, non-parochial argumentation into the strategic planning process. Walls rumble between entire societies as their members begin to perceive their so-called opponent's situation. Wars are avoided through systematic exchange of information to reach a common goal; the captains of industry can benefit from this lesson.

DIALECTICAL EXCHANGE AND CONFLICT MANAGEMENT

We earlier stated that, as researchers, we are constantly confronted with the dilemma that structured conflict improves decision quality while simultaneously eroding the group's ability to function. Our results are comparable to those experiments and field studies earlier cited. Schweiger and Sandberg(1989), Chanin(1980), Mitroff and Emshoff(1979), and Cosier(1982) all found that those decision-making groups using a conflict-based problem-solving technology fared better in terms of performance than those who did not. In the present study's three experiments - undergraduates, MBAs, and managers - overall the dialectical-based groups outperformed the consensus and control groups. We had hoped, of course, that our new Dialectical Exchange GPST would outperform idealistic DI, but it did not. We did, however, attempt to gather information regarding the level of conflict that existed in the groups during the experiments. Because both the MBAs and the managers simulated only one year of decision-making(1 day-long session each), we concentrated on the undergraduates who simulated three years across fifteen weeks. In addition, the undergraduates afforded a larger sample size amenable to parametric statistical analysis. Before presenting our methodology and findings, however, a discussion of conflict is warranted.

Chanin and Lirtzman(1989), citing Davis(1951), Gulick and

Urwick(1937), Taylor(1937), Argyris(1964), and McGregor(1960), pointed out that traditional approaches to conflict portrayed it as "an undesirable, detrimental and internally destructive process in organizations(p.1)". Chanin and Lirtzman(1989) redefined conflict as " a natural phenomenon involving individual perceptions of a dialectical process between two or more interacting parties with incompatible goals, ideas, values, behaviors..(p.12)." They further stated that conflict matures, based upon the interaction of opposites(the dialectical contradiction), along a multistage continuum(p.12):

1. Dissonance - a state of conflict in which there is a lack of agreement, incongruity or discrepancy between opposites in a particular entity.
2. Divergence - a state of conflict when opposites are drawing apart and there exists a difference between them in form, character or opinion.
3. Disagreement - an act or an instance of disagreeing, or a state of being in disparity.
4. Confrontation - an act of meeting opposition and hostility.
5. Antagonism - an act of the highest expression of conflict, hostility, open aggression and enmity through destructive activities.

While we have earlier established that dialectical-based GPSTs by their nature function and thrive on contradiction, we believe that the exchange component of DX elevates the nature

of conflict beyond the continuum suggested by Chanin and Lirtzman. We have already shown that in terms of decision performance, there was no statistical difference between DX and DI. What is needed therefore, is an empirical measure of conflict among the groups. While traditional DI bristles with competition and contradiction, we believe that DX elevates provincial debate to pandemic argumentation, where the needs of the many outweigh the needs of the few.

Our primary research questions, as earlier stated, did not directly include conflict as a scientific inquiry component. In the belief that experiments should provide as much primary data as possible, and building upon the work of Chanin(1980), we administered to the undergraduates at the end of their simulation the Thomas-Kilmann(1978) Conflict-Handling Behavior Modes Instrument(see Appendix II). The instrument consists of thirty pairs of forced-choice statements which categorize the respondent into varying strengths of five modes, as elaborated by Chanin(1980):

1. Competing - identified with forcing and power-oriented behavior; a desire to achieve a favorable result at the expense of the other in a win-lose situation.
2. Collaborating - an individual's desire to find an integrative approach which will satisfy all parties; it involves confrontation and clarification i the existing differences and finding a mutually beneficial outcome.
3. Compromising - sharing and bargaining; it seeks moderate but incomplete satisfaction to find the

middle ground.

4. Avoiding - the avoidance of unpleasantness; postponement of the solution by withdrawal from the conflict.
5. Accommodating - smoothing or appeasement; the individual tries to satisfy the concerns of other individuals without paying attention to his own.

Reliability checks for internal consistency across our administration for all five modes are presented in Table 79. Cronbach's alpha(1951) compares favorably(mean = .5) to Lawrence-Lorsch(1967),Hall(1969), Thomas-Kilmann(1978), and Chanin(1980). Table 80 shows means, standard deviations, and preference ranks for the five modes across our four undergraduate experimental GPSTs. Interestingly, DX and DI lay on opposite ends of the preference rank for Competing. For DX, Competing was the least preferred, and for DI it was the most preferred. Furthermore, both DX and DI, despite this intriguing disparity, had no significant performance differences throughout the entire simulation. Table 81, reporting analysis of variance within groups between modes, shows that individuals were able to distinguish between the five modes in reporting their contribution to the group's decision climate. Further analysis of the t-values between the means of the undergraduate groups as reported in Table 82 reveals that DX was very significantly lower in the Competing mode than DI, and significantly higher than DI for both the Collaborating and Compromising modes.

Table 79

Internal Consistencies- Cronbach's Alpha

Conflict-Handling Behavior Mode	Lawrence-Lorsch(1967)	Hall (1969)	Thomas-Kilmann(1974)		Simko (1991)
	Results of Thomas-Kilmann(1978)		Chanin(1980)		
	(n=86)		(n=188)		(n=90)
Competing	.37	.61	.71	.59	.58
Collaborating	.40	.73	.65	.65	.57
Compromising	.46	.45	.58	.67	.63
Avoiding	.45	.39	.62	.41	.74
Accommodating	.59	.57	.43	.66	.52
Mean	.45	.55	.60	.60	.61

Note: Cronbach(1951) accepts an alpha coefficient of .50 as demonstrating sufficient internal consistency of an instrument.

Buttressed with these results, we sought to account for two apparent divergent conflict climates achieving the same performance. We wondered if there empirical evidence existed to show more detailed support of actual lower conflict in our new dialectical-based approach. More importantly, did the level of conflict change across the simulation?

The information we needed to answer these questions was to be found in our operationalization of both DX and DI. As reported in Chapter 5, both dialectical-based groups submitted three decision forms : two showing the initial subgroup positions before dialectical debate, and one reporting the final decision to be submitted for the simulation. We believe that the mean absolute deviation between the subgroups in both DX and DI is a reasonable surrogate measure for the intensity of conflict in the groups. Clearly, the closer the initial positions, the less debate or conflict needed for resolution. We are cautious to remind ourselves that we would expect DI to maintain a high level of initial contradiction throughout the experiment, since their instructions were to negate initial submitted plans, keeping with the Hegelian "deadly enemy" philosophy. Indeed, results of the Thomas-Kilmann Conflict Mode instrument revealed that the Competing mode was significantly the most preferred behavior for the traditional DI groups. We considered examining the final decision recommendations made by both dialectical-based groups, but rejected this idea since decision changes and orientations from period to period will reflect reactions to

Table 80

Group Problem-Solving Technologies

Modes	Total n =90		DX n=23		DI n=24		Cons n=22		Ctl n=21	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Competing	5.10 (2.96)	4	4.08 (2.60)	5	8.29 (2.65)	1	4.31 (1.79)	4	3.38 (1.55)	5
Collaborating	6.66 (2.01)	2	7.65 (1.94)	2	6.41 (2.05)	3	6.45 (1.69)	3	6.09 (1.97)	3
Compromising	8.20 (2.05)	1	8.78 (1.79)	1	6.75 (1.85)	2	9.22 (1.20)	1	8.14 (2.27)	1
Avoiding	4.74 (2.27)	5	5.13 (2.38)	3	4.79 (1.93)	4	3.36 (1.69)	5	5.76 (2.34)	4
Accomodating	5.26 (2.55)	3	4.34 (2.19)	4	3.83 (2.28)	5	6.50 (2.38)	2	6.61 (1.98)	2

Table 81

Analysis of Variance In Treatments

	Variation	Sum of Squares	d.f.	Mean Sum of Squares
DX	Explained	405.217	4	101.304
	Unexplained	558.783	110	5.08
	Total	964	114	F = 19.942
DI	Explained	291.383	4	72.846
	Unexplained	568.583	115	4.944
	Total	859.966	119	F = 14.734
CON	Explained	454.237	4	113.559
	Unexplained	354.682	105	3.378
	Total	808.919	109	F = 33.618
CTL	Explained	249.905	4	62.476
	Unexplained	440.095	100	4.401
	Total	690	104	F = 14.196

changing external environmental conditions. While this reaction probably will still be present in the initial subgroup plans, the difference in these initial decisions no doubt tempers the intensity of the conflict prior to the final decision being reached. Furthermore, since DX exchanges initial positions of the subgroups, the mean absolute deviation of the initial differences is a valid measure of the level of anticipatory thinking required of DX. A reduction, therefore, in the level of conflict over time will indicate that DX is working towards its goal: decision integrity and objectivity with a reduction in competitive conflict.

Since our earlier statistical analysis addressed the long-term strategic decisions of plant investment and research and development, and since we found no significant differences in these decisions between DX and DI, we focused our conflict inquiry on these two decisions. The Consensus and Control groups did not employ subgroup decision forms, and, since their Thomas-Kilmann Mode scores reflected low conflict(supported by our earlier manipulation checks), they were not compared to DI and DX.

For each year, for both DX and DI, we calculated the mean absolute deviation for plant investment and research and development. Table 82 shows that for both decisions, this deviation between the subgroups' initial positions significantly decreases for DX throughout the three years of simulated time, while DI more or less remains constant. T-tests, also reported in Table 82, reveal that DX was significantly lower in initial subgroups positions than DI for

both decision types at the end of the simulation. We conclude, therefore, that although the actual decisions did not differ significantly for DX and DI, the level of conflict was reduced in DX as compared to DI. Furthermore, as supported by the Thomas-Kilmann mode instrument, the conflict in the DX was non-competitive while the conflict in DI was highly competitive, and it apparently remained at those levels.

For the MBA and Managerial experiments presented earlier, the subgroup deviations are reported in Table 83. Since only one year was simulated, means and standard deviations are reported for each of the four periods. Comparison of the means for each decision separately by period was precluded by the fact that only two groups per treatment were used due to the smaller sample size compared to the undergraduates. To examine any reduction levels, however, and to employ parametric statistical analysis, we combined the deviations for both decisions. Decision type deviations were paired consistently: plant investment with plant investment, and research and development with its counterpart. These data were then combined to increase sample size and invoke parametric analysis. Table 83 reveals that there was significant conflict reduction for DX versus DI in the MBA experiment. While there appeared to be the beginnings of conflict reduction in the Managerial experiment at the end of the simulated year, there was no significant statistical difference between DX and DI. We speculate that the managers, more experienced in corporate decision making, may require

Table 82

Mean Absolute Deviation of Initial Subgroup Position

($000)

Plant Investment	Year 1	Year 2	Year 3
DX	59.95	34.79	20.83
	(89.08)	(50.99)	(21.04)
DI	87.87	93.95	89.79
	(58.69)	(96.30)	(53.57)
t-values DX versus DI	-1.257	-2.604 a<.01	-5.746 a<.001
Research and Development			
DX	27.21	27.91	5.41
	(21.11)	(21.88)	(4.98)
DI	50.66	43.75	54.37
	(38.60)	(43.85)	(32.25)
t-values DX versus DI	-2.55 a<.01	-2.04 a<.05	-7.19 a<.001

more time to build the objectivity required of DX. On the other hand, the data analysis for both the MBAs and the Managers reflect only one year of simulated time, so we are cautious to draw firm conclusions. Nevertheless, the MBA results concur with those of the undergraduates. Since the MBA and Managerial experiments lasted one day, the Thomas-Kilmann Mode instrument was not administered. We felt that the short time period would not be sufficient to generate meaningful conflict perceptions.

Our follow-up investigation of GPST effects upon conflict in the groups reveals encouraging results. Table 84 reports t-tests between mean scores on the Thomas-Kilman mode instrument for all experimental groups. There are key differences between the conflict based GPSTs(DX and DI) and non-conflict based GPSTs(Consensus and Control), especially in competing, collaborating, and accommodating. We recognize the limitations of post-experimental analytical techniques. However, the use of measuring post-hoc perceptions of conflict modes can be defended on the grounds that there are no instruments currently available that measure the on-going level of conflict in group decision-making. Moreover, even if such instruments existed, ongoing experimental measurement of conflict would be a formidable task since the dialectical process constantly evolves in the groups.

Table 83

Mean Absolute Deviations of Initial Subgroup Positions
Combined Decisions
($000)

		Period			
MBAs		1	2	3	4
	DX	56.25 (10.82)	62.5 (51.53)	6.25 (10.82)	6.25 (10.82)
	DI	46.0 (31.39)	80.0 (56.74)	62.5 (27.04)	58.0 (23.60)
	t-values DX versus DI	.535	-.395	-3.34 a<.01	-3.42 a<.01
Managers					
	DX	51.25 (29.65)	25.0 (30.61)	62.5 (41.45)	21.25 (24.59)
	DI	61.5 (22.28)	37.5 (41.45)	15.75 (20.10)	56.25 (36.97)
	t-values DX versus DI	-.479	-.420	1.758	-1.365

To summarize, we have shown that:

1. Conflict based GPSTs have outperformed non-conflict based GPSTs.
2. A moderate level of conflict enriches strategic decision-making and is desirable in the planning process.
3. DX has achieved performance similar to DI with less conflict.
4. DI is useful in stimulating conflict, but when it becomes a violent confrontation, DX can be used as a special tool to deal with conflict at its highest level.

We believe, based on the foregoing analysis, that DX has penetrated the frontier of a new type of conflict, a conflict based on open-mindedness and objectivity of perception. This conflict transcends the parochial, interest-based confrontational debates of the Hegelian "deadly enemies". We have seen that DX has yielded performance similar in quality to DI, and it has achieved this with a decreasing level of confrontation. We thus introduce a new type of conflict called meta-conflict, defined as decisional argumentation conducted by two or more persons yielding their parochial positions for the overall purpose of attaining objectivity. We view meta-conflict as an important potential tool for the strategic management process. Its potential for injecting unbiased, objective analysis into the study of relevant internal corporate issues and key external environmental threats and opportunities appears unlimited. The next step, of course,

requires more elaborate and extended field testing in the corporate environment. Management cultures, climates, and sacred cows die hard. But, as Fredrick W. Taylor stated:

> After managers and workers come to see that when they stop pulling against one another, and instead both turn and push shoulder to shoulder in the same direction...this..is the beginning of the great mental
>
> revolution which constitutes the first step towards scientific management.

Meta-conflict affords strategic planing teams the same opportunity to take that first step.

Table 84

T-Values Between Means of Experimental Groups

Mode	DX/DI	DX/CONS	DX/CTL	DI/CONS	DI/CTL	CONS/CTL
Competing	-5.377 ***	-0.336	1.047	5.785 ***	7.281 ***	1.775
Collaborating	2.082 *	2.159 *	2.584 **	-0.070	0.520	0.629
Compromising	3.738 **	-0.943	1.019	-5.203 ***	-2.211 *	1.916 *
Avoiding	0.527	2.801 **	-0.864	2.605 **	-1.489	-3.777 **
Accommodating	0.765	-3.099 **	-3.512 **	-3.800 **	-4.239 ***	-0.160

Legend:
* $p < .05$
** $p < .01$
*** $p < .001$

CHAPTER SIX- APPLICATIONS OF DIALECTICAL EXCHANGE TO INDUSTRIAL RELATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Our experimental results have shown that Dialectical Exchange is capable of reducing conflict in decision-making groups. A more ambitious claim views DX as a tool for managing conflict. Certainly, such a claim should be tested in a carefully designed experiment within a specific context. While it is beyond this dissertation to actually test DX in a given discipline, we can nevertheless discuss a possible application in the field of Industrial Relations, specifically to collective bargaining.

Strategies for mediation of disputes in labor-management relations have traditionally involved the use of third-party intervention in the discussion process. Waters(1991) offers the following as the most common dispute resolution methods:

1. **Negotiation** - the parties to a dispute engage in back and forth discussions designed to reach agreement.
2. **Conciliation** - a third party seeks to bring disputing parties to agreement by lowering tensions, improving communications, exploring possible solutions, and providing technical assistance.
3. **Facilitation** - a third party plays no substantive role but provides information on process as parties with various viewpoints seek to collaborate on reaching a goal or completing a task.
4. **Mediation** - a third party, skilled in identifying areas of agreement, assists disputants in discussing their

differences and reaching a mutually satisfactory settlement.

5. **Arbitration** - a third party hears all sides of a dispute, reviews the evidence, and issues a decision that is meant to settle the dispute.

All management-labor contract discussions begin with negotiation, and ironically most end with bitter confrontation as the "deadly enemies" suffer dialectical deadlock. The remaining dispute resolution methods - Conciliation, Facilitation, Mediation and Arbitration all involve the active involvement of a third party. Kolb and Rubin(1989) stated that

> the ways potential third parties diagnose conflicts and organize their intervention depend upon social position in the organization, the organizational resources they can mobilize, the power they have to resolve disputes and the kind of outcomes they envision.(p.4)

Dialectical Exchange "cuts out the middleman" by providing both management and labor with a tool to be used to settle disputes before impasses occur. Moreover, it can accomplish its task while providing control over the bargaining process to the players involved. For example, Kolb and Rubin(1989) stated that managers do not generally use mediators because they are reluctant to give up control over decisions for which they are held accountable. In collective bargaining, the stakes are high: wages, benefits, working conditions, and the ever-present threat of work slowdown or a strike. We are convinced that DX can be useful prior to the introduction of third-party conflict intervention. The challenge is selling

DX to both management and labor in light of its radical departure from standard negotiating behavior.

Our experiments utilized strategic planning team dynamics to test the impact of dialectical processes upon decision making. Planning efforts at least reflect supposedly common goals in their commitment to organizational growth. Management/labor thinking does not necessarily enjoy this luxury. Long-standing, hard-bargained positions die hard. Thus, if the introduction of Dialectical Exchange is to have any chance of succeeding, it must do so in an environment that is willing to try "one more idea" before the introduction of a third party mediator.

We believe that both parties in an industrial relations setting must first be convinced of the power of DX to reduce destructive conflict while maintaining decision quality. To achieve this, we must lead them through an experiential exercise designed to acquaint them with DX in a context that demonstrates its capabilities in a simple, yet non-threatening way.

Initially, the generation of a "deadly enemy" thesis/antithesis should be avoided. At the point in the collective bargaining negotiations where DX would be introduced, we would expect that some type of confrontational debate would have already occurred, yielding little constructive discussion. Thus, we believe that DX should be introduced in a context far divorced from any of the contested issues at hand. Our earlier experimental treatment for DX required participants to initially generate a plan, complete

with its underlying assumptions. In a collective bargaining environment, time is of the essence, so we want to expedite the process by entering directly into the debating component, for two reasons. First, both management and labor will have achieved by this point a momentum of argumentation, and this can be continued in the DX debate. Second, the debating segment of DX maximizes individual participation. We do not, at this point, want people to listen passively to lecture on conflict resolution. Active generation of ideas and assumptions provides proactive involvement for persons motivated to negotiate.

We propose three alternative strategies for conducting the initial exercise:

1. The presentation of a list of statement/ideas by the DX facilitator from which the entire negotiating team can choose for use in the introductory exercise.
2. Solicitation from the group by the DX facilitator of a mutual interest topic for exchange and debate.
3. Issuance by the DX facilitator of a topic for exchange and debate.

The first alternative has the advantage of allowing some common interest to emerge, which may yield greater interest than a topic imposed by the DX facilitator. Administrative instructions for the first approach would be as follows:

A. Present to both management and labor a list of several statement on debatable issues(see Figure 12 for examples). Topics should avoid personality and experiential bias such as religion, race, class, sex, and politics at this point to

avoid destructive confrontation. The topics should, however, reflect possible affirmative and negative positions. Ask the participants to rank order the statements in preference of interest(1 = highest). Also, they should indicate agreement/disagreement with the statements. A sample form is presented in Figure 12.

B. Search for agreement and disagreement on a common topic, preferably in the top-half ranked topics.

C. Present the topic selected to the teams and allow each side a few minutes to orally state their position regarding the chosen topic.

D. Have the teams exchange positions, and allow a short time for debate presentation.

E. Conduct the debate through either a Lincoln-Douglas Affirmative/Negative rebuttal, or through informal cross-examination.

F. After the debate, conduct a short debriefing focusing on final positions, assumptions, and arguments. Do not declare a winner or a loser.

Do not reveal prior to the debate that both sides will exchange positions, in order to capitalize on the novelty of DX in the collective bargaining context. The follow-up discussion should emphasize how assuming another's viewpoint can uncover both strengths and weaknesses of one's own position.

After the debriefing, both groups can be solicited for a

TABLE 85

EXAMPLES OF DEBATABLE ISSUES

	Rank	Yes or No?
Is space exploration justified?	___	___
Should professional sports figures be paid high salaries?	___	___
Should smoking be banned in public?	___	___
Should the 55 mph speed limit be lifted?	___	___
Are video games harmful to children?	___	___

negotiable item, for example some benefit or other working condition on which to repeat the DX procedure. The success of this exercise will in turn determine both teams' willingness to conduct a fully developed Dialectical Exchange GPST.

The second and third approaches are simple variations on the first. The facilitator should assess the participants for their preferences for the three approaches, either through direct observation in the negotiations if possible, or through administration of the Thomas-Kilmann Conflict Mode instrument earlier discussed. We believe that, in order to preserve the ability of the DX facilitator to project an unbiased position in the DX proceedings, he should not be an active participant in the "icebreaking" DX exercise. The main objective of the initial exercise is for both parties to reach understanding of each other's positions. If this can be achieved, further deliberations in the negotiation process can transform confrontation into compromise. Fisher and Ury(1981) stated that

> The ability to see the situation as the other side sees it, as difficult as it may be, is one of the most important skills a negotiator can possess. It is not enough to know that they see things differently. If you want to influence them, you also need to understand empathetically the power of their point of view and to feel the emotional force with which they believe in it(p.24)

We note that, if successful, DX can be used in future collective bargaining sessions without the use of a facilitator.

SUGGESTIONS FOR FURTHER RESEARCH

Collective Bargaining is just one of several potential application arenas for DX to be explored as a conflict-reducing tool. Political forums, leadership team training, and even legal plea bargaining can serve as settings to test DX. College level courses in critical discourse and argumentation can also benefit from DX as a learning tool. We offer the following suggestions for future research on DX:

1. Real, ongoing organizations should be incorporated into the studies to provide an environment rich in social dynamics and culture. The climate of an experiment, no matter how well designed, is no substitute for a real organization.
2. Studies of longer duration should be attempted in order to uncover team dynamics. People involved in finite relationships may be influenced by the fact that group termination is shortly forthcoming.
3. Computer simulation approaches should be compared with other, non-computerized methods in testing GPSts. People respond to computers in varying ways, even in our so-called age of information processing.
4. Non-business participants should be incorporated into experimentation from other fields in order to increase the legitimacy of DX as a conflict-reducing tool.

Dialectical Materialism(DM) as introduced by Chanin(1980) also may provide a new direction for future extension of our

research. DM, if incorporated with DX, can provide the "anchor" for dialectical debate in that real, tangible outcomes can be integrated into the final shape of the decisions reached. For example, the Chief Financial Officer's pre-occupation with the bottom line and immediate results can be confronted by the Marketing Director's need for longer-term strategic market positioning. In a possible experimental structure, planning team subgroups could use separate approaches - both DM and DX - to reach a final synthesis of the problem at hand. Such an approach could be thought of as a hybrid DMDX-GPST to capture both materialistic and philosophical components of the Dialectical process. Alternately, there are numerous variations in the experimental design that may provide new insights into how GPSTs affect decision outcomes. For example, groups can use different GPSTs at different points in the simulation to perhaps experience a wider range of conflict dynamics. Thus, GPST variation may affect satisfaction, commitment, and the quality of the assumption re-evaluation process.

In addition, we are concerned about experimenter effects. Our enthusiasm both in conducting the experiments, as well as our subconscious subscription to Dialectical Thinking may have influenced the groups' motivation to use the approach. While we did take measures to prevent this by spending equal time with all groups, it is impossible to eliminate the effect entirely.

Finally, it is highly desirable to test different experimental groups along similar time dimensions. Both the

managers and the MBAs would have experienced maturation of the dialectical processes had their exposure to the simulation been extended by several weeks. On-site visitation and experimentation is difficult, but future experiments can logistically provide an environment of longer duration.

We realize that DX is not for everyone. It is very difficult for everyone to yield their entrenched position for the sake of common benefit and understanding. Often, strategic plans are executed at the direction of a single visionary decision maker. Yet, we call to mind the words of William Penn(1693):

> Truth often suffers more by the heat of its defenders, than from the arguments of its opposers.

APPENDIX I

MANIPULATION CHECK QUESTIONNAIRE

Name:_____ Team Code:_____

Please answer the following questions as objectively as you can. Try to answer from the viewpoint of your group's operations over the entire planning period of the simulation. This questionnaire does not affect your grade in any way. Please circle your response.

Key: SA = Strongly Agree A = Agree U = Undecided
D = Disagree SD = Strongly Disagree

	SA	A	U	D	SD
1. The two subgroups initially developed a set of recommendations based on opposite sets of assumptions	1	2	3	4	5
2. On the basis of a debate over two sets of opposing assumptions developed by each subgroup, the group developed a pool of valid assumptions and based its recommendations on these assumptions.	1	2	3	4	5
3. One subgroup initially developed a set of recommendations followed by a formal critique of it by a second subgroup.	1	2	3	4	5
4. The group's final set of recommendations was based on the outcomes of a formal critique by one subgroup of the initial recommendations of the other subgroup.	1	2	3	4	5
5. During the group meeting only, members of the gorup individually presented their personal recommendations and asusmptions	1	2	3	4	5
6. The group's final set of recommendations was the combined, but not necessarily the average, outcome of members' individual contributions	1	2	3	4	5

	SA	A	U	D	SD
7. I would be willing to work with this group on other projects in the future.	1	2	3	4	5
8. Working with my group was an enjoyable experience.	1	2	3	4	5
9. The group decision process made the group critically re-evaluate the validity of the assumptions and recommendations that were made in the initial stages of discussion	1	2	3	4	5
10. The group decision process uncovered valid recommendations and assumptions that were not considered in the initial stages of discussion.	1	2	3	4	5
11. I am committed to my group's recommendations and assumptions.	1	2	3	4	5
12. I am satisfied with my group's recommendations and assumptions.	1	2	3	4	5

References

Ackoff, R. 1967. Management Misinformation Systems. Management Science 14.

Affisco, J.F., & Chanin, M. N. 1989. The Impact of Decision Support Systems on the Effectiveness of Small Group Decisions - An Exploratory Study. In T. Pray & J. Wingender(Eds.)Developments in Business Simulation and Experiential Exercises. Stillwater, OK: Association for Business Simulation and Experiential Learning, 132-135.

Affisco, J. F., & Chanin, M. N. 1990. The Impact of Decision Support Systems on the Effectiveness of Small Group Decisions - Revisited. In J. Wingender & W. Wheatley(Eds.) Developments in Business Simulation and Experiential Exercises. Stillwater, OK: Association for Business Simulation and Learning, 1-5.

Ansoff, H. I. 1965. Corporate Strategy. New York: McGraw-Hill Book Co., Inc.

Argyris, C. 1966. Interpersonal Barriers to Decision Making. Harvard Business Review, 44 , 84 - 97.

Barlett, J. 1955. Familiar Quotations. Boston: Little, Brown & Co.

Bateson, R. 1958. Naven: A Survey of the Problems Suggested By a Composite Picture of the Culture of a New Guinea Tribe Drawn From Three Points of View. Stanford, CA: Stanford University Press.

Belohlav, J., & Sussman, L. 1983. Environmental Scanning and Dialectical Inquiry. Managerial Planning, 32(2) : 46-49.

Benson, J.K. 1977. Organizations: A Dialectical View. Administrative Science Quarterly, 22: 1-21.

Berstein, R.J. 1977. Why Hegel Now? The Review of Metaphysics, 31: 29-60.

Bettenhausen, K., & Murningham, J.K. 1985. The Emergence of Norms In Competitive Decision-Making Groups. Administrative Science Quarterly, 30(3), 350-372.

Bitzer, L. 1974. Aristotle's Enthymeme Revisted. In K.V. Erickson(Ed.) Aristotle: The Classical Heritage of Rhetoric. Metuchen, NJ: Scarecrow.

Bottger, P.C., & Yetton,P.W. 1988. An Integration of Process and Decision Scheme Explanations of Group Problem Solving Performance. Organizational Behavior and Human Decision Processes, 42, 234-250.

Brehmer, B. 1976. Social Judgement Theory and the Analysis of Interpersonal Conflict. Psychological Bulletin, 83: 985-1003.

Bresser, R.K., & Bishop, R.C. 1983. Dysfunctional Effects of Formal Planning: Two Theoretical Explanations. Academy of Management Review, 8: 588-599.

Brunswik, E. 1955. Representative Design an Probabilistic Theory in a Functional Psychology. Psychological Review, 63(3): 193-217.

Chanin, M. N., & Shapiro, H.J. 1979. Towards a Dialectical Theory of Strategic Planning. Proceedings, 11th Annual Meeting of the American Institute for Decision Sciences, New Orleans, LA, November 19-21: 232-234.

Chanin, M.N. 1980. An Empirical Study of Problem-Solving Technologies and Conflict-Handling Behavior Modes. Unpublished Doctoral Dissertation, City University of New York.

Chanin, M.N., and Lirtzman, S.I 1989. Conflict and Conflict Management:A Dialectical Extension. Unpublished manuscript, Baruch College, City University of New York.

Chanin, M.N., and Shapiro, H.J. 1982a. Dialectical Empiricism: A Synthesis? Unpublished Manuscript, Baruch College, City University of New York.

Chanin, M.N., and Shapiro, H.J. 1982b. Comparison of Problem-Sovling Technologies: A Free Simulation Approach. In D.J. Fritzsche and L.A. Graf(Eds.) Developments In Business Simulation and Experiential Exercises, Normal IL: Association For Business Simulation and Experiential Learning, 236-239.

Chanin, M.N., & Shapiro, H.J. 1984. A Comparison of Dialectical and Devil's Advocate Problem-Solving. Asia-Pacific Journal of Management, 1(3): 159-170.

Chanin, M.N., & Shapiro, H.J. 1985. Dialectical Inquiry in Strategic Planning: Extending the Boundaries. Academy of Management Review, 10(4): 663-675.

Churchman, C.W. 1966. Hegelian Inquiring Systems. Internal Working Paper No. 49, University of California, Berkeley, Space Sciences Laboratory, Social Sciences Project.
Churchman, C.W. 1971. The Design of Inquiring Systems: Basic Concepts of Systems and Organization. New York: Basic Book Publishers.

Clark, R.A., & Delia, J.G. 1979. Topoi and Rhetorical Competence. Quarterly Journal of Speech, 65:187-206.

Cooper, M.R. 1974. Effects of Member Participation and Commitment in Group Decision Making on Influence, Satisfaction, and Decision Riskiness. Journal of Applied Psychology, 59(2): 127-134.

Cosier, R.A. 1978. The Effects of Three Potential Aids for Making Strategic Decisions on Prediction Accuracy. Organizational Behavior and Human Performance, 22: 295-306.

Cosier, R.A., & Aplin, J.C. 1978. An Evaluation of the Effectiveness of Dialectical Inquiry Systems. Management Science, 24: 1483-1490.

Cosier, R.A. 1980. Inquiry Method, Goal Difficulty, and Context Effects on Performance. Decision Sciences, 11: 1-16.

Cosier, R.A., and Aplin, J.C. 1980. A Critical View of Dialectical Inquiry As a Tool in Strategic Planning. Strategic Management Journal, 1(4): 343-356.

Cosier, R.A. 1981a. Dialectical Inquiry in Strategic Planning: A Case of Premature Acceptance? Academy of Management Review, 6: 643-654.

Cosier, R.A. 1981b. Further Thoughts on Dialectical Inquiry: A Rejoinder to Mason and Mitroff. Academy of Management Review, 6: 653-654.

Cosier, R.A. 1982. Methods For Improving the Strategic Decision: Dialectic Versus the Devil's Adovcate. Strategic Management Journal, 13: 373-374.

Cosier, R.A. 1983. Approaches For the Experimental Examination of the Dialectic. Strategic Management Journal, 4(1): 79-84.

Cosier, R.A. & Rechner, P.L. 1985. Inquiry Method Effects on Performance in a Simulated Business Environment. Organizational Behavior and Human Decision Processes, 36(10): 79-95.

Cronbach, L.J. 1951. Coefficient Alpha and the Internal Structure of Tests. Psycho Metrika, 16, 297-334.

Curran, K.E., & Hornaday, R.W. 1990. Formal Planning and Simulation Team Performance: A Cross Sectional Approach. In J. Wingender and W. Wheatley(Eds.) Developments in Business Simulation and Experiential Exercises. Stillwater OK: Association For Business Simulation and Experiential Learning, 38-41.

Dalkey N., & Helmer, O. 1963. An Experimental Application to the Delphi Method to the Use of Experts. Management Science 9, 458-67.

Delbecq, A.L., & Van De Ven, A. 1974. The Effectiveness of Nominal, Delphi, and Interacting Group Decision-Making Processes. Academy of Management Journal, 17: 605-621.

DeSanctis, G.,& Gallupe, R.B. 1987. A Foundation For the Study of Group Decision Support Systems. Management Science, 33: 589-610.

Dipboye, R.L.,& Flanagan, M.F. 1979. Are Findings in the Field More Generalizable Than in the Laboratory? American Psychologist, 34(2): 141-150.

Donahue, W.A., Hawes,L.C.,& Mabee, T. 1986. Testing A Structural-Functional Model of Group Decision Making Using Markov Analysis. Human Communication Research, 7(2): 133-146.

Emshoff, J.R., and Finnel, A. 1978. Defining Corporate Strategy: A Case Study Using Strategic Assumption Analysis. Working Paper No. 8-78, Unpublished Manuscript, University of Pennsylvania, Wharton Applied Research Center.

Emshoff, J.R., and Mitroff, I.I. 1978. Improving the Effectiveness of Corporate Planning. Business Horizons, 21(5): 49-60.

Fisher,R. & Ury,W. 1981. Getting To Yes: Negotiating Agreement Without Giving In. Boston, Massachusetts: Houghton Mifflin.

Fodor, E.M.,& Smith, T.S. 1982. The Power Motive As An Influence On Group Decision-Making. Journal of Personality and Social Psychology, 42(1), 178-185.

Frederickson, A. 1985. Effects Of Decision Motive and Organizational Performance Level On Strategic Decision Processes. Academy of Management Journal, 28(4): 821-843.

Gadamer, H.G. 1976. Hegel's Dialectic(translated by Peter Heath) New York: Harper and Row.

Galloway, T.D.,& Mahayni,R.G. 1977. Planning Theory In Retrospect - The Process of Paradigm Change. Journal of The American Institute of Planners, 43(10: 62-71.

Gardner, P. 1975. Scales and Statistics. Review of Educational Research, 45: 43-57.

Gist, M.E., Locke,E.A, & Taylor, M.S. 1987. Organizational Behavior: Group Structure, Process, and Effectiveness. Journal of Management, 13: 237-258.

Gladstein, D.L.,& Reilly, N.P. 1985. Group Decision Making Under Threat: The Tycoon Game. Academy of Management Journal, 28(3): 613-627.

Guzzo, R.A. 1979. The Decision Making Quality of Managerial Groups. Unpublished Docotral Dissertation, Yale University, 1979.

Guzzo, R.A.,& Waters,J.A. 1979. The Expression of Affect and the Performance of Decision-Making Groups. Journal of Applied Psychology, 67(1): 67-74.

Hackman, J.R.,& Morris, C.G. 1975. Group Tasks, Group Interaction Process, and Group Performance Effectiveness: A Review and Proposed Integration. In L. Berkowitz(Ed.) Advances In Experimental Social Psychology, Volume 8, NY: Academic Press.

Hall,J. 1969. Conflict Management Survey: A Survey on One's Characteristic Reaction to Handling of Conflicts Between Himself and Others. Conzoe, Texas: Teleometrics International.

Hall,J. 1971. Decisions, Decisions, Decisions. Psychology Today, 5: 51-54,86,88.

Heimovics,R.D. & Zemelman, D. 1978. The Influence of Interpersonal Relationships On Group Decision Making. Educational Administration Quarterly, 14(3): 61-73.

Henshaw,C.,& Jackson,J. 1984. The Executive Game. Homewood, IL: Richard D. Irwin Inc.

Hewes, D., 1986. Systematic Biases In Coded Social Interaction Data. Human Communication Research, 11(4): 554-574.

Hiltz,S.P.,& Turoff, M. 1986. Experiments In Group Decision Making-Communication Process and Outcome In Face-To-Face Versus Computerized Conferences. Human Communications Research, 13(2): 225-252.

Hirokawa, R.Y.,& Pace,M.S. 1983. Communication and Group Decision Making. Beverley Hills, CA: Sage.

Hirokawa, R.Y.,& Pace, M.S. 1983. A Descriptive Investigation of the Possible Communication-Based Reasons For Effective and Ineffective Group Decision-Making. Communication Monographs, 50(4), 363-379.

Isenberg, D.J. 1984. How Senior Managers Think. Harvard Business Review, 6: 80-90.

Janis, I.L. 1982. Groupthink. Boston: Houghton Miflin.

Jensen, R.,& Cherrington,D.J. 1984. The Business Management Laboratory. Plano, TX: BPI.

Kameda, T. 1989. Effects Of Two Procedural Factors On Group Decision-Making: Deliberation Style and Assigned Decision Rule. Unpublished Doctoral Dissertation, University of Illinois at Urbana-Champaign.

Kerlinger, F.N. 1986. Foundations of Behavioral Research. Orlando, FL: Holt, Rinehart, and Winston Inc.

Kolb,D.M. & Rubin, J.Z. 1989. Research Into Mediation. Dispute Resolution Forum, October.

Kuhn, T. 1962. The Structure of Scientific Revolutions. The International Encyclopedia of Unified Science, 2(2): Chicago: The University of Chicago Press.

Kuhn, T. 1970, Logic of Discovery or Psychology of Research? In I. Lakatos and A. Musgrave(Eds.) Criticism and the Growth of Knowledge. Aberdeen, UK: Cambridge University Press, 1-24.

Lantame, B., Williams, K.,& Harkins, .G. 1979. Many Hands Make Light the Work: The Causes and Consequences of Social Loafing. Journal of Personality and Social Psychology, 37: 822-832.

Lawrence, P.R., & Lorsch, J.W. 1967. Differentiation and Integration in Complex Organizations. Administrative Science Quarterly, 12, 1-47.

Levi, A.S.,& Mainstone, L.E. 1989. Complex Organizational Simulations: A General Scheme For Collecting, Organizing, and Analyzing Decision Process Data. Paper Presented at the Annual Academy of Management Meeting, San Diego.

Lombardo, M.M.,& McCall,M.W. 1982. Leaders On Line: Observations From A Simulation of Managerial Work. In J.G. Hunt, U. Sekaran, & C.S. Schriesheim(Eds.) Leadership: Beyond Establishment Views. Carbondale, IL: Southern Illinois University Press, 50-67.

Maier,N. 1952. Principle of Human Relations. New York: Wiley.

Maier, N. 1963. Problem Solving Discussions and Conference: Leadership Methods and Skills. New York: McGraw-Hill.

Marx, W. 1975. Hegel's Phenomenology of Spirit. Translated by Peter Heath. New York: Harper and Row.

Mason, R.O. 1969. A Dialectical Approach To Strategic Planning. Management Science, 15: B403-414.

Mason, R.O.,& Mitroff, I.I. 1981a. Challenging Strategic Strategic Planning Assumptions. New York: Wiley.

Mason, R.O.,& Mitroff,I.I. 1981b. The Metaphysics of Policy and Planning: A Reply To Cosier. Academy of Management Review, 6: 649-651.

McCartt, A. 1988. The Effects Of Decision Conferences On the Processes and Outcomes of Group Decision-Making. Unpublished Doctoral Dissertation, State University of New York at Albany.

McGrath, J.E. 1981. Dilemmatics: The Study of Research Choices and Dilemmas. American Behavioral Scientist, 25(2): 179-210.

Meyers, R.A. 1987. Argument and Group Decision-Making: An Interactional Test of Persuasive Arguments Theory and An Alternative Structurational Perspective. Unpublished Doctoral Dissertation, University of Illinois at Urbana-Champaign.

Mintzberg, H. 1972. The Nature of Managerial Work, New York: Harper and Row.

Mitroff, I.I. 1971. A Communications Model of Dialectical Inquiring Systems- A Strategy for Strategic Planning. Management Science, 17(10): B634-648.

Mitroff, I.I.,& Betz,F. 1972. Dialectical Decision Theory: A Meta-Theory of Decision-Making. Management Science, 19(1): 11-24.

Mitroff, I.I.,& Nelson, R.O. 1974. On Management Myth-Information Systems. Management Science, 21: 371-382.

Mitroff, I.I. 1974. A Brunswik Lens Model of Dialectical Inquiring Systems. Theory and Decision, 5(1): 45-67.

Mitroff, I.I. & Turoff, M. 1975. Philosophical and Methodological Foundations of Delphi. In H.A. Linstone & M. Turoff(eds.) The Delphi Method: Techniques and Applications. Reading, Massachusetts: Addison Wesley 17-36.

Mitroff, I.I., Baraba, V.P.,& Kilmann,R.H. 1977. The Application of Behavioral and Philosophical Technologies to Strategic Planning: A Case Study of a Large Federal Agency. Management Science, 24: 44-58.

Mitroff, I.I., Emshoff,J.R., & Kilmann, R.H. 1979. Assumption Analysis: A Methodology for Strategic Problem Solving. Management Science, 25(6): 583-593.

Mitroff, I.I.,& Emshoff, J.R. 1979. On Strategic Assumption-Making: A Dialectical Approach To Policy and Planning. Academy of Management Review, 4: 1-12.

Mitroff, I.I.,& Mason, R.O. 1980. Structuring Ill-Structured Policy Issues: Further Explorations in a Methodology for Messy Problems. Strategic Management Journal, 1: 331-342.

Mitroff, I.I.,& Mason, R.O. 1982. Business Policy and Metaphysics: Some Philosophical Considerations. Academy of Management Review, 7: 361-371.

Mitroff, I.I. 1982a. Talking Past One's Colleagues in Matters of Policy. Strategic Management Journal, 13: 374-375.

Mitroff, I.I. 1982b. Dialectic Squared: A Fundamental Difference in Perception on Some Key Concepts in Social Sciences. Decision Sciences, 13: 222-223.

Mure, G.R. 1970. An Introduction to Hegel. Oxford: Clarendon Press.

Nees, D.. 1983. Simulation: A Complimentary Method for Research On Strategic Decision-Making Processes. Strategic Management Journal, 4: 175-185.

Nemiroff, P.M.,& King, D.C. 1976. Group Decision-Making Performance as Influenced by Consensus and Self-Orientation. Human Relations, 28(1): 1-21.

Nunamaker, J,F., Applegate, L.M., & Konsynski, B.R. 1988. Computer-Aided Deliberation: Model Management and Group Decision Support. Operations Research, 36: 826-849.

Nurmi, H. 1984. On the Strategic Properties of Some Modern Methods of Group Decision-Making. Behavioral Science, 29(4): 248-257.

Nystrom, P.D. 1977. Dialectical Decision Process: Its Use in Faculty Personnel Actions. American Institute for Decision Science Proceedings, 491-493.

Peperzak,A. 1985. From Dialectics to Discussion. Review of Metaphysics, 39: 243-259.

Pondy,L. 1982. On Real Decisions. In G.R. Ungson & D.N. Braunstein(Eds.), Decision Making: An Interdisciplinary Inquiry. Boston: Kent Publishing Co.

Poole,M.S.,Siebold, D.R.,& McPhee,R.D. 1985. Group Decision-Making as a Structurational Process. Quarterly Journal of Speech, 71(1): 74-102.

Popper, K. 1940. The Logic of Scientific Discovery. London: Routledge & Kegan Paul.

Popper,K. 1963. Conjectures and Refutations: The Growth of Scientific Knowledge. New York: Harper and Row.
Rappaport & Bornstein 1989.

Saaty,T.L.,& Rogers,P.C. 1976. Higher Education in the United States(1985-2000), Scenario Construction Using a Hierarchical Framework with Eigenvector Weighting. Socio-Economic Planning, 10: 251-263.

Schwartzman, H.D. 1986. Research on Work Group Effectiveness: An Anthropological Critique. In P.S. Goodman(Ed.), Designing Effective Work Groups. San Francisco: Jossey-Bass.

Schweiger, D.M.,& Finger,P.A. 1984. The Comparative Effectiveness of Dialectical Inquiry and Devil's Adovcacy: The Impact of Task Biases on Preivous Research Findings. Strategic Management Journal, 5(4): 335-350.

Schweiger,D.M.,Sandberg,W.,& Ragan,J.W. 1986. Group Approaches for Improving Strategic Decision-Making: A Comparative Analysis of Dialectical Inquiry, Devil's Advocacy, and Consensus. Academy of Management Journal, 29(1): 51-71.

Schweiger,D.M.,Anderson,C.R.,& Locke,E.A. 1985. Complex Decision Making: A Longitudinal Study of Process and Performance. Organizational Behavior and Human Decision Processes, 36: 245-272.

Schweiger,D.M.,& Sandberg,W. 1989. The Utilization of Individual Capabilities in Group Approaches to Strategic Decision-Making. Strategic Management Journal, 10: 31-43.

Schwenk,C.R.,& Cosier,R.A. 1980. Effects of the Expert, Devil's Advocate, and Dialectical Inquiry Methods on Prediction Performance. Organizational Behavior and Human Performance, 26: 409-424.

Schwenk, C.R. 1982a. Effects of Inquiry Methods and Ambiguity Tolerance on Prediction Performance. Decision Sciences, 13: 207-221.

Schwenk, C.R. 1982b. Why Sacrifice Rigour for Relevance? A Proposal for Combining Laboratory and Field Research in Strategic Management. Strategic Management Journal, 13: 213-225.

Schwenk, C.R. 1982c. Dialectical Inquiry in Strategic Decision-Making: A Comment on the Continuing Debate. Strategic Management Journal, 13: 371-373.

Schwenk, C.R. 1984. Effects of Planning Aids and Presentation Media on Performance and Affective Responses in Strategic Decision Making. Management Science, 30: 263-272.

Schwenk, C.R. 1985. The Use of Participant Recollection in the Modelling of Organizational Decision Processes. Academy of Management Review, 10(3):496-503.

Schwenk, C.R. 1989. A Meta-Analysis on the Comparative Effectiveness of Devil's Advocacy and Dialectical Inquiry. Strategic Management Journal, 10: 303-307. Sharda et al(1988).

Smith, K.K.,& Berg, D.N. 1987. A Paradoxical Conception of Group Dynamics. Human Relations, 40(10):633-658.

Sniezer, J.A.,& Henry,R.A. 1989. Accuracy and Confidence in Group Judgement. Organizational Behavior and Human Decision Processes, 43: 1-28.

Sorenson,R.L.,& Savage,G.T. 1989. Signalling Participation Through Relational Communication. Group and Organization Studies, 14(3): 325-354.

Stasser,G.,& Titus,W. 1985. Pooling of Unshared Information in Group Decision-Making: Biased Information Sampling During Discussion. Journal of Personality an Social Psychology, 48(6): 1467-1478.

Steiner,G.A. 1972. Top Management Planning. New York: The MacMillan Company, Inc.

Sussman, l.,& Herden,R. 1982. Dialectical Problem-Solving. Business Horizons, 25: 66-71.

Tatarkiewicz,W. 1911. Spor o Plantona Przeglad Filozoficzny, XIV.

Tilles,S. 1977. How to Evaluate Corporate Strategy. Harvard Business Review, 41.

Thomas, K.W., & Kilmann,R.H. 1978. Comparison of Four Instruments Measuring Conflict Behavior. Psychological Reports, 42, 1139-1145.

Thompson, A.A. & Strickland, A.J. 1967. Strategic Management Concepts and Cases. Homewood, Illinois: Irwin.

Tuckman,B.W. 1965. Developmental Sequence in Small Groups. Psychological Bulletin, 63: 384-399.

Vancil,R.F.,& Lorange,P. 1975. Strategic Planning in Diversified Companies. Harvard Business Review, 75: 81-90.

Vinokur,A.,Burnstein,E.,& Sechrest,L. 1989. Group Decision Making by Experts- A Field Study of Panels Evaluating Medical Technologies. Journal of Personality and Social Psychology, 49(1): 70-84.

Walsh,C.M.,Henderson,C.M.,& Deighton,J. 1988. Negotiated Belief Structures and Decision Performance: An Empirical Investigation. Organizational Behavior and Human Decision Processes, 42: 194-217.

Wanous,V.P., & Youtz, M.A. 1986. Solution Diversity and the Quality of Group Decisions. Acadeny of Management Journal, 29(1): 149-159.

Weber,C.E. 1984. Strategic Thinking-Dealing With Uncertainty. Long Range Planning, 17(5): 60-70.

White, S.E.,Dittrich,J.E.,& Lang,J.R. 1980. The Effects of Group Decision Making process and Problem-Situation Complexity on Implementation Effects. Administrative Science Quarterly, 25(3): 428-440.

Whyte, G. 1989. Groupthink Reconsidered. Academy of Management Review, 14(1): 40-56.

Yoshida,R.K.,Fenton,K.S.,Maxwell,J.P.,& Kaufman,M.J. 1978. Group Decision Making in the Planning Team Process: Myth or Reality? Journal of School Psychology, 16(3):237-244.