ENVIRONMENTAL IMAGES

A STUDY OF MANAGERIAL COGNITION IN THE CONTEXT OF STRATEGY FORMULATION

BY

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PREFACE

Presented as a doctoral dissertation, this thesis is submitted as partial fulfillment of the requirements for the degree dr. oecon. at the Institute of Organizational Sciences, Norwegian School of Economics and Business Administration.

The dissertation has been organized into six parts: In part I, the background for the study is presented along with an overview of the various chapters. Part II is a discussion of theories and models used for designing a conceptual model which is the basis for generating hypotheses for empirical investigation. In part III the research design chosen, the variables and their measurement are discussed together with an analysis of their reliability and validity. Part IV is a discussion of the statistical tests used relative to the data obtained. Here, the various hypotheses are tested and the results presented. The results obtained are discussed in part V, with some practical implications and directions for future research, given the most important weaknesses of the present study as well as opportunities offered by the results. Part VI consists of the appendixes.

Several individuals and institutions made this dissertation possible. The most central persons are naturally those constituting my dissertation committee: Professors Kjell Grønhaug and Sigurd Troye at the Norwegian School of Economics and Business Administration, and Professor Joseph F. Porac at the University of Illinois at Urbana-Champaign.

The topic for the dissertation grew out from earlier research engaged in with Professor Kjell Grønhaug, and the ideas developed in the course of that work. From the dissertation's inception, he has commented on innumerable drafts and offered advise and counsel in spite of a very hectic schedule. For this I am very grateful, and I also want to take the opportunity to express my thanks for all his support given me since the day I entered the school. Professor Sigurd Troye has proved invaluable in suggesting improvements throughout the whole process. In addition, he always saw to it that I never lost sight of the real purpose behind research, and for this I want to thank him. Again, I will also take the opportunity to express my gratitude for his support and friendship during the time I have spent at the school. Professor Joseph Porac agreed to serve as a member of the dissertation committee at an early

stage of the dissertation project. During my stay at the University of Illinois at Urbana-Champaign as Visiting scholar he offered advise and several suggestions with respect to the dissertation which proved to be decisive in all its different stages. His contributions and concern have been far above what could reasonably be expected, and for all this I am deeply indebted.

My thanks also go to Professor Torger Reve, at the Institute of Organizational Sciences, who influenced me in my decision to enter the doctoral program. His support have been of immense value during the whole program, not the least in securing the resources necessary to complete the training. Also, he was the first to point out for me the growing literature on cognitive psychology as applied to organizational theory and decision-making behavior. By doing this, he spurred my interest leading to the present work.

A work such as this grows out of a context. I want to express my appreciation for the very fine milieu at the Institute of Organizational Sciences and Institute of Market Economy. To the staff here, my friends and fellow students I am indebted for support and countless favors of various sorts.

The Norwegian School of Economics and Business Administration has supported me financially throughout the whole project. Further, the school offered me a grant for spending a year at the University of Illinois. This stay was also supported financially by Norge-Amerika Foreningen. It was made possible by the Department of Business Administration at the University of Illinois at Urbana-Champaign, finding it feasible to invite me and let me take part in their resources. To all those institutions I am greatly indebted.

My sincerest thanks go to my wife, Inger-Johanne, who have always encouraged me to pursue my interests, and she has been the best companion one could ever wish for. I will also express my deepest sympathy for my daughter Camilla. In all her eleven years of life her father has been worrying about papers to be written, examinations to come through and, finally, a thesis to be written. I hope I have been a good role model after all.

Willy Haukedal
Bergen, Norway
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PART I

Introduction

CHAPTER 1

Introduction

1.1. PURPOSE OF STUDY

The importance of strategy for organizational adaptation and growth, as well as survival, seems well agreed upon in the literature (Ansoff, 1980; Holbæk, 1983; Porter, 1980). This concern has materialized into a range of different planning and strategic problem handling systems. In these systems, the human processes behind the formulation of strategy have been disregarded in favor of the organizational procedures for planning, collecting information and directives on how to collect information from the environment (Ansoff, 1980; Bourgeois, 1985). In recent years, however, a scattered group of writers have occupied themselves with the actual perception and definition of strategic issues (Dutton, Fahey, & Narayanan, 1983; Falkenberg, & Grønhaug, 1988; Gripsrud, & Grønhaug, 1985; Grønhaug, & Haukedal, 1988; Kilmann, & Mitroff, 1979; Lyles, & Mitroff, 1980; Mitroff, & Emshoff, 1979; Porac, Thomas, & Emme, 1985; Schwenk, 1988; Smircich, & Stubbard, 1985). From these investigations, the finding is emerging that managerial cognition is

of importance for the detection of strategically significant events as well as for qualities of the formulated strategy (Falkenberg, & Grønhaug, 1988; Grønhaug, & Falkenberk, 1988a; Mintzberg, & Waters, 1984; Porac, Thomas, & Emme, 1985; Salancik, & Porac, 1986). The reason for this is found in the subjective elements of organizations' environments (Smircich, & Stubbard, 1985) necessitating interpretation of large amounts of ambiguous and weak signals by individuals. The processing of this kind of data has been found to be influenced by such variables as cognitive style (Haukedal, 1986; McKenney, & Keen, 1974), categorisation (Porac, & Thomas, 1988) and problem solving strategies (Isenberg, 1986).

The purpose of this dissertation is to further explore the topic of managerial thought in relation to the identification and formulation of strategic issues. It has been demonstrated that in perceiving strategically significant events or elements, managers rely on their own knowledge representations (Kiesler, & Sproull, 1982; Porac, Thomas & Emme, 1985; Weick, 1979a). On the other hand, little work has been done concerning the attributes of these representations and the features associated with their relative effectiveness. It seems plausible to assume that the quality of managers' cognitive representations are influenced by experience. In fact, there are some indications that experienced strategists do not respond to the very complex environmental information with the strategies predicted by the principle of bounded rationality (Ross, 1976), which may be explained as a function of representational qualities. The focus of this work is, accordingly, upon experienced managers environmental images: Their characteristics and functions relative to novices'. It is of importance to gain insight into this matter in order to design better educational and training programs for managers with

present or future strategy related tasks, as well as systems for managing strategic issues in organizations (SIM).

To accomplish this end, an empirical study was undertaken with a 'contrasting groups' design. One group of managers experienced in strategy formulation in the banking industry, and another group consisting of MBA-students with no such experience, but with comparable educational background, responded to four 'projective minicases'. Their verbalizations during this process were taped and transcribed. Then the transcripts were analyzed for their content according to a categorical coding scheme.

The study is reported as follows. First, a conceptual framework for the literature review is presented. Then the literature is discussed and summarized in a model showing the salient variables and their interrelationships. This model is used for generating hypotheses for empirical testing. Next, a description of the method used follows along with presentation of the results. Last, the results are discussed in relation to the ideas addressed at the beginning.

PART II

Theory

CHAPTER 2

Environmental Images

2.1. STRATEGIC ISSUE FORMULATION

This work addresses the process of interpreting the environment, as evidenced by decision-making processes at the individual level of strategic management. Specifically, the goal is to analyze the cognitions involved in the perception and formulation of strategic issues (S.I.). These are defined here as conceptualized phenomena of actual or potential significance for the organization's goal attainment. They derive their importance from the fact that they are the basis for decision making and problem solving processes (fig. 2.1).

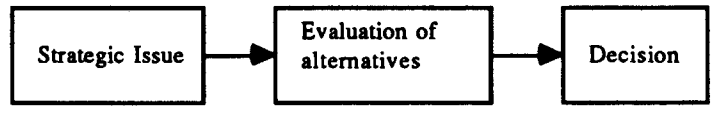

Fig. 2.1. The decision-making process

The attention given to the decision making process has largely been on the later stages of evaluation and choice of alternatives. When it comes to the earlier stages of perceiving and/or formulating the strategic issue, the matter is

left quite undeveloped. Recently, however, there has been some interest in these early stages of decision making processes in organizations. There may be several reasons for this, reflecting the varied theoretical background of this new orientation: In the area of organization theory, one is concerned with higher learning processes, which involve the analysis of assumptions behind action alternatives (Mitroff, & Emshoff, 1979) and the formulation of new action alternatives rather than merely choosing among a given set (Argyris, & Schön, 1978; Fiol, & Lyles, 1985; Hedberg, 1981). Recently, the strategic management literature has recognized the subjective element in organizations' environments. As a consequence of this, strategy formulation is taken as a point of departure. Authors within this tradition take the stance that organizations take action in relation to the subjectively defined environment, and not the one existing by some objective measures (Gripsrud, & Grønhaug, 1985; Lyles, & Thomas, 1988; Porac, Thomas & Emme, 1985; Smircich, & Stubbard, 1985). In cognitive psychology, and more precisely the problem solving literature, one has come to recognize the problem formulation stage as essential for the way solutions are reached and elaborated (Newell, & Simon, 1972).

In these diverse contributions there seems to be a growing agreement that the actors' environment is not given, but construed and even enacted by the organization itself. If the environment is not objectively given, then it becomes a problem to be solved because its characteristics must be worked out by the actor (Weick, 1979a). It follows that strategic problems do not have unique formulations (Lyles, & Mitroff, 1980; Ungson, Braunstein, & Hall, 1981). Moreover, formulating a strategic problem in different ways can result in different solutions to the same problem. It has also been pointed out that an error in formulating a strategic problem can simply compound the problem

(Watzlawick, Weakland, & Fisch, 1974). Lastly, an error in formulating a strategic problem can result in solving the wrong problem, also referred to as the Type III error (Mitroff, & Featheringham, 1974). As is implied by these points, this early stage of the decision making process is of extreme importance for strategic action, both as adaptation and innovation. Adaptation because strategic alignment to the environment is dependent upon a 'correct', or at least functional, formulation of the situation, and innovation because in formulating the strategic problem the actor is free to define new strategic issues altogether.

Empirical research in this field has largely focused on the organizational level (Alexander, 1979; Lyles, & Mitroff, 1980; Mintzberg, Raisinghani, & Théorét, 1976; Nutt, 1984). Still, an increasing number of research has already required several reviews of the literature on individual strategy formulation (Cowan, 1986; Lyles, Thomas, 1988; Schwenk, 1988). This interest in the individual decision-maker is based upon the belief that although taking place in the social world of organizations, several circumstances make the individual particularly interesting for the analysis of strategic decisions. For one thing, individuals seem to be of great importance for the perception of opportunities (Nutt, 1984). In addition, it has been pointed out (Holsti, 1976) that non-routine situations, decisions made by top-level managers relatively free from organizational constraints, high-uncertainty decisions as in long range planning, highly ambiguous situations and circumstances of information overload are all conditions where the individual cognitive processing is of vital importance. The bulk of this work, however, stresses various constraints on cognitive processes (Duhaime, & Schwenk, 1985; Gripsrud, & Grønhaug, 1985; Kiesler, & Sproull, 1982; McKenney, & Keen, 1974; Porac, & Thomas, 1988; Schwenk, 1984; Schwenk, 1988). In contrast to this work are some accounts on how strategy formulators with

extensive experience in their particular field seem to be less restrained by such factors than expected (Mintzberg, & Waters, 1984; Ross, 1976). One example is given by Ross (1976) who analyzed the cause map derived from a delegate (Gouverneur Morris) to the Constitutional Convention (of what is now the USA). This delegate was a central person to the Convention, credited with the final rewriting of the constitution before it was signed, he was very active in the debates and was generally influential in the very complex issue of designing a new constitution and management of the executive branch of the government. He was also known as a complex but gifted debattant. As pointed out by Ross (op. cit.), referring to Cyert, & March (1963), one would expect the delegate to apply such cognitive strategies as selecting one goal at the time in order to meet the constraints on rationality. In fact, he was demonstrated to relate to several goals at the time. Further, Ross (op. cit.) also points out that one would expect the 'rationally bounded' delegate to simplify the decision process by satisficing, i.e. choosing the first alternative meeting some standard instead of evaluating all alternatives. Again, this simplifying strategy is not evident in this subject's verbalizations.

The discussion and example above point to a gap in our knowledge of strategy formulation: How does practised strategy formulators differ from novices (Salancik, Porac, 1986; Weick, & Bougon, 1986) that make them less vulnerable to constraints on rationality? The inquiries into this question have focused on the so called well structured problems, presented to subjects with varying degrees of expertise e.g. (Larkin, McDermott, Simon, & Simon, 1980). Although these studies serve as a point of departure for the present study, they are unsatisfactory because strategic situations are typically complex, they must be discovered by the actor and are usually quite confounded (Kilmann, & Mitroff, 1979; Mason, & Mitroff, 1981). One study (Isenberg,

1986) compared managers with students in the solving of a business case, thus simulating managerial responses to strategic problem situations. As he analyzed their transcribed verbal protocols, valuable insights into the managers' cognitive processes were gained. His emphasis was on problem solving, however, so there is little to be learned about the managers' cognitive representations as such. Of particular interest would be their knowledge representations drawn from when framing the problems, because these are demonstrated elsewhere (Newell, & Simon, 1972) to be of central concern in the formulation of problems generally, and even organizations' adaptation to their environment (Grønhaug, & Haukedal, 1988).

2.1.1. Conceptual Framework

It follows from the above discussion that individual characteristics may have quite an impact on strategic choice through their importance for defining the alternatives. While problem solving and decision-making processes at the individual level have been studied extensively, the cognitive representations on which these are based have been largely overlooked in the context of managerial decision making. Furthermore, the cognitive limitations of decisionmakers are extensively investigated, while the the characteristics of effective strategists have not been. The lack of understanding regarding managerial cognitive representations and the characteristics of experienced managers' thinking points to a gap in the studies on strategy formulation and decision making. In other words, we need to know more about experienced strategists' cognitive representation of strategy related elements. This will be the point of departure for the present study.

A conceptual framework (fig. 2.1.1.) is offered below, showing the salient variables and their interrelationships, serving as the point of departure for this study. Each of these elements are then discussed on the background of the relevant literature, in separate sections. While only the concepts enclosed in the heavy frame are analyzed empirically in this study, the others are included for illustrating the theoretical framework in which they are embedded. On the basis of the theory discussion the model is elaborated upon at the conclusion of chapter 3, and will then serve as a point of departure for generating hypotheses for empirical testing.

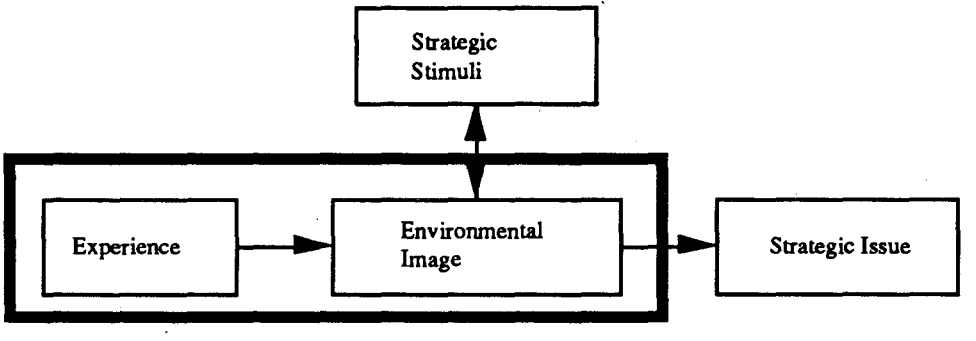

Fig. 2.1.1. Theoretical framework

Fig. 2.1.1. should be read as follows: The strategic issues are outputs of a cognitive process resting on environmental images (EI). These are individual cognitive representations of the organization's internal and external environment. The images differ among individuals, and are related to the person's experience. With recourse to the EI, the strategic stimuli (SS) are processed. The SS is conceived of as triggering the process of interpretation, but also being the result of active scanning on the part of the actor and based

upon information in the EI (Neisser, 1967). This relationship is therefore noted by a two-way arrow. Strategic stimuli may be seen as the input to the process resulting in the awareness of a strategic issue, and defined as changes in the environment that are of potential importance for the organization. As is often pointed out, organizational managers find themselves in a constantly changing environment which poses varying demands for change and adaptation. Three general sources of strategic stimuli have been identified: Trends in the external environment, the evolutionary trends within the organization, and trends in its performance (Ansoff, 1980). Examples of these are: Inflationary trends, complexity of organization and solvency of the enterprise.

Strategic stimuli are merely data with no inherent meaning in themselves, they are phenomena to notice or not. They have several qualities which probably contribute to their visibility. Examples are dimensions like intensity, rate of development, frequency, novelty and duration. The more important point is that they require additional information gathering, interpretation, and diagnosis (Bonge, 1972) in order to be useful in a strategy formulation process. For example, the news that solvency is decreased (SS) would require additional data on for example projected cash flow in order to be interpretable as a strategic issue of value. Other information that could be of help in this interpretation process is the goodwill of funders, experience with similar episodes in the past and probable economical outcomes according to financial models.

Seen in this light, strategic issue formulation is a complex conceptual and behavioral act operating on perceived stimuli of the environment, where SS are inputs and SI the resultant output. Thus, in order to understand strategic

issues as they are formulated, it is not enough to investigate the stimuli's sources which they refer to, as is usual (Porter, 1980). What may be more important is the person(s) doing the perceiving and conceptualizing (Smircich, & Stubbard, 1985) and their cognitive representations of the strategy related environment.

2.2. THE NATURE OF ENVIRONMENTAL IMAGES

Here, the framework's concept 'environmental image' is explored on the basis of existing literature. 'Image' as used here, refers to the individual managers' cognitive representation of their organizations' environment. As there is no literature on environmental representations specific for the strategic management field, it is necessary to access theory and findings that are indirectly relevant. Specifically, the tradition developed in cognitive science is applied in the following.

The question of cognitive representations is an old one in psychology. The earliest issue was whether this construct had any value at all for the study of human behavior. It was pointed out that introspection, the typical method for studying cognitions, did not meet basic standards for scientific procedures like reliability and objectivity. However, with the possibility of simulating human thought on computers and the difficulties involved in explaining verbal behavior as stimulus-response chains, 'cognitive representation' have gradually come to be accepted as an important construct (for a more complete discussion, see for example Gardner, 1985). Some studies commencing in the early 1970s definitely turned the question from one about the *existence* of mental

representations to inquiries about their *properties*. In typical studies of this sort, subjects are asked to compare two geometrical forms when one of them is rotated. Reaction times preceding decisions about the identity of these forms is contingent upon the size of the angle of difference between the orientations of the two forms (Shepard, & Metzler, 1971). For example, it was found that when the angle between the forms' orientation were zero, the response was given instantaneously. As the angle is larger, the subject's response slows down in a liner relation to the size of the angle.

Even though the existence of cognitive representations is to a large degree established as a fact[1], there is still the question of their attributes and there is no general theory on cognitive representations (Palmer, 1978). This is not the place for a complete review, therefore two contributions are selected due to their relevance for this work. The first of these addresses itself to the representation of *knowledge*, which is conceived of as several different types or modalities, making it particularly interesting for real life settings like that of strategic management. The other perspective concerns representations of *problems*. A problem representation is seen as a space of behavioral alternatives relative to a particular stimulus-situation. The value of this perspective lies in its focus on 'real time' problem solving.

One of the most persistently found and agreed upon distinction of knowledge representations is that between the declarative and procedural mode (Winograd, 1975). Declarative knowledge is facts about events and things, their relations, and states of the world. Procedural knowledge, on the other

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[1] The critisicm is mostly to be found with orthodox behaviorists. However, the general trend in behaviorism seems to be in the direction of integrating cognitive representations within its theory system.

hand, is knowledge about how to perform various activities. Initially, due to the AI (Artificial Intelligence) background of this concept, the acivities referred to were those related to the storage and retrieval of information (Barr, & Feigenbaum, 1981; Winograd, 1975). Researchers in this tradition pointed out that data do not constitute knowledge of themselves; they must be accessible for processing. As computer databases grew larger, techniques of information retrieval became very important. Without effective storage systems and retrieval routines the data would simply not be found in a reasonable span of time. It was soon realized that human subjects would need some similar kind of systems, which came to be known as 'procedural knowledge'. With time, there has been a need to account for the storage of behavioral skills in a more general sense, like for instance pouring a cup of tea, leading a marketing campaign or even formulating strategies. Procedural knowledge therefore has also come to comprise such elaborate behavior routines.

One other quite concensual distinction is that between modal specific perception-based representations as for example memories that can be recalled with all the richness of the senses like sounds, smells and visualizations, and nonspecific meaning-based symbolic representations (Anderson, 1985; Paivio, 1971; Russel, 1921). The central point here, although the actual formulations differ, is that some representations seem to retain all the richness of sense data while the other kind of representation are of a more semantic and lexical kind. Thus, three categories may be discerned: 1) modal and 2) non-modal representations, and 3) procedural representations (fig. 2.2.).

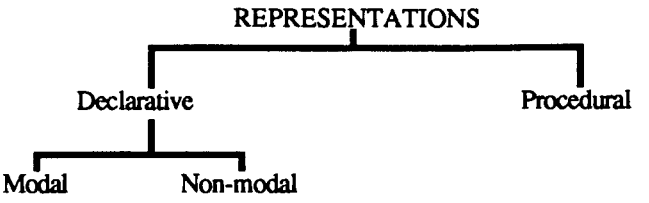

Fig. 2.2.: Taxonomy of Cognitive Representations

This three-partite scheme was proposed by Tulving (1983; 1985) in a slightly different conceptualization. The focus here is on the propositional (declarative) representations, which was argumented to be best conceived of as a system with two subsystems; episodic (corresponding roughly to the modal) and semantic (corresponding to the nonmodal) representations. In addition, the category of procedural representations was retained, but defined broadly in terms of skills and behavior. A number of distinguishing characteristics between propositional and procedural representations may be delineated: Propositional knowledge may be demonstrated through many different means, like speech, writing, discourse and art. Procedural knowledge can only be demonstrated through the performance of skill. Propositional knowledge may be true or false relative to an empirical reality, while procedural representations are neither true nor false. Propositional representations demand directive attention while procedural knowledge is best performed automatically. While propositional representations may be acquired on a brief occasion, procedural representations are acquired through extensive practise because it is learned connections between complex stimulipatterns and response chains, which enable skillful adaptation to complex environments. The focus here is clearly on skilled performance attained through experience and practise.

Episodic and semantic representations differ, in general terms, with regard to a) the kinds of information processed, b) characteristics of their operation and c) their applications. In episodic memory it is information identified with self that is represented. The subject will recall this kind of memories as self-related episodes with external references. These are the episodes typically evoced when subjects are interviewed about 'critical incidents'. Semantic representations, on the other hand, have only cognitive references. They do not imply personal experiences, but conceptual understanding. If I think of myself posting my letters at the post office, it is an episodic representation. If, on the other hand, I recall the address of the same post office, it would be a semantic representation. Episodic representations may be called 'remembering' as contrasted with semantic representations which are more like 'knowledge'. Again, with semantic representations it is possible to internally represent states of the world not perceptually present; as models that can be operated upon without overt behavior. This makes it possible to test hypotheses without behavioral commitment. Episodic memory adds the capability to 'travel back' in time for the utilization of personally experienced events in real time situations.

2.2.1. Episodic memory and managers

Since it is reasonable to conceive of managers as 'human', they also would be assumed to have episodic representations. The obvious question is if it has any significance for their work, and if it has; what? As far as I know, there are no studies to answer this particular question. On the other hand, there are some observations which may hint at the direction the answers may take.

Most researchers will consent that knowledge of the field 'strategic management' and problem solving/decision making are valuable assets in strategic management. This is, after all, a dominant part of the curriculum of most business schools. However, there has been raised some doubts lately by practitioners as well as theorists (Leavitt, 1989; Peters, & Waterman, 1982) about this practise. While conceptual models at a high level abstraction is necessitated by a complex environment (as evidenced by the success of operations research applied to marketing and finance), it is evidently insufficient in a world of strategic action. Why is this so? In relation to strategic issue formulation, we are in position to suggest the following answers. First, strategy in action is dispositions in a real world of real people, real organizations and real firms, all with their distinctive qualities and patterns of reaction and interaction. While knowledge of general principles are often helpful, they may also be insufficient as well as of disadvantage in real action, because there are always exceptions as well as effective short cuts in reality not accounted for in conceptual terms. Episodic memory with its potentially rich database on the domain in focus may be the missing link here, although in some 'pre-conceptual' format. Second, this type of memory may be a prerequisite for the flexible problem formulation activity referred to as innovation, which was implied by a series of studies on problem finding (Getzels, & Csikszentmihalyi, 1965; Getzels, & Csikszentmihalyi, 1975). When observing individuals in the process of formulating problems, originality was found to correspond closely to the degree of energy invested in exploring and gathering concrete perceptual data about the objects in focus. This conclusion is also reached by (Greeno, & Simon, 1988): "(the creative) solution of problems can be strongly influenced by quite low-level perceptual factors" (p. 76). Or, in the words of another author, addressing managers: "To

assess the value of historical, aggregated, 'hard' MIS information, consider two of the manager's prime use for his information—to identify problems and opportunities and to build his own mental models of the things around him (eg., how his organization's budget-system works, how his customers by his product, how changes in the economy affect his organization, an so on). Every bit of evidence suggests that the manager identifies decision situations and builds models not with the aggregated abstractions a MIS provides, but with specific tidbits of data" (Mintzberg, 1975:218). Third, human subjects have been demonstrated to possess very rich and complete records of their experiences from childhood and up (Penfield, 1959). Even though such knowledge may not be conscious it probably influences the way one perceives and frames issues of the world in general (Freud, 1974). Therefore, one has reason to expect that managers' earlier experiences influence the way they construe the organization's strategic situation. Lastly, first-hand experience with a certain domain of events and problems probably short-circuits the tendency to biased perception following abstract conceptualization. Some of the research on mental set may be interpreted in this direction (Haukedal, 1989).

Episodic memory then, may serve as a phenomenological resource for semantic development, adjustment and change. When for example a manager experiences a novel situation, he may search his episodic representation for experiences with some kind of correspondence to the actual one, work on it conceptually and integrate it with his existing semantic representation. Thus he may gain some new insight and even reach a new level of awareness through the dual operation of episodic and semantic representations. This is a kind of reasoning which is in line with the view of memory proposed by Schank and Abelson (1977:17)

In addition to serving as a store of cognitive 'raw material' for semantic processing, episodic memory may also be a source of analoguous situations that the individual may apply to a particular situation, which is demonstrated to be a powerful formulation strategy in solving problems (Gick, & Holyoak, 1980). There is some evidence that managers do this to a greater extent than people with less experience in this field (Isenberg, 1986), when working with business problems. Thus, an actual case may be matched to a situation stored in memory and solved by using elements from this recalled situation.

2.2.2. Semantic memory and managers

Semantic memory is closely related to language: "It is a mental thesaurus, organized knowledge a person possesses about words and other verbal symbols, their meaning and referents, about relations among them, and about rules, formulas, and algorithms for the manipulations of these symbols, concepts, and relations" (Tulving, 1972:386). In this memory, stimuli have no autobiographical references; only semantic. It deals with abstract facts, like the category a stimulus belong to, its relation to other things or events, its probable frequency and the like.

The primary function of semantic memory, apart from its obvious importance for language, is that it adds the capability for construction of models of the world. Such models may be used for analysis, testing and experimentation without commitment to behavioral acts (Kelly, 1955). One can even operate on states of the world not actually experienced, or in 'real' existence for that matter. If episodic representations are 'memories', semantic

representations are best characterized as 'knowledge'. This may be knowledge about the world, as for example knowledge about one's firm or organization, its relation to the environment and the events determining its operation.

Content. It may be helpful to analyze managers' semantic representations from the perspective of their content on the one hand and structure on the other. Content refers here to the concepts making up the representation, their types and semantic referrals. We will have more to say about this after discussing the *experience* variable, but given that knowledge representations reflect the events, situations and environments exposed to, it seems obvious that the content of managers' semantic representations will reflect their particular experience base as well as some kind of abstract level concepts related to this field of experience.

Structure. Structure refers here to how the concepts are 'tied together', thus making up more or less organized semantic representations. Several structural schemes have been offered in the literature but there are as yet no consensus on which one to adopt (Anderson, 1983; Barr, & Feigenbaum, 1981). On the other hand there seem to be a shared belief that this kind of representation is made up of *units* (e.g. concepts, nodes, primitive, variables, propositions, schemata), *connections* between them (e.g. associations, probabilistic connections, causal relations) and that these elements together may form structures of varying degrees of complexity and organization. Cause relationships may be of particular interest concerning this type of representations when it comes to managers, because of the instrumental nature

of their work which implies knowledge of means and ends—or causal structures (Hall, 1984; Maruyama, 1982; Salancik, & Porac, 1986). Causal relations are generally conceived to take place between variables subjectively held to be of importance for a particular phenomenon (Maruyama, 1982; Weick, & Bougon, 1986). These variables may be seen as categories bracketed out of an otherwise continuous stream of sensory data. Therefore the variables themselves, being the building blocks of cognitive maps, are also of considerable interest. Some research has been conducted on managerial categories (Dutton, & Jackson, 1987; Porac, & Thomas, 1988) demonstrating the value of this approach.

Again, the particulars of the structural nature of managers' semantic memories will have be postponed till the discussion of *experience*. Still, when formulating strategic issues, managers will have to refer to their semantic representation, or conceptual models, of their organization and its environments (Pounds, 1969). Thus, their strategic thinking is influenced by the content as well as structure of this representational mode.

2.2.3. Procedural memory and managers

The third kind of representations are called procedural (Tulving, 1985). In contrast to the other two forms of representation reviewed above, this mode is knowledge about process. For reasons discussed below, it is also probably best understood as consisting of different levels.

Historically, the distinction between static and procedural representations go back to the discussion in the field of AI on declarative vs. procedural knowledge (Winograd, 1975). Here, one was occupied with the

issue of whether knowledge had any value at all if it could not be found or accessed (Anderson, 1985; Barr, & Feigenbaum, 1981; Lindsay, & Norman, 1977). This issue is no longer very actively debated, as one has come to recognize that all data are dependent upon some kind of processual activity in order to be operable.

As noted earlier, procedural representations may also be conceived of in a more general sense. Procedural memory may be seen as the retained learned connections between stimuli and responses, and is a kind of prescriptive blueprints, or plans, for action. In this interpretation of procedural representation, the concept of level has great importance. Consider for example the strategic act of 'venturing into a new market'. On a very abstract level, this amounts to recognizing the opportunity of doing so. On a more concrete level, something more substantial has do be done in order to materialize the act. This might be formulating a proposal of the strategy, which translates into such mundane behaviors as finding a piece of paper and even engaging in the minute sensory-motor motions of writing it up (Powers, 1973; Powers, 1978).

Procedural representations, then, are about skills somehow stored in memory. As noted, such skills may be at different levels of abstraction nested within each other (Carver, & Scheier, 1981; Powers, 1973). Managerial work may be described in terms of skills that mediate between input- and output variables (Yukl, 1981). Examples of these are problem solving skills (March, & Simon, 1958), skills in structuring work processes (Fiedler, 1986), decision making skills (Vroom, & Yetton, 1973) and social skills (Mayo, 1945). As is clear from this list, the question of levels becomes valuable as soon as one goes from mere labelling to analysis of the skill in question. If this is correct, one may speculate that experience endows managers with a certain repertoire of

skills as well as foolproof and automatically executable low-level routines of execution of these skills.

The best sustained discussion of such representations are those of *scripts* (Schank, & Abelson, 1977). These are generalized cognitive schemas relating to well known behavioral situations. Scripts share the characteristics of skills discussed above, and adds the notion of default values and mechanisms for acquisition: When encountering a new situation, scripts are of value because they 'fill in' information for interpretation of the situation, and routines for execution of behavior, when needed. This prepares for flexibility through generalizability of skills as well as effective learning by experience and economy of attention.

Managerial work is heavily biased towards action (Kotter, 1982; Mintzberg, 1973). Therefore the procedural representations may be of particular value in this context. In relation to strategic issue formulation, claims as to what should be done as well as the perception of key elements, like competitors' behavior and what it means, would rest on this kind of cognitive representations. For example, on learning that a major customer is playing golf with a competitor the manager may interpret this as a threat or not according to the script invoked. The same script specifies also actions to engage in, as for example to offer new incentives to the customer.

What is suggested here is that environmental images consist of multimodal knowledge pertaining to strategy-related domains. Having knowledge is, however, not the same as applying it. Next section introduces some concepts of value for analyzing these images' operative characteristics.

2.2.4. Representations as problem spaces

Problem solving is frequently described in terms of searching a problem space (Newell, & Simon, 1972), which consists of representations of the *elements* of the situation, the *goal*, *actions* and *strategies* that can be undertaken in working on the problem and *constraints*; restrictions on what can be done and limits on how elements may be combined (Greeno, & Simon, 1988).

The initial situation of the problem solver is referred to as the *initial state*, the situations on the way to the goal as *intermediate states*, and the goal as the *goal state*. The actions undertaken in trying to reach the goal state are called *operators*, and they are seen as behaviors transforming the problem space from one state to another. Formulating a problem may itself be seen as a problem solving activity, where the perception of a strategic stimulus is the initial state, the successive efforts as operators transforming the initial state, and the strategic issue is the goal state.

Given this conceptualization, a subject's knowledge and experience with the problem domain obviously have significance for how effectively the goal state (i.e. strategic issue) is reached and its qualities defined. For example, a given stimulus may be recognized from earlier experience which allows recall of stored paths through the 'problem space' to a proofed goal state (i.e. formulation of issue).

This conceptualization of cognitive representation must be perceived as complementary rather than an alternative to the tripartite division discussed above. While the former system focuses on the nature of knowledge representation itself, the latter is rather a way to conceptualize *problem* representation. Thus, a manager may face a strategic stimulus (which, in

problem solving terms would be the initial state), search his semantic and/or episodic memory for relevant *elements* and *contstraints*, then apply *actions* and *strategies* from procedural memory to reach the *goal state* (strategic issue)[2]. When the stimuli confronting the individual are well-known, then the task may be simply to narrow the problem space as much as possible to effectively reach the solution (goal state), which may be simply to choose one of several known problem- or strategic issue- categories (Chi, Feltovich, & Glaser, 1981; Dutton, & Jackson, 1987). On the other hand, when the stimuli are unrecognized, ambiguous or weak (as is often the case in strategic situations) the task may be better described as an *expansion* of the problem space (Volkema, 1983) and the *designing* of a solution. In such circumstances it is conceivable that the episodic memory is accessed for bringing in additional material.

These points are better appreciated when seen in the light of some basic principles of information-processing theory as applied to human thinking (for a detailed discussion see Ericsson, & Simon (1984); Newell, & Simon (1972)). The different states of the knowledge space reached by the subject are then the result of operators applied to knowledge held in short-term memory (STM), by bringing in new information from long term memory (LTM) or external sources. The subjects' verbalization correspond to some part of the information currently held in STM. In other words, the representation of problem situations are directly related to the material which is brought into STM. This should become especially apparent when the external source of information is scarce, since one has to rely all the more on internal sources of

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[2] Of course, the subject will also search the external environment for such data if needed

information. The other implication of this model of human problem solving is associated with the reliance on STM. It is well known that the information processing capacity of STM is severely limited (Miller, 1956). This fact is cause for perceptual filters (Hedberg, 1981; Starbuck, Greve, & Hedberg, 1978) and a range of cognitive heuristics (Kahneman, Slovic, & Tversky, 1982) which, on the one hand make it possible to relate to a complex world with limited resources, but on the other hand are reason for misperception, oversimplified and often quite wrong interpretations. There are, however, some research indicating that experience with a particular domain make one less susceptible for such biases through a more effective use of one's cognitive representations. This will be the theme for the next chapter.

2.2.5. Summary

Environmental images may be conceptualized as cognitive representations of environment, being a multimodal and composite subset of knowledge held in LTM. As such, EI may be understood as a schema (Schwenk, 1988) particular for strategic contexts, that the subject applies to strategy related problems. This structure integrates bits of knowledge and problem space elements like operators, strategies and goals. As such, environmental images are probably developed through practise and experience with strategy related work.

CHAPTER 3

Experience and Managerial Thought

We get better at things by practising. This is a quite straight forward observation that has recently been taken as point of departure for the analysis of skilled behavior in a whole range of fields. One emerging fact is that through experience one developes knowledge-based strategies for problem solving in order to bypass the limitations of STM. Research on especially talented problem solvers, for example, invariably indicates that they are particularly efficient in the *formulation* of the problem at hand. In this stage, they draw upon their extensive experience to produce problem representations that later score high on efficiency and originality. In the following, we will explore this concept and some relevant findings further.

In formulating problems, a person has to rely both on internal and external sources of information. Thus, his level and organization of relevant knowledge becomes a topic of great interest. In other domains, such as chess-playing, computer programming, electronic and medical diagnosing, it has been found that individuals with a degree of experience compatible with the label

'expertise' may be characterized by the general trait of efficient organization and utilization of large knowledge bases. Whether this also holds true for managers has not been studied yet, but there is reason to believe that this is so.

3.1. CONCEPTUAL CLARIFICATION

Expertise is a fuzzy concept. It is hard to find authors in this field venture on a definition of the construct. Some help may, however, be found in the concept's etymology. The term 'expert' is derived from the Latin word *expertus*, itself derived for *experiri* which means 'to make full trial of' (Skeat, 1972). From this, and other etymological connections, the term seems to convey something close to 'thoroughly tried knowledge'. This, of course, is close to the general conception of expertise; a person that has reached a level of special proficiency in a particular domain through 'hands on' experience.

Anderson (1985) takes this idea as a point of departure when accounting for expertise. Assuming that we all have reached such a level in some activities, at least in speaking a language or driving a car, he goes on to place expertise in a perspective of skill acquisition where such a proficiency marks the highest level. This level (and therefore expertise) is characterized by the fact that the skill in question has become automatic and very rapid. Such skills are not confined to everyday activities like speaking and driving, however. Therefore, expertise has been studied in a wide range of activities not usually associated with our basic preoccupations.

Though it is possible to agree upon the meaning content of the label 'expert' it is much more difficult to establish an external standard on which to decide who are and who are not experts. In practical life, this problem is

solved by resorting to peer evaluation (examples of this is the evaluation of academics and the acknowledgement of Masters in European guild systems). In research on expertise, the problem has largely been met by utilizing individuals with long practise in a particular field as subjects e.g. (Chi, Feltowich & Glaser, 1981). In view of the difficulties involved in defining *expertise* appropriately, it is probably best to think of the phenomenon as a continuum. Therefore, individuals may exhibit more or less of the traits associated with expertise, according to their degree and length of involvement with a particular problem domain. Therefore, the empirical findings and theoretical discussions on expertise may be viewed as indications of performance levels and not of one particular category of human beings.

The literature on expertise seems to be growing steadily. What started as analysis of artificial intelligence has now developed into a study of expertise in applied domains like medical diagnosis, shoplifting and consumer behavior. The findings on expertise may broadly be described as dimensions of *amount* and *organization* of knowledge on the one hand, and its *utilization* on the other. Here I will present some salient features of experts' knowledge in qualitative as well as quantitative terms.

3.2. CONTEXTUAL KNOWLEDGE

There seems to be no doubt in the literature that expertise involves having more knowledge (Chi, Feltowich, & Glaser, 1981; Egan, & Schwartz, 1979; Fiske, Kinder, & Larter, 1983; Greeno, & Simon, 1988). Since expertise is a domain

specific trait (Chase, & Simon, 1973b), this means that experts' representations are characterized by relatively larger bases of knowledge specific to their field.

This rather trivial fact actually turns some long held conceptions about human intelligence inside out. For example, the powers of logic and reasoning have enjoyed a high status as hallmarks of intelligent thinking. Actually, expert performance seems to rest on rather different mechanisms like pattern-recognition, application of well-learned procedures and recollection of stored knowledge (Chase, & Simon, 1973a; Chase, & Simon, 1973b; Fiske, Kinder, & Larter, 1983; Greeno, & Simon, 1988; Larkin, McDermott, Simon, & Simon, 1980; Lesgold, Feltovich, Glaser, & Wang, 1981; Newell, & Simon, 1972; Simon, & Gilmartin, 1973). The explanation is that the expert has knowledge about the focal type (Chi, 1981) of stimuli, their constraints, and their probable causes (Lesgold, 1981) as well as outcomes given specific interventions (Chase, & Simon, 1973b). This knowledge may be applied directly to relevant situations, thereby short-circuiting the need for elaborate reasoning. Clearly, this is a more economical way of thinking than engaging in laborious reasoning processes from scratch. Still, it must be remembered that this kind of processing presupposes years of intensive practise in a given field[3].

As argumented above, extensive contextual, or domain specific, knowledge is the basis for expert performance. Some authors have hinted to such knowledge in accounting for strategic performance. Mintzberg and Waters (1984) were very explicit on this point when discussing the

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[3] Hayes (1981) suggests that at least ten years of intensive experience in the field is necessary.

entrepreneur of a successful strategic turnaround: "A further point that emerged clearly in this study is that the key to generating such a vision [i.e. strategy formulation], and to changing it at the right time is intimate, detailed knowledge of the business. In discussing his firm's competitive advantage, Sam Steinberg (a successful entrepreneur) told us: "Nobody knew the grocery business like we did. Everything has to do with your knowledge". He added, "I knew merchandise, I knew costs, I knew selling, I knew customers, I knew everything...and I passed on all my knowledge; I kept teaching my people. That's the advantage we had. They could not touch us" (p. 64).

There seems to be reason to expect well developed knowledge representations relative to the domain of concern with experienced managers, and that this furthers better strategy formulations. It goes without saying that experience in a domain endows one with a lot of varied knowledge of the episodic type. The constant need to translate strategic stimuli into issues make it reasonable to expect development of the repertoire of semantic constructs specific for the managerial field also (Randall, 1977). The same demands should also secure a well developed adroitness of what to do and how to do it, contingent upon various situational characteristics. In other words, one would expect experienced strategists to exhibit a relatively distinct problem space when working on strategic problems or stimuli, due to the development of all three modes of representation.

The properties, related to knowledge, of experts' cognitive representations are addressed in two lines of research. For one thing, analysis of chess masters' performance indicate that they have at their disposal a substantial mass of 'if-then' connections (or what is called *productions*) (Chase, & Simon, 1973a; Chase, & Simon, 1973b; Simon, Gilmartin, 1973).

These are stored procedures to engage in given a certain condition or set of conditions, and the more such structures that are stored and accessible the better will be the performance due to the lesser need for processing capacity. One other set of studies have demonstrated that effectivity in processing may also be explained by the organization of representations around inferences about principles and abstractions subsuming concrete objects and events (Chi, Feltovich, & Glaser, 1981; Chi, Glaser, & Rees, 1982). These are principles not apparent in the problem situations, and must therefore be stored in the problem solvers' LTM. These studies have something to say about what to expect with regard to the kind of knowledge experienced problemsolvers have that make them more efficient than those less experienced. They do not, however, adress the issue of representational modes.

3.3. LEVELS

The idea that cognitive processes and content are organized according to levels has a somewhat complex background. On the one hand, it is well known and not a quite new one (Bartlett, 1941). On the other hand, the idea creeps into discussions on cognition here and there (Broadbent, 1977; Lindsay, & Norman, 1977; Powers, 1973; Powers, 1978) and seems to have a kind of general acceptance. Here, it is the cognitive representations of individuals that are in focus. Therefore, the concept of levels of cognitive *content* will be discussed in the following.

In a line of research on the control of behavior, standards of performance is held to be organized hierarchically in levels (Carver, & Scheier,

1981; Powers, 1973; Powers, 1978). The higher levels, in these authors' view, are cognitive structures in the form of values or perceived norms and programs prescribing behavior to accomplish these goals. The concept of cognitive schema also embodies this idea. It has been noted, for example, that these cognitive units may be nested within each other, making otherwise complex processing of information less demanding (Rumelhart, 1980), because of the structural net of associations inherent in such an architecture. Categories are also held to be organized by levels of abstraction. Studying natural categories of ethnic groups, Brent (1978), for example, identified as many as six different levels of category abstraction. All these levels are, however, probably not of equal importance. It has been argued (Rosch, Mervis, Gray, Johnsen, & Boyes-Braem, 1976) that what has been called the basic level (Rosch, 1978) is used more frequently than others. The reason behind this is that this level carries the most information about the environment. This level represent an intermediate degree of generality with an optimal number of attributes, making it rich enough for perceiving a complex environment and yet simple enough for processing by limited cognitive resources, as well as corresponding to 'natural' units of phenomena (Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976). One recent study of managerial categorisation of organizational forms (Porac, & Thomas, 1988) demonstrated that their categories were indeed organized hierarchically and that their conceptualizations centered around "an information-rich middle level of abstraction" (p. 25).

This vertical organization of categories according to levels, in addition to other findings, resulted in a maladaptively narrow definition of the competitive environment (Porac, & Thomas, 1988). However, the hierarchically structured knowledge may also be argued to enhance the

processing of complex data. It has been suggested that experience with a particular domain result in the *integration* of knowledge at different levels of abstraction into tree-like hierarchical structures (Fiske, Kinder, & Larter, 1983; McKeithen, Reitman, Rueter, & Hirtle, 1981). This kind of association would make it easy for the experienced individual to shuttle between theoretical principles and their particular exemplars at the "real life" level. Therefore, they should be better at perceiving underlying patterns of a given phenomenon, which greatly enhances diagnostic skills (Lesgold, 1984; Lesgold, Feltovich, Glaser, & Wang). In addition, this kind of structure makes possible rapid association between features of the concrete problem situation and the more general problem categories, thus giving access to a repertoire of 'proof' methods and procedures for solving the problem (see also Weaver & Carrol, 1984). While not pursuing the theme of integration, Selnes and Troye (1988) report some results supporting the idea of levels of knowledge. They demonstrate that some conflicting findings on the relationship between cognitive complexity and information search may be reconciled by viewing the data according to the level of knowledge, or expertise, as are their particular focus.

With the above discussion as point of departure, it seems valuable to distinguish between at least four levels of knowledge concerning strategic management:

Level I: Knowledge about a particular organization and its domain of action.

Level II: Knowledge about a particular industry.

Level III: Knowledge of strategic management in general

Level IV: Knowledge of theories addressing strategy and strategic management.

The first level refers to events and facts relative to one particular firm or organization. This may be significant events, knowledge of standard operating procedures, goals, how things are done in a specific organization, important people, salient competitors and customers, its products etc. The second level concerns knowledge about a particular industry's level of competition, its significant actors and their characteristic behavior patterns, the products' stage in the life cycle, customer characteristica etc. The third level consists of context-free ideas and principles pertaining to the field of strategy and adaption to environment generally. This may be ideas about such things as competitors and their actions, economy issues and administrative matters (internal environment). The fourth level consists of the theory domain of strategic management: concepts and principles, and their interrelationships. While the two lowest levels may be viewed as concrete exemplars of abstract categories, the third level consists of the categories themselves, their attributes and relationships between those categories and their attributes. In this perspective, the fourth level may be seen as sets of rules relating the categories to each other.

Experience may influence this structure of levels in several ways. First of all, one would expect level 1 and 2 to be quantitatively developed as a function of experience. It is quite possible to gain a good working insight into a particular organization and/or an industry by attending to the press, doing study and monitoring other sources of information. On the other hand, experiential involvement with an organization or industry obviously exposes one to more data about these domains. One would also, by the same line of reasoning, assume a qualitative development of these two levels as a function of experience since length and degree of involvement would expose one to

other kinds of data in addition to more of it. The third and fourth levels are less clear concerning the effect of experience. On the one hand, studies of experts have demonstrated that they do indeed have greater knowledge of general principles as well as theories than others. But this is hardly surprising in view of the fact that the experts studied have largely been professors in fields like physics and mathematics (Chi, Feltovich, & Glaser, 1981; Larkin, McDermott, Simon, & Simon, 1980). The issue is probably less clear when it comes to more 'applied' fields like strategic management. This is, after all, an extremely action-oriented profession, and studies of leaders repeatedly find that they spend little or no time in the kind of activity associated with theoretical analyses (Kotter, 1982; Mintzberg, 1973). Moreover, anecdotal data suggest that theoretical knowledge of business strategy are viewed with some degree of wariness, at best, by many managers. In sum, then, empirical studies of experts in other fields suggest that a thorough command of theoretical principles is associated with experience, but the generality of this findings to the field of strategic management is uncertain.

3.4. SUMMARY MODEL

As indicated, EIs are probably best conceptualized as a kind of cognitive schemas for cognitive processing of strategy-related information. They contain relevant information in several representational modes. Experience is postulated to further the development of EI in regard to amount of knowledge accumulated, its complexity and structural organization. This development, in turn, is assumed to lead to more effectively formulated strategic issues through better exploitation of the limited capacity of STM. This line of argument is illustrated in fig. 3.5.

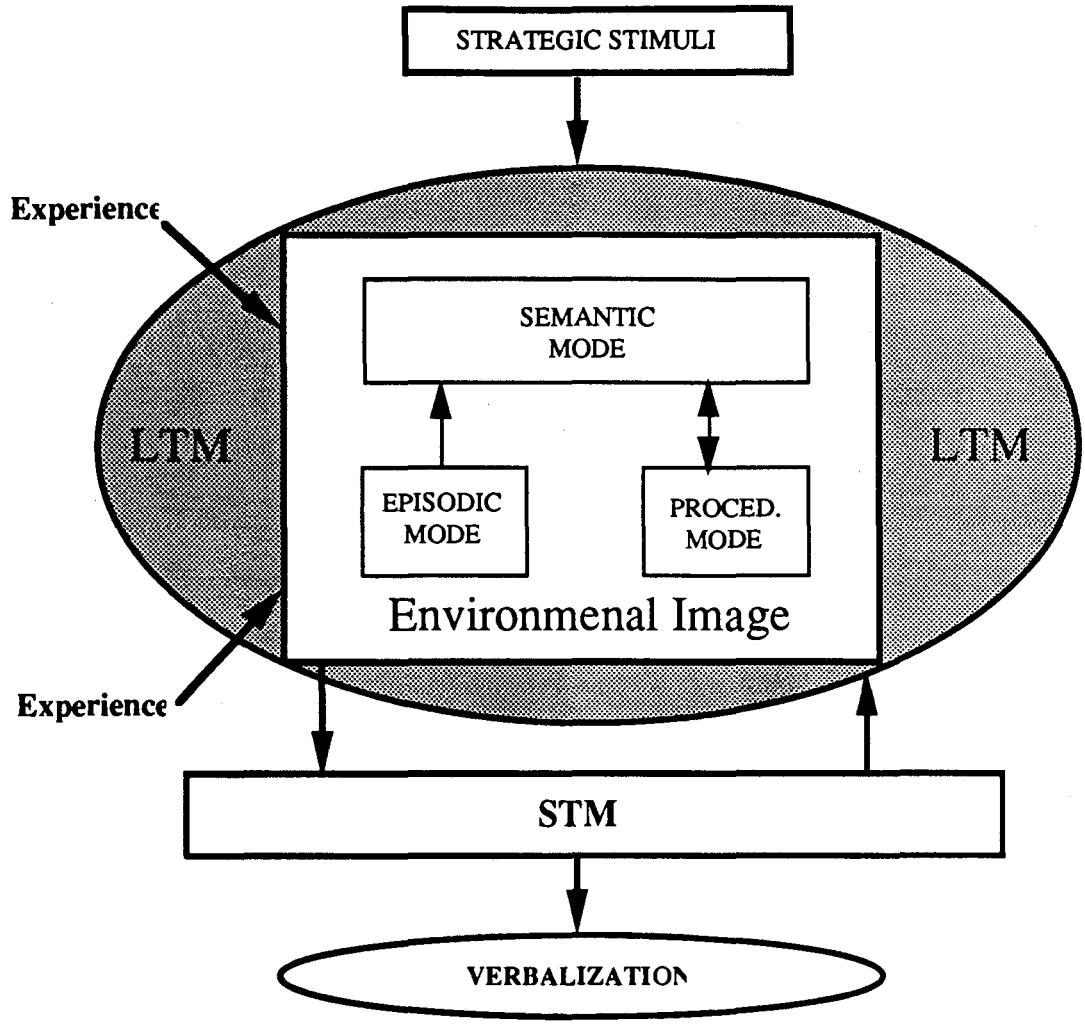

Fig. 3.5.: Conceptual Model

The model should be read as follows: Environmental images are subsets of individuals' long term memory. They are developed as integrated structures of the three representational modes through experience, in a particular domain of action. These images are accessed by operations in STM

when responding to strategic stimuli. The results of those routines, which are held in STM as successive states of the processes, may be verbalized. The verbalizations correspond, in this study, to the verbal protocol. Several points of importance should be noted with respect to the model. For one thing, EIs are developed relative to a particular sphere of experience. Second, development here means enrichment of the contents of the three representational modes and their integration. Third, the semantic mode is held to be central relative to the others, because it is here conceptual modelling of the environment must occur. This modelling, or symbolic manipulation, of the environment may be the essential key to understand managerial behavior. As for the other two modes, they are conceptualized as supporting systems relative to the semantic. As argued earlier, episodic material may serve as a repertoir of experiences that can be coded or recoded by the semantic representational mode. Procedural material, on the other hand, serve as a repertoir of procedures to follow in order to implement plans and as a source of schemas or prototypes for recognizing situations, especially those with strong elements of transactional contents. Fourth, the verbalizations are seen as completetely contingent on the content of short term memory (STM). Fifth, the EIs are activated by strategic stimuli. Last, the verbalizations, or output in the form of strategic issues perceived and elaborated on, are contingent upon the processes in and between the EI and STM. Consequently, the quality of the output will also depend on those cognitive processes and structures.

CHAPTER 4

Hypotheses

As indicated, this study addresses the relation between experience and environmental images through the analysis of verbal protocols. These data are held to be the result of processes and content of the subjects' short term memory (STM) at the time of protocol production (Ericsson, & Simon, 1984). This processing, and its content, is based on the subjects' EI which is being accessed at the time of protocol production. Some hypotheses for empirical testing of the expected relationships between these data are offered below. The hypotheses are formulated with regard to the protocols, and not the EI themselves, because cognitive entities are by their nature not observable. By analyzing the verbal output, however, one learns about the properties of the EI held to produce the verbalizations.

Hypothesis 1 builds on the discussion of the episodic mode and the importance of an extensive base for advanced cognitive behavior, together with the belief that experienced problems-solvers' cognition is more integrated than that of the inexperienced. Hypothesis 2 focuses upon the procedural representational mode, and otherwise builds upon the same principles as H1. Hypotheses 3,4 and 5 adress issues related to the semantic representational

mode. Those hypotheses also build upon the same premises as the H1 and H2, in addition to the principle of *levels*.

HYPOTHESIS 1

Experienced strategists' verbal protocols will contain more statements referring to episodic material than those of the inexperienced.

As will be recalled, it was argued that there is reason to think of cognitive representations as a composite of three different modes of operation (Paivio, 1986; Tulving, 1972; Tulving, 1985; Winograd, 1975). One of them is the episodic, which basically is memory of personally related events, and other non-verbal representations. Having such representations is a general cognitive property equal to all. Basically, therefore, variations in verbalizations referring to such representations should reflect either differences in communicative style or situational demands.

On the other hand, people with experience in the strategy domain should have more episodic material relevant for this kind of practise at their disposal. This is based on the rather prosaic observation that spending time in a certain environment exposes one to stimuli particular for that domain. While there is no reason to expect all those stimuli to result in conceptual processing and learning, they probably are stored in some preconceptual (episodic) form as memories (Penfield, 1959). In addition, such material should be more available due to priming effects well known from associative studies (Meyer, & Schvaneveldt, 1971). The importance of availability, and the role of episodic material in making information available, are well documented in studies of cognitive heuristics (Tversky, & Kahneman, 1973). Having more of relevant

episodes stored in memory, and these being primed through constantly relating to this problem domain in practical use, one would expect experience to result in higher frequencies of referrals to episodic content when solving problems of this domain. It has, for instance, been demonstrated that managers rely on analoguous reasoning to a greater degree than students when working on business cases (Isenberg, 1986), which may be interpreted as an indication of use of episodic material.

When the individuals access their episodic content in LTM, the chosen material is represented in STM and may be given semantic form. These data may then be verbalized by the individual, and there is reason to believe that verbal protocols are valid indicators of STM material (Ericsson, & Simon, 1980). Therefore, one expects a higher incidence of episodic content in the protocols of experienced strategists relative to the novices. To my knowledge, there are no studies addressing this particular relationship. At the same time, the general interaction between the two modes of representation referred to has been suggested elsewhere (Paivio, 1986). Therefore, the empirical investigation of the suggested relationship between experience and the enhanced integration of episodic and semantic memory has some interest in a wider theoretical context as well as the strategy management field.

To sum it all up, there is reason to believe that experience is associated with a higher incident of episodic material in the verbal protocol. This is of interest because it would be an indication of a more developed episodic representational memory, and/or a better integration between this mode and the semantic.

HYPOTHESIS 2

Experienced strategists' verbal protocols will contain more statements referring to procedural material than those of the inexperienced.

The access to episodic content is of interest because of the opportunity for development of the semantic representation offered by such an association. Procedural representations are of interest here because of the highly action-oriented nature of managerial work (Kotter, 1982; Mintzberg, 1973). Procedural representations may be thought of as scripts, or programs, for behavioral acts (Bartlett, 1941; Carver, & Scheier, 1981; Powers, 1973; Schank, & Abelson, 1977). These acts may be motorically simple and have short time-spans, like for instance signing a letter. Other, and more important procedures are very difficult to describe, not to mention prescribe, because their optimal form is simply not known. On the other hand, some of the scripts managers engage in are known by their labels. Some examples are: Building networks, motivating people, managing projects and planning.

Through a relevant education one may learn about the kind of procedures constituting a large part of strategic management. There are, however, several problems associated with this learning relative to the real world. First, there is seldom any learning of procedures at all. Usually one learns **principles**: Under what circumstances will this and that have so and so consequences; what is it all about; how did it develop; what is its relationship to other parts of the field, etc. Business strategy as teached in the typical business school is actually a good case in point. In most courses of this sort, the student

will read about theories and models, get them illustrated through lectures and even apply them to cases. Unfortunately, it is all verbal activities and more often than not carefully distanced from particular contexts. What is learned, then, is in large part about the labels and categories of procedures, and not the procedures themselves. Second, very little is known about the procedures that managers actually engage in. Further, the procedures that are known have a low level of specificity. While there are some very few exceptions (see for example Mintzberg, 1973) concerning managers, the specialized functions of **strategists** have not been studied at all, in this context. In other words, little is known about what procedures are central for strategists and even less is known about their structure and how they should be executed.

When the educational system can't provide students with the proper experiences to develop a repertoir of procedures relevant for management and strategy related tasks, experience is the only alternative. Besides, even if education could provide this learning, added experience should provide the subject with a still greater quantity of procedures richer in detail and better adapted to contextual constraints. The rationale for this conjecture lies in the variation in situations met and consequences learned from acts in different contingencies. Further, implementing intentions exposes one to a host of practical details not captured in books and lectures.

In light of the above discussion, then, it is natural to expect an association between experience and the development of procedural material. Also, because of the action-dominated nature of managerial work, one would expect such material to be more salient and better integrated with the semantic mode, in the experienced group. Consequently, their protocols should be richer in procedural content.

HYPOTHESIS 3

Experienced strategists' verbal protocols will contain more statements reflecting contextual semantic-representational material than those of the inexperienced.

As will be recalled, it was argued that the cognitive content may be seen as organized in levels, and that the basis for expert cognition is an extensive knowledge base. The essence of this hypothesis is that experienced managers have more knowledge particular to their organization and industry (Levels I and II), which is used actively when working on strategic problems. The importance of this proposition lies in its implication for how a mind, practised in a particular field, works. It is almost a truism that intelligence is a function of general problem-solving techniques. Slowly, however, there is developing the view that intelligent thinking may be better understood in terms of knowledge-based cognitve strategies. As was indicated in the chapter on expertise, skilled cognitive performance seems to be closely related to recognition and matching of patterns to stored memory structures (Anderson, 1985; Chase, & Simon, 1973b; Chi, Feltovich, & Glaser; Fiske, Kinder, & Larter, 1983; Weaver, & Carrol, 1984): "...It is by no means obvious that very smart people are that way directly because of the superior power of their general methods—as compared with average people—A very intelligent person might be that way because of specific local features of his knowledge-organizing knowledge rather than because of global qualities of his 'thinking'" (Minsky, & Papert, 1974:59). This is an important insight which, if it applies to the managerial field, will have some consequences for how recruitment, training and education of managers should be done. The point being made here is that there may be a closer link between experience and intelligence than is

usually appreciated, and that a higher value should be placed on intensive practise in a given field. In recruiting managers, on should, perhaps, be more attentive to their level of experience with the particular industry. In their training, one of the goals should be to offer relevant experiences in a systematic way.

Experienced decisionmakers and problemsolvers seem indeed, to a large degree, to base their behavior upon a well-developed knowledge base specific for their particular domain of practise (Fiske, Kinder, & Larter, 1983). This makes them less dependent on the relatively slow cognitive strategies of general reasoning processes (Greeno, & Simon, 1988) and more general levels of knowledge. While studies of physicists, mathematicians, physicians and even shop-lifters support the conjecture of reliance on domain specific knowledge, there are no studies of managers that are of immediate relevance here. Still, there are some studies of managers that point in this direction and that were cited earlier (Kotter, 1982; Mintzberg, 1973; Mintzberg, & Waters, 1984). The problem with these studies is that they are all of an impressionistic and anecdotal nature, and the data are not available for verification. Therefore, it is of interest to examine this relationship in a more controlled setting.

To the degree that their protocols are valid and reliable reflections of the EIs, the content of those protocols should evidence a particular development of the first two levels of representational abstraction, in the experienced subjects group. The first level is developed as a function of working with a particular organization. Such knowledge is important because it provides the subject with the information on the 'nuts and bolts' of his/her firm, which in its turn is necessary to appreciate its idiosyncratic domain of action. The second level, which is knowledge about the industry in question is also naturally

developed through working withing the industry. Every industry has its own profile of elements such as products, markets and customers. In addition, they all have their own history and potential for future development. These are data which demand a certain time to gather and integrate. In other words, it takes practise and experience to know a business in a competent way.

The particular relationship proposed here between contextual knowledge and competence have been pointed out as a condition for applying the powerful problem solving strategy called 'Working Forward' (Greeno, & Simon, 1988). The use of this kind of strategy is one of the salient traits of expert problem solvers. What has received less attention is some recent ideas (see for example Minsky, & Papert, 1974) that such knowledge may be closer associated with intelligence than generally allowed for. In other words, intelligence may be understood in terms of the following function:

Intelligence = f (G x S) + **CSK**, where

G =	General cognitive competency
S =	Specific cognitive skills as for example verbal and sensorimotor capabilities
CSK =	Context specific knowledge

If this conceptualization of intelligence is accepted[4], it follows that having context specific knowledge will enhance cognitive processing relative to a particular domain, even though intelligence is not completely contingent upon it. Therefore, experienced managers should have an advantage relative to inexperienced subjects, even though the two groups may be comparable

[4] The CSK element account for the fact that intelligence tests are culture-specific as well as fact that familiarity with a particular intelligence test result in a higher score.

otherwise with regard to intelligence. In sum, there is reason to expect experienced subjects' protocols to contain more context specific material than those of the inexperienced.

HYPOTHESIS 4

Inexperienced subjects' verbal protocols will contain more statements reflecting context free semantic-representational material than those of the experienced.

As pointed out earlier, the concept of levels is important when discussing human cognition, and it was argued that contextual knowledge may account for some measure of skilled cognitive performance. Still, all situations cannot be known by all, and human cognition can, after all, handle stimuli that have not been met before. Therefore, there must be some mechanism one resorts to when this is the case. Those mechanisms have been identified as general problem solving strategies (Anderson, 1985), and have been referred to as 'Weak Methods' (Greeno, & Simon, 1989) because they are slow and unreliable. One example of such strategies is that of working incrementally towards states gradually resembling the desired goal. The attractive side of these methods is that they do not rest on a base of domain specific knowledge. All that is needed is some general frame of reference. For example, knowing nothing about banks one can still analyze their environment by considering competitors, potential product substitutes, movements in customer base etc.

Context free knowledge, in this case general knowledge pertaining to business strategy and applicable to all sorts of businesses (Level III), seems to be a reasonable compensation for contextual knowledge. General principles, concepts and systems are exactly the things schools are best at teaching, according to prevalent opinions (see for example Leavitt, 1989). Therefore, one is justified in expecting the inexperienced subjects to have this kind of knowledge, as well as making use of it when working on the cases, in order to compensate for the lack of more concrete information. Consequently, it is reasonable to predict a higher incidence of statements reflecting context free knowledge, relative to business strategy, in the inexperienced subjects' protocols.

HYPOTHESIS 5

Inexperienced subjects' verbal protocols will contain more statements reflecting theory-based semantic-representational material than those of the experienced.

Experience certainly offers empirical support and authorization for positions taken relative to the domain in question. This is of importance for the following reason. A line of argument, of the sort met in the protocols, is difficult to defend without some source of legitimization. If not explicitly expressed, a tacit basis of this sort would still make the subject more comfortable when arguing for his/her viewpoints. The experienced subjects will probably possess this sort of basis in their background of exposures to real

phenomena; they have first-hand experience from which they may argue. The inexperienced subjects, on the other hand, lack this kind of background relevant for the problems presented with in this study. Therefore, it is reasonable to expect them to resort to established theories, models and authors of the field of business strategy (Level IV) instead. This is, after all, also an accepted way of legitimizing arguments.

Theories also serve another function: They direct attention towards relevant concepts and they help focus on central issues. As was argumented earlier the experienced problem solvers probably have stored categories of problem situations in their memory. When exposed to stimuli, they apply the categories to the stimulus-situation and thereby gain access to strategies and solution-standards proved to be effective in past events with similar attributes. In other words, the experienced subjects doesn't need theories to the same extent as the inexperienced. The latter group have not developed the same repertoir of categories pertainting to strategic situations. Therefore they must find support in the models and theories they know, in order to handle the new situation cognitively. When facing a situation of declining market shares, for example, the experienced subjects may respond with a similar case they have been exposed to, frame the problem accordingly and pick out the salient elements explaining the situation according to their stored interpretation of the event. The inexperienced subjects, on the other hand, have no other choice than applying theory-based knowledge to the problem.

In light of the discussion above, then, it is predicted that the inexperienced subjects' verbal protocols will contain a higher incident of referrals to theory than those of the experienced. This verbal behavior is taken

to reflect, on behalf of the experienced group, EIs richer in contextual experiential content and particularly adapted to strategy related issues.

PART III

Research Design and Measurement

CHAPTER 5

Research Design and Datacollection

The hypotheses serve as directions for empirical investigation of the relationship between experience and the environmental images. A discussion of how the data are collected and analyzed follows.

5.1. REQUIREMENTS OF THE STUDY

The general idea of this study is to analyze the characteristics of experienced strategists' environmental representations relative to novices'. The point of departure is theories and concepts developed in other fields of study. The study is focusing primarily on theory-testing. The hypotheses are formulated as propositions about relationsships between experience and certain cognitive

characteristics. Therefore, the study is descriptive; the goal is to examine some hypothesized relationships between strategy related experience and cognition.

The nature of a study has implications for which requirements it is supposed to meet. In the case of theory-testing it has been suggested (Cook, & Campell, 1979:83) that internal, construct, statistical conclusion and external validity are given priority in that particular order, since it is impossible in practise to attain the same high validity on all four dimensions in the same study. Internal validity refers to the validity with which a relationship between two variables are inferred as causal (see Cook and Campell, 1979:37). Through a study's design, internal validity may, in principle, be enhanced. The present study, however, is of a descriptive nature and the question of causality is not pursued. This makes the problem of internal validity redundant, given the definition of the term above. On the other hand, the principle of internal validity as a check on a study's robustness with respect to alternative interpretations of the relationships analyzed may be generalized to other types of relationsships. Therefore, the present study will be analyzed relative to its power in eliminating competing explanations.

Operationalization of the theoretical constructs is an important part of controlling the construct validity of a study, and variance in the variables of a study is a prerequisite for statistical analysis. Statistical conclusion validity is related to the conclusions reached through statistical processing of the data—the degree of confidence one can have in these conclusions given the constraints of the statistical methods used relative to the datas' nature. Lastly, external validity refers to the validity with which the findings can be generalized to alternate measures, persons, settings and times (Cook, & Campell, 1979:37). It is suggested here, then, that internal, construct and statistical conclusion

validity are of the most central concern for this study. The observations noted in this chapter makes the study's design (internal validity) and the operationalization of the theoretical constructs (construct validity) significant, along with the need for adequate variance for statistical processing.

In order to test the hypotheses empirically, within the validity constraints indicated above, some requirements may be delineated. The first of these is related to the design of the study, the second to the measurement of the concepts and the third to the need for variance in the data. Relative to internal validity, as conceived above, the study has to be designed so that it is possible to isolate the variance in cognitive characteristics that is associated with experience. How this is attained is discussed in the next section. Concerning measurement, the hypotheses are formulated on the background of the expected distribution of some specified cognitive characteristics according to level of experience. These characteristics obviously have to be measured in order to be tested for their relationships with experience. The question of construct validity of these measures are dealt with in chapter 6, while the procedure of their collection is described in the next section. Concerning variance, two groups of research subjects were selected: One group of managers with strategy-related experience and one group of students without this kind of experience. Since the relationships focused upon by the hypotheses are all related to the variable 'experience', it was assumed necessary to polarize the variance here as much as possible. The concrete sampling procedure is presented in the following.

The following sections are, together, a detailed account on how the study was carried out together with a discussion of validity problems. The chapter is then summed up with a discussion of the study's overall strengths and weaknesses in relation to the validity concept.

5.2. QUASI EXPERIMENT

The purpose of the empirical analysis is to test hypotheses about the characteristics of experienced strategists' cognitive representations. Normally, when the goal is to study the relations between variables, one would choose a purely descriptive design as long as variance in the proper variables is secured (Churchill, 1979). Here, however, it was decided to use a contrasted groups design. This is a research set-up belonging to what has become known as 'quasi experiments' (Nachmias, & Nachmias, 1981). As will be accounted for below, this kind of design has some weaknesses associated with it when it comes to inferring causal relationships (internal validity) but are otherwise well suited for maximizing variance in the predictor variable.

Contrasted groups designs are characterized by the comparison of groups that differ on the dimension under study, without random assignment of individuals to the various groups. This implies a deviation from the classic experiment pointing to some threats to internal validity[5]. Generally, the problems may be tracked to the fact that the two groups will differ from one another in other ways than what is controlled for through their selection. In the present study, experienced managers were assigned to the experimental group with the intention to measure associations between experience and the specified cognitive characteristics. Students were assigned to the comparison group because they lack this kind of experience[6]. Because the individuals may, and

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[5] 'Internal validity' is here referred to in its extended, as well as traditional, sense discussed earlier.

[6] This is also the procedure which has gained precedence in this kind of research in other fields (c.f. Chi, Feltovich & Glaser, 1981).

probably do, differ on other dimensions than that of experience with strategy related decisions, the measured differences between the two groups may be caused by these other influences. The classes of these alternate influences are, however, identified, and some of them are not relevant for this particular study while some others are controlled for to a certain extent. These subjects are discussed more thoroughly later.

5.3. SAMPLE

As already indicated, the study is an analysis of the responses of two contrasting groups of individuals. The selection of those individuals, and their subsequent assignment to one group or the other, was based upon several criteria. The first of these is related to the construct 'experience'. The study's main objective is to analyze relationships between strategic work experience and cognitive representations. Therefore, it was necessary to secure variance on the experience dimension. Since it was impossible to know the degree of impact of various levels of experience upon the cognitive structures, it was decided to polarize the experience dimension as much as possible. This intention was pursued by selecting 10 managers with several years of experience (table 5.3.1.) with strategic work[7], and 10 students with no such experience as comparison group.

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[7] Those were top- and middle level managers from four large Norwegian banks. The managers had all profit/loss responsibility and belonged to various functional departments. About half the banks were commercial and the rest were savings banks. All were situated in Bergen, Norway.

Table.5.3.1.: Table of Sample's Demographics

	DEMOGRAPHICS[1]						
GROUPS	AGE	Y.B.[2]	S.E.B.	S.E.O.I.	S.E.T.	H. E.	M.D.
MANAGERS	43.50	13.05	7.40	3.80	11.20	3	10
STUDENTS	31.00	0.20[3]	0.00	0.00	0.00	9	0

N = 20

[1] All numbers are means, except for M.D.

[2] Y.B.= Years of experience in the banking business
S.E.B.= Years of experience with strategic tasks in the banking business
S.E.O.I.= Years of experience with strategic tasks in other businesses
S.E.T.= Yeears of experience with strategic tasks in total
H.E.= Years of education in addition to economics/business adm. at the Graduate level
M.D.= Participation in management development programs (frequency where 1=yes, 0=no)

[3] One student had worked about two years in a bank

This may seem a small number of subjects, and the power of statistical comparisons is indeed decreased by this. On the other hand, there is established a precedence for such small numbers due to the high cost of transcribing and coding the protocols. Therefore, a group of 20 subjects is consistent with similar research and is even on the higher side. Isenberg (1986) had 15 subjects of which 12 was managers. Adelson (1981) had a total of 10 subjects, Bouwman (1984) had eight subjects and Chase and Simon used a total of three chess players. The managers were contacted through personal networks, and all of those contacted agreed to participate. The student group consisted of research assistants at the graduate level, at the Norwegian School of Economics and Business Administration. All the students approached agreed to participate.

In this type of design, internal validity is especially dependent upon the samples' characteristics, because differences along dimensions other than experience may, potentially, explain variations in the criterion variables. This threat is impossible to eliminate entirely, but on the other hand it may be alleviated with careful selection of the samples and cautious interpretation of the data. Consequently, the two groups were matched on some of the most obvious potentially confounding dimensions. One of the most important of those is probably that of education. Different training background would provide the individuals with dissimilar conceptual backgrounds, at the least. Therefore, care was taken that the two groups were matched as much as possible conserning level and type of education. From table 5.3.1. it is clear that all the individuals except one have BA bacground. The students have, however, more education since most of them were in a Ph.d. program. The managers, on the other hand, had all, except for one individual, participated in several management development programs and some of them had also higher education. In sum, the two groups' educational background seem reasonably similar. Sex is another potentially confounding variable, because men and women obviously have different experiences. However, the two groups are almost perfectly matched in this respect, as there were two women in the student group and one in the managerial group. It may be argued that the differences in age (table 5.3.1.) pose a threat to the study's internal validity, because differences in the criterion variables may be due to general maturity and not the practising of a particular discipline. This issue might be met by using a contrasting group of the same age as the managers. This was not done because of practical problems with recruiting the research subjects. It is also questionable if the differences in age really do pose a threat. Time alone do not generate change in cognition, except for those contingent upon biological

development[8] (Piaget, 1952). What initiates change and learning are events and acts in the course of this time. Spending time practising a given discipline, therefore, seems to be a necessary condition for developing a certain level of mastery. Other potentially influencing variables can be imagined like socio-economic background, being brought up in or presently living in a milieu relevant for the study. As the subjects are not randomly assigned to the two groups, and the variables discussed above are not controlled for, they are acknowledged as potential threats to internal validity.

Since experience is impossible to emulate in the laboratory over a reasonable span of time, longitudinal and contrasted groups designs are the most central alternatives given the problem. The last type of design was chosen for the present study, due to practical constraints. With this as point of departure, care has been taken to preserve internal validity, as the concept is used here, to a reasonable degree.

Other types of validity must also be addressed in relation to the design and sampling procedure. The two most important of those, which are related to non-random assignment of individuals to study groups, are probably statistical conclusion- and external validity. The problem associated with statistical conclusion validity is, generally, violation of the assumptions of the statistical techniques used. This is treated in the discussion of the results. The problem with external validity is related to the fact that one cannot attach estimates of standard errors to the sample results. Thus, it is problematic to infer population characteristics, and relationships, from those of the sample. Again it must be

[8] Hardly a relevant issue here, since the groups do not differ that much in age, biologically seen.

emphasized, however, that the present study is primarily concerned with theory-testing. Therefore, external validity is not the central concern (Calder, Phillips, & Tybout, 1982).

5.4. DATA-COLLECTION PROCEDURE

The subjects were presented with four 'projective' minicases (discussed later) and taped while analyzing those cases, according to the following procedure: The interviews were conducted one at the time, by myself, at the subjects' convenience. All subjects were told that they would be presented with four minicases. They were instructed to analyze them, and suggest actions to engage in given the situations they perceived in the cases. They were also told that the cases contained little specific information, and that they were expected to supply whatever data they felt the cases missed and felt appropriate for explaining the cases. They were instructed to think aloud while working on the cases, which proved to present no difficulties. They were also encouraged to specify information which they would look for or want to have in order to respond properly. The cases were then presented them one at a time on a separate piece of paper. All respondents had the cases presented to them in exactly the same order.

In the course of this process, some questions typically arised with respect to the procedure, and sometimes relative to the interpretation of words or phrases. Since I myself administered all the sessions, it was easy to respond in a standard way to all such requests. All sessions were taped.

5.5. VERBAL PROTOCOLS

The subjects were tape recorded while thinking aloud as they analyzed and solved the four 'projective' mini-cases developed for this study. The tape recordings were then transcribed and typed. Lastly, the written protocols were studied and coded according to a coding scheme (Appendix 1). The categories were based upon the theories discussed earlier; the constructs and relationships between those constructs depicted in the conceptual model that was used to generate the hypotheses. In order to keep the leap of inference between the text and the theoretical categories as short as possible, sentences were chosen as units of analysis (Weber, 1985). These are blocks of information that are held to correspond directly to what is held in STM in 'real time' (Ericsson, & Simon, 1980; Ericsson, & Simon, 1984). Therefore, there is no inference from the text to the subjects' representations of the cases; the two things are identical.

The think-aloud method, called verbal protocol analysis, has been used frequently to study cognitive phenomena in general (Ericsson, & Simon, 1984). The method has also been used by researchers in management-related fields (Bouwman, 1982; Bouwman, 1984; Isenberg, 1986; Schweiger, Anderson, & Locke, 1985). Along with interest in the the method, discussions over its merit have appeared (Ericsson, & Simon, 1980; Ericsson, & Simon, 1984; Payne, Braunstein, & Carrol, 1978; Ungson, Braunstein, & Hall, 1981). The issues discussed include the accuracy and completeness of subjects' verbal reports (Nisbett, & DeCamp Wilson, 1977) as well as the obtrusiveness of the thinking-aloud process (Schweiger, 1983). So far, the verdict seem to be generally in favor of the method (Ericsson, & Simon, 1984).

The use of verbal protocols may be evaluated with respect to reliability and validity. The discussion on verbal protocols' reliability is confounded by the various data sources referred to as verbal protocols. One major group is reports of internal states and processes which presuppose that the subjects have complete knowledge of their own mental processes, demonstrated without doubt not to be the case (Nisbett, & Wilson, 1977). One other kind of verbal protocols treats the verbalizations, as well as the knowledge and processes necessary to produce them, as data. Following this procedure, one is not forced to trust the subjects' interpretations and knowledge levels concerning their mental operations (Ericsson, & Simon, 1980).

Foremost of the last group of verbal reports, being the closest reflection of the cognitive process, is the concurrent verbal reports used in this study. In a comprehensive summary of the literature, Ericsson and Simon (op. cit.) argued, based upon generally accepted models of human information processing, that this type of verbal protocols is usually accurate and representative measures of cognitive processes. This is especially so, they argued, when subjects are reporting memory traces that are already in verbal form before they begin the process of verbalizing about them. This condition is presumably met in this study, because the subjects verbalized while reading and analyzing a written business case.

On the other hand, all data processing, also the analysis of verbal protocols, involves interpretation. The interesting question then is if, how and to what extent such data differs relative to other kinds of data: It has been suggested that raw data, in general, goes through a sequence of steps from the initial observation to the coded form used in the theoretical analysis (Coombs, 1964). In this process theory enters even in the first step of delimiting a

portion of the available universe of potentially observable behavior as relevant. At the next step, these behaviors are coded according to categories dictated by theory. Concerning verbal behavior, all auditory data are contained in tape recordings. Theory enters this stage in the parsing and segmenting of this material when transcribing it. In deciding what constitutes units of verbalizations, the coders apply grammatical, linguistic and other rules that may help bracketing the stream of sounds making up a verbal protocol. As one is here relying on culturally shared rules, there should be small variations between coders, and coders and subjects, at this stage.

In the next phase, the units are encoded into the categories delineated by the theoretical model which is the basis for the particular study. Human judges, or computers, make the coding assessments based upon a coding scheme decided upon earlier. The utility of the categories decided upon is a function of the model selected for study. What may be of more immediate concern is the reliability of the decisions which segments are assigned to what category. Three types of reliability seems to be of special importance for content analysis in this context; *stability*, *reproducibility*, and *accuracy* (Krippendorff, 1980). Stability refers to the invariability of the results of content analysis over time. This kind of reliability can be ascertained by having the material coded at different time interval by the same coder. Because only one person does the coding, this is the weakest form of reliability. Reproducibility is also known as intercoder reliability. When the results are stable across different coders, reproducibility is high. This kind of reliability is held to be a minimum standard for content analysis (Weber, 1985). Accuracy is the strongest form of reliability, and refers to the degree to which the classification of text correspond to a standard or norm. The problem with this

is that such standards very seldom exist. Consequently, this measure of reliability is not often used by researchers.

In this study, reproducibility is proposed as a measure of reliability since stability is too weak a measure and there is no standard to relate to in order to assess accuracy. Intercoder reliability is also generally accepted as an adequate measure of reliability in the behavioral and social sciences. In sum, then, the data of verbal protocols are available for the same kind of verification as those collected by other kinds of observation.

The question of validity is more complex, as in most other kinds of empirical research. Validity, in protocol analysis, is probably most critical in the relationship between the categories decided upon and their empirical counterparts in the form of for instance words, sentences and paragraphs. This is essentially the question of semantic validity (Krippendorff, 1980), which exists when persons familiar with the texts examine lists of units placed in the same category and agree that these units have the same meanings. The analysis of verbal protocols are open to misinterpretations because of a range of ambiguities inherent in language. For example, should the sentence "I was so sure about it!" be categorized as reference to an earlier experience or the subject's remark to his/her own behavior in the research situation? Semantic validity may be measured formally by having expert judges categorize units on the basis of their semantic similarities, and comparing their output with the categorized units based upon the analytic procedure by other persons (Krippendorff, 1980). In the present study, semantic validity was controlled for less formally through consultation with several persons with expertise in the field of strategy when developing the categories. Although this is a less desirable procedure, it is frequently used and demands less resources, which

was a pertinent requirement for this study. In addition, the categories were defined conceptually very close to the actual text, in order to minimize the amount of inference needed. If the protocols are valid data with respect to the subjects' strategic images, would other kinds of measurement covary with the data obtained from the protocols? This is basically the question of construct validity, which is dealt with in the next chapter.

5.6. CASES

We wanted to study top managers with strategic experience. It would be very hard to have such individuals commit themselves to the time and inconvenience involved in a laboratory setting. Therefore, strategic stimuli were presented to them in the form of four business cases in written form, a procedure which has gained precedence in the literature (Dearborn, & Simon, 1958; Isenberg, 1986).

The cases were developed for this particular study. Since the objective was to study the subjects' cognitive representations several requirements had to be met. First, the extent of the subjects' contextual knowledge was expected to vary. Therefore, the cases just sketch strategic situations in the managers' fields. This is one way to make respondents provide elements from their own knowledge-base and its structure, which was one object of the study. The rationale behind this procedure is well developed in literature on projective tests in clinical and experimental psychology (cf Kleinmuntz, 1967). Second, we wanted cases that stimulated large productions of verbal protocols in order to sample as much as possible of their representations. Therefore, four minicases

(instead of one as is usual) of varying degrees of specificity and 'structuredness' were developed and tested before use. The design of the cases was done by myself and a professor in the field of Market Economy. The cases' themes were selected from the banking industry, and incorporated current events covered by the Norwegian press at the time, as well as elements basic to strategic management as a theoretical field. The idea behind this was simply to secure some degree of representativeness of the field both in in its theoretical and practial aspects. In addition to concern about the cases' contents, they were designed on the basis of a particular categorisation of strategic stimuli. It has been argued that strategic stimuli, or strategic signals, vary in strength (Mintzberg, Raisinghani, & Thèoret, 1976). Strength refers here to the demand for immediate action implied by the stimuli. If, for example, the entire work force goes on strike, something usually has to be done within a short span of time. Work on problem solving and -formulation has indicated that it is of value to think of stimuli situations as more or less *structured* (Kaufmann, 1987b). In a structured problem situation, the goal and the means to reach the goal are known. In an unstructured situation those elements have to be established by the actor. Strategic stimuli may be categorized according to this dimension also. A trend in social values developing over years is one example of stimuli that one assume will represent some kind of issue, but when and how and with what implications are unclear. The dimensions of *strength* and *structuredness* form a matrix which was the basis for developing the cases (fig. 5.6.).

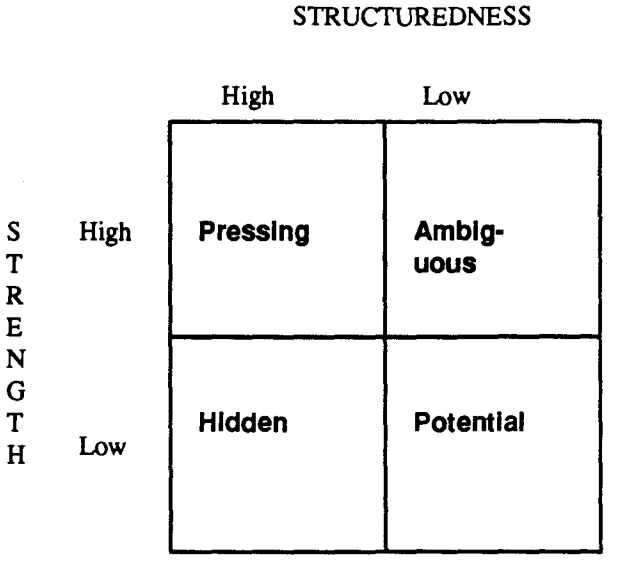

Fig. 5.6.: Categories of Strategic Stimuli

The matrix offers four categories of strategic stimuli: 1) *Pressing*, which are strong and clear signals that have to be acted upon without delay; 2) *Hidden* stimuli which are easy to interprete but that have to be uncovered; 3) *Ambiguous* stimuli which present themselves but must be interpreted through diagnosis; and 4) *Potential* stimuli that only exist as a possibility. These typically call for innovative behavior (Haukedal, 1989).

Each of the four cases were designed with reference to one of the cells in the above matrix, as an attempt to secure variation in the subjects' responses. The first case (Appendix 3) was designed to capture stimuli of the 'pressing' kind; the loss of market shares. This is a rather straight-forward situation not very demanding on the interpretation-side. The second case was written with the fourth cell, that of potential strategic stimuli, as reference. Here, the subjects had to generate the issue themselves completely, as this 'case' was just a request for a strategic plan. Interestingly, several of the managers spontaneously draw a parallel between this case and their own work. The third

case was rather clear in its implications, because first-buyers' home loans (Appendix 3) are not profitable for banks. On the other hand, this strategic stimulus was not strong because the case did not force one to give this kind of loans, and it was not specified how to give priority to the applicants. Therefore, this is an example of 'hidden' strategic stimuli; relatively clear in its implications but with no immediate demand for action. The fourth case was built on the third cell, which is that of 'ambiguous' stimuli. This is a case demanding that something be done, as it refers to an official regulation. It is, however, a completely new situation where the implications are not known. Therefore, it calls for diagnosis in order to adjust to the authorities' intentions and at the same time securing one's interests.

There is a subjective element in the two dimensions which these categories are built upon: For example, very explorative individuals confront more data than those less explorative. Therefore, what are strong stimuli for one individual may be weak to an other. This variable has been demonstrated to be related to innovativeness in problem solving (Kaufmann, 1987a) and creativity in art (Getzels, & Csikzentmihalyi, 1965; Getzels, & Csikzentmihalyi, 1975). Likewise, what is perceived as 'structured' is probably a function of both the stimulus and the subjects' level of knowledge relative to the stimulus' context. This is just another way to say that there will be variation in the ways that the various cases are perceived and responded to because individuals are different. And some of these differences are due to experience in the field of practise referred to in the cases.

CHAPTER 6

Variables: Their Reliability and Validity

In this chapter the variables' operationalizations are presented, along with the results of the testing of their reliability and validity. As noted earlier, the intercoder reliability is chosen as measure of reliability. Concerning validity, the discussion focuses upon the construct type.

6.1. OPERATIONALIZATION OF VARIABLES

In order to test the hypotheses empirically, the variables have to be operationalized. The conceptual model, and the hypotheses drawn from its relationships and specifications, are theoretical entities. By defining their observable aspects, through the operationalizing process, they are made accessible for empirical investigation (for a list of the names of the variables, please refer to table 6.3).

6.1.1. Experience

As indicated earlier, the concept of 'expertise' is difficult to operationalize because the very classification itself may be more theoretical than real in a substantive sense. On the other hand, it has been established without doubt that in a range of fields encompassing medicine, mathematics and physics, extensive practise gives the subject better problem representations. In chess, researchers have relied on the established classification of players as criteria for who are experts and who are not (Chase, & Simon, 1973a; Chase, & Simon, 1973b). When it comes to fields like physics and medicine it becomes more difficult. The general procedure has developed to accept practitioners and instructors with considerable experience as experts (Adelson, 1981; Bouwman, 1982; Chi, Feltovich, & Glaser; Lesgold, Feltovich, Glaser, & Wang; Weaver, & Carrol, 1984). This was also the procedure chosen here. The managers included in the study had all extensive experience with all aspects of strategic work in the banking industry. In this respect they are assumed to be more adept at responding to strategic stimuli than novices. It is also assumed that such performance was based on attributes of their environmental representations (EI). This variation is analyzed in the present study, therefore the issue of expertise or not is of rhetoric more than substantive interest in the present context.

Experience, then, is defined as the period of time working with strategic matters on a day-to-day basis and in the environment of the banking industry. The group of managers (EXPERTOR=1) has more experience (table 5.3.1.) and is therefore positively correlated with this variable, while the student group (EXPERTOR=0) were chosen on the criterion not to have this kind of experience. Thus, the variance on this variable is secured.

6.1.2. Environmental Images

EI is defined as the portion of LTM most relevant for strategy related problems, and it is known through a subjects' verbalizations. This raises a couple of issues which must be dealt with. First, the representations were argued to be partly of non-verbal character—that is the episodic and some aspects of the procedural representations. Episodic representations are nonverbal memory traces of personall experiences. It may then be argued that these representations can not be communicated verbally, because this amounts to semantic processing of the material. Verbal communications of episodic memory are therefore nothing else than the communication of semantic representations. This objection may be countered by several arguments. First, episodic representations are probably not possible to communicate at all as such; how could one make one's personal experiences, with all the feelings, moods and perceptual qualities generally, objective and available for others? The essential point here, however, is that we are not really interested in these experiences in themselves. What is of interest here is their significance for semantic processing, which is exactly what one gets. The verbalizations are the end-result of episodic material (when this is accessed) 'brought into' the semantic representational mode, processed there, fed into STM and communicated verbally. This brings the second point to attention, which is that the whole idea of episodic representations was offered in response to irregularities in research on semantic memory (Tulving, 1972; Tulving, 1983). A third argument is that we are not analyzing the *characteristics* of episodic representations per se, which might be biased by the verbal expression and recoding implied by that process. Instead, we are merely arguing for and

investigating the *existence* and *application* of such representations in relation to experience.

Another objection may be raised. If environmental images are known through the subjects' verbalizations—what is then the difference between these and other representations? To this it may be answered that the verbalizations referred to are responses to strategic stimuli. Knowledge and cognitive representations are not completely isolated 'things'. Rather, they are probably better conceptualized as a more or less integrated whole, parts of which may be more developed than others. According to stimuli, certain parts of this whole are excited and become active. In the case of the strategic stimuli the parts relevant to strategic problems/themes are activated, and these are what is referred to as 'environmental images'. In other words, EIs are the parts of LTM activated by strategic stimuli

6.1.3. Episodic representation.

As noted earlier, the measurement of episodic representations introduces some problems of its own. As far as I know, there is no standard procedure concerning the operationalization of this kind of representations. Nevertheless, given their nature as discussed earlier, it seems possible to detect the use of such representations through noting subjects' referrals to personal experiences and the use of analogies.

Concerning personal experiences, two conditions must be satisfied in order to qualify as referrals to episodic representations. First, the subject must use a personal referral like I, me, my, one and we. Second, the subject may use such referrals in contexts other than episodic memory as when reflecting on

how to proceed with solving the case. Therefore, the personal referral must be expressed in relation to an experience. These two conditions together imply that indications for episodic representations must be coded with larger units than single words. Since reliability is increased by holding units of text small (Weber, 1985), sentences are chosen as unit of analysis. In other words, sentences containing personal and experiential referrals are suggested as operationalizations of activated episodic representations (PERSEX).

The use of analogies may also be taken as indications of episodic activation. This is because subjects may use referrals to events as illustrations of their message, without semantical elaborations. By labelling such events, they trust the other party to have access to similar material in their memory, which they can draw upon in order to understand. Therefore, sentences containing analogous referrals (ANALOG) are also serving as operationalizations of episodic processing. These are verbalizations containing references to other events or phenomena in order to elaborate on or exemplify a theme connected with the work on the cases.

In sum then, two variables are taken as empirical evidence for the activation of episodic memory: Personal experience (PERSEX) and analog reasoning (ANALOG).

6.1.4. Procedural Representations

As pointed out earlier, EI consists of three representational modes. One of them is the procedural. This mode is operationalized as statements about actions referred to by the subject with respect to the cases (ACTION). There is a problem here because in some cases there may be ambiguity as to deciding if

the subject really is referring to some action, even though he/she certainly uses a verb. For example: "*Then you would have to find out if—if it is caused by one business area or the other*". On the one hand, 'find out' is a verb, and implies some sort of action or procedure. On the other hand, it is vague, general and tied to manners of speach, and do not communicate any obvious signal as to how the intention might be carried out. Therefore, this type of procedures was left out of the analysis. This left actions that was clearly labelled: "*First, you would have to do a market analysis*", or had a specific target in view: "*I would engage in some lobbying through the Association of Saving Banks, with respect to the authorities*". As before, sentences are chosen as units of analysis.

6.1.5. Contextual knowledge.

This refers to knowledge about a range of dimensions including material, economical, and social elements specific to the banking industry. Single words may be generally known but still have meaning-contents specific for this particular field. Therefore, sentences are again chosen as units of analysis. Specifically, the concern will be with 1) strategic issues (SPESTRA), or things associated with strategy, specific for the banking industry (for instance constraints specific for this particuar industry's environment), and 2) economical topics (SPESECON) specific for the banking industry (for example concern with operating capital).

There is one problem here because of the pervasive nature of the field of banking relative to the rest of the business field. All kinds of firms, businesses and organizations with some kind of economic concerns come into touch with a range of banking concepts. It was therefore decided that the

concepts did not have to belong to the banking industry exclusively in order to be coded in this category. They should rather be specific in the sense that they should refer to elements of the banking business even though relevant to other businesses as well. Risk capital, for example, is a term referring to a product in the banking business environment, but at the same time relevant for most firms of other businesses as well because of the almost universal nature of economy related concerns.

6.1.6. Context free strategy related statements

In contrast to contextual knowledge, context free statements are verbalizations that do not necessarily imply knowledge of the banking industry or its activities in other industries. Statements of general administrative/strategic principles, which may be applied to any organization existing in a changing environment, are operationalizations of this variable.

Two variables are taken as indicators of this kind and level of knowledge: 1) Strategic statements which are generic (GENSTRA) to the field of business strategy (for example: "This may be a potential entrant to the market"). 2) Economic matters generic to all industries (GENEC) where such concerns are relevant. These are mostly micro- and macro-economical matters like concerns about revenue and economical fluctuations in society (for detailed exposition of the operationalization of the specific variables the reader is referred to Appendix. 1).

6.1.7. Referrals to Theories and Models

These are references to theories, models and authors generally known from the field of business strategy or strategic management (THEORY).

6.2. THE CODING PROCEDURE

The statements of the protocols were categorized according to the rules formalized in the Codebook (App. 1). These rules were designed for the present study, as there are no standard procedures to apply. One important issue must be dealt with in this context. This is related to the choice between coding a given statement as belonging to one category only, or permitting it to be coded as belonging to several categories. The issue is an important one that has not been resolved in the central literature. The only advice given is that the researcher must choose one or the other, and be attentive to the consequences of the chosen procedure (see for example Weber, 1985).

Coding statements into several categories, if applicable, is an attractive alternative. Some statements naturally may be understood according to several semantic dimensions. Forcing a choice of only one category for such statements is an artificial constraint and make it harder for coders to agree. In other words, allowing for several categories for coding single statements makes sense from a semantical point of view and enhances intercoder agreement. On the other hand, such a procedure makes it hard to do multivariate statistical analyses on the data-material, because of the chances it entails for spurious relationships between the variables due to language patterns. Of course, one

statement could be seen as an item with several attributes given by the profile of categories it was classified into. Such a procedure would, however, not match the demands of this study. In addition, the data material is probably too small to allow for statistical processing if this procedure was followed.

In consequence of the views discussed above, it was decided that one statement should be coded into one category only. When no category matched, the statement was not to be coded. If it was impossible to decide upon one category to code the statement into, it was to be left out. Otherwise, the coding was to proceed according to the structure of the codebook in such a way that if a statement was coded as for example ANALOG, it was not available for the other categories. In practise, however, some corrections did occur when a later category was felt to be a better match than the one already chosen.

6.3. SUMMARY OF OPERATIONALISATIONS

The operationalisations above result in nine variables. When analyzing the relationships between those variables, group membership (EXPERTOR) will serve as the independent, or predictor, variable. The other eight are analyzed relative to that variable single or in groups, according to their classification (Fig. 6.3.). As inspection of the figure reveals,

EXPERTOR	Group belonging: 1=managerial group 2=student group
PERSEX	Referrals to personal experiences
ANALOG	Analog reasoning
ACTION	Referrals to procedures
SPESEC	Referrals to contextual economic matters
SPESTRA	Referrals to contextual strategy related matters
THEORY	Referrals to specific theories or models in the strategy related literature
GENEC	Referrals to general economic concerns
GENSTRA	Referrals to general strategy related matters

Table 6.3.: Variable Names and Their Meaning

the episodic representational mode is reflected by two variables (ANALOG, PERSEX). The semantic mode is reflected by five variables (SPESEC, SPESTRA, GENEC, GENSTRA, THEORY) at three levels of contextual specificity. The procedural mode is reflected in one variable (ACTION).

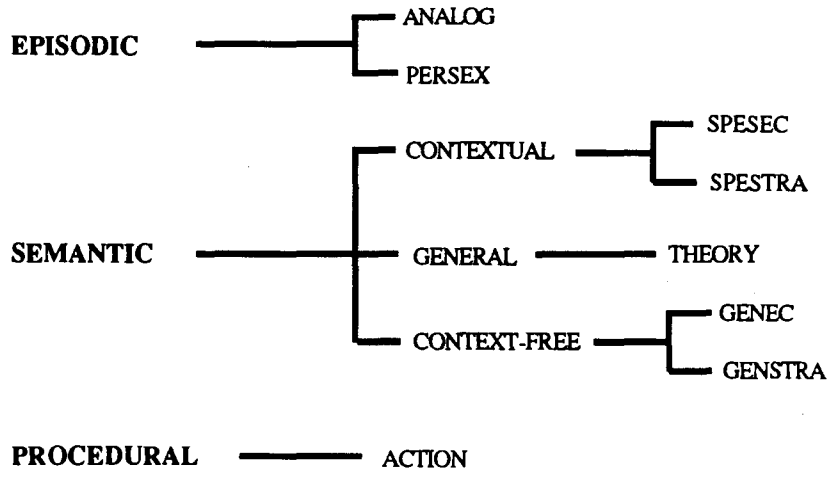

Fig. 6.3.: Map of the Variables' Conceptual Structure

The scheme above depicting the variables' structure relative to each other must be interpreted as a conceptual heuristic. It is not intended to reflect an empirical reality. In other words, the concepts for the various levels of the semantic mode must be understood as classificatory, and not as underlying constructs.

6.4. RELIABILITY

In this chapter, the variables' intercoder reliability are reported. The data was obtained through the following procedure. First, a coding manual (Appendix 1) was developed and used by the author to code the complete set of protocols. Then, another person used the same manual to code approximately 20% of the

material[9]. Only the author coded the whole set of categories. Reliability was then calculated based on sentence-to-sentence matches between the coders, on each category. One coder has business administration training, where organizational theory and business strategy are parts of the curriculum. The other coder has a degree in Organizational Sciences.

The intercoder reliability was calculated using the coefficient kappa (Cohen, 1960). This is a technique for assessing agreement between several coders relative to what is expected by chance variation. Thus, it is more attractive than simply counting up the proportion of cases in which the judges agreed (Krippendorff, 1980). The coefficient kappa (K) is the "proportion of chance-expected disagreements which do not occur, or alternatively, it is the proportion of agreement after chance agreement is removed from consideration" (Cohen, op. cit., p.40). When adjusting for free marginals (Brennan, & Prediger, 1981), the formula is:

$$K = \frac{\int_o - \frac{N}{n}}{N - \frac{N}{n}}, \quad \text{where}$$

$K =$ kappa coefficient
$\int_o =$ observed frequency of agreed upon matches
$N =$ total no. of observations
$n =$ no. of categories

[9] This was a uniform random sample of 30 numbers, out of 149, being pages of transcribed verbal protocols. The sample was generated by the Minitab uniform sample generator.

The Kappa (**K**) may not be higher than 1.0, which is total agreement between the coders. Its level of statistical significance is found by transforming it to its corresponding z-score, which may then be located on a regular normal distribution.

6.4.1. Results of Testing for Intersubjective Reliability

By the procedure discussed above, the following data were obtained for the variables (Table 6.4.1.). Inspection of the table reveal that all the variables attain high intercoder agreement, reaching a high level of statistical significance.

Table 6.4.1. Results of Testing for Intercoder Agreement

	STATISTICS		
VARIABLES	% [1]	K [2]	I [3]
ANALOG	94.32	0.89***	0.81<–>0.97
PERSEX	99.61	0.99***	0.96<–>1.02
SPESEC	96.38	0.93***	0.88<–>0.98
SPESTRA	82.69	0.65***	0.58<–>0.74
GENEC	96.08	0.92***	0.87<–>0.97
GENSTRA	83.73	0.67***	0.59<–>0.75
THEORY	100.00	1.00***	
ACTION	92.83	0.86***	0.80<–>0.92

N = 20
[1] Percent agreed codings
[2] Kappa coefficient
[3] Confidence interval
*** Indicate P<.001

Still, some issues must be dealt with, that may have served to inflate the results to some degree. The first of these have to do with the persons doing the coding. I myself was one of the two persons. Since I also had formed the categories in the first place, knew the hypotheses and had trained the other coder, it is possible that the agreement between us was greater than it would have been between two equally 'naive' coders, due to less random errors in the present case. The second issue concerns the training of the other coder. In addition to studying the Codebook; the rules and examples there, the other coder was given feed-back for the first two (of 30) pages for every variable by me. In the actual case there was seldom need for any communication. Still, 6.7% of the sampled protocols could, in principle, be said to be coded in cooperation. Ideally, this training should have been done on material not included in the analysis. The reason for not following this precaution was the small size of the data-set to begin with. In sum, there is reason to suspect that the results of the reliability test is somewhat inflated. On the other hand, the margin is probably large enough to assimilate this error. Therefore, it is concluded that the variables satisfy the demand of intercoder reliability.

6.5. VALIDITY OF THE VARIABLES

As pointed out earlier, semantic validity is a central concept for this kind of study and is to a certain extent taken care of. In a more general sense, internal-, statistical conclusion- and construct validity must also be considered. Internal validity has already been discussed and statistical validity is addressed together

with the discussion of the statistical method used. This leaves construct validity unaccounted for.

Following Cook and Campell (1979:59), construct validity is seen as the degree to which operations, or empirical measures, represent a particular theoretical construct. This type of validity is generally assessed through measuring the covariance between different measures of the same construct, and the presumed lack of covariance between measures of different constructs (Cook, & Campell, 1979). The most elegant example of this procedure is the Multitrait-Multimethod Matrix Method (MMMM) (Campbell, & Fiske, 1959; Reve, 1985). This technique takes a correlation-matrix as its point of departure, and calculates discriminability and convergence of the measures. Other techniques are also based upon correlation-matrixes, but test only convergence through factor analysis (Kerlinger, 1973:468). These are powerful techniques, but build upon some assumptions which are hard to accomodate to in protocol analyses. One of those requirements is that there must be several measurements of a particular construct. In survey studies or when using psychological tests one is free to design as many measures as one like of a particular construct, which may be used in a correlation matrix as sketched above. This is not the case in the analysis of protocols where one must take the verbal material as it is offered. If there are only single, or very few, measurements of a given construct, it is hard and even impossible to employ MMMM. In addition, the practise of seeking maximum covariance between measures of the same construct is criticised on the ground that when the correlations are very large, it simply means that they measure overlapping dimensions of the construct, which is diametrically opposed to the reason why several measures are used in the first place (Kidder, 1981; Wilcox, 1989).

At the current stage of the method of protocol analysis there is a real problem with measuring validity. In published studies of experts, using protocol analysis, the issue is simply not addressed. In the two seminal works on protocol analysis as used in this study, validity is barely mentioned (Ericsson, & Simon, 1984; Newell, & Simon, 1972). The reason for this lack of concern is explained by reference to the knowledge of language for inferring cognitive structures from verbal behavior: "- we rely upon a systematic, but informal, set of procedures, combined with our own knowledge of the English language and our consequent ability to extract meanings from natural-language strings—to extract from the protocols the most directly obvious components of the underlying deep structures that are implicit in them." (Newell, & Simon, 1972: 185). In the present study we have, however, decided to go a step further in the direction of validating the data. The essence of MMMM is to compare different measures of the same constructs. Therefore, it is possible to obtain some indication of the convergence validity (one dimension of construct validity) by correlating each measure by itself across the four cases. The four cases are then seen as different measures of the same theoretical constructs. One objection may be raised here. It may be argued that the four cases are not 'different enough' to qualify as discriminant measures of the variables. The optional situation would be to have another source of data altogether, measuring the same variables. This could, for instance, be responses to tests or behaviors in a real or simulated situation. In the absence of such data, however, the chosen procedure represents a working compromise. It is also frequently used when validating questionaires.

In this format, convergent validity is indicated when there is a positive correlation between the four measures of a particular construct. Correlation

matrices for all the measures are reproduced in App. 2, together with some descriptive statistics. As inspection of that material reveals, most of these measures are characterized by evenly distributed positive correlations, indicating convergent validity. One problem here is that there is no standard for how large the correlations should be in order to be interpreted as meaningful. The level of statistical significance is reported for the various correlations, but they are suspect since a certain number of significant relationships are to be expected as a result of chance alone. It may be more interesting to study those measures that do not yield to the pattern of positive correlations.

ANALOG confoms very much to the expected pattern, except for case #4, which is negatively correlated with the other cases. There is no clue to this deviation in the statistics for this variable, except that it is quite skewed and the correlations in question are, after all, quite small. On the other hand, the consistent pattern seems to indicate that case #4 is somewhat different from the others with respect to this variable. Still, there is enough positive relationship across the other cases to conclude that the variable is convergently valid to a reasonable degree. This conclusion holds for PERSEX and SPESEC also. The next variable SPESTRA, on the other hand, also has one case deviating from the pattern of positive correlations. This variable is hard to interpret along the lines established here, because there are some large, some small and some negative relationships between the various cases; no definite pattern emerges. Therefore, the result for this variable is inconclusive. GENEC shares the profile of small, and some negative, relationships. These results, however, may be ascribed to great differences in means, variances and skewness between the four cases. Again, the result is inconclusive with respect to convergent validity. GENSTRA, on the other hand, is described by a consistent pattern of posive correlations, matching nicely to the pattern prescribed for a convergently

valid variable. The results for THEORY cannot be interpreted, because the cases are very skewed, and the fourth case is missing; there was no statements in this category for that case. For the last variable, ACTION, the results support the conclusion of convergent validity, although case #3 is deviant. This leaves us with three variables for which the results are non-supportive or inconclusive with regard to convergent validity: SPESTRA, GENEC and THEORY. This fact must be taken into consideration when interpreting the statistical analyses later.

In addition to quantifying this one element of construct validity it is important to identify potential threats to the latter validity type in a more general sense, in order to evaluate the data on a broader base. A list of such threats is offered by Cook and Campbell (1979:64). Here I will confine myself to discuss those which seems to be the least guarded against in the present data-material. One of these is the *tendency to hypothesis-guessing within the experiment* by the subjects. Very little is known about the particulars of this phenomenon; under what conditions it is most likely to occur, whether it is treatment specific etc. Therefore, it is impossible to estimate the degree to which the results are confounded by such influences. The fact that the research hypotheses are relatively distant from everyday concerns may be taken as an obstacle to such behavior on behalf of the subjects. *Evaluation apprehension* is another threat grounded in individuals' motivations to present themselves as favorably as possible to the experimenter. The seriousness of this threat is eased by the fact that it probably is a general trait shared by most of the subjects making up the samples. Moreover, the desire to present oneself as competent is not a serious interference relative to the hypotheses of this study. *Experimenter expectancy* is a more serious threat which is present because I administered the interviews myself. As pointed out earlier, standardization of

the procedure was one measure to limit this problem. Another was to have an assistant unfamiliar with the hypotheses code a sample of the responses. Still, this is threat which must be addressed when considering the results.

In sum, construct validity is accounted for to certain degree even if some threats have to be acknowledged. This applies especially to three measures discussed above. In relation to the precedence established by published works in this field the quantification of convergent validity represents an improvement at the operational level.

PART IV

Empirical Analysis

CHAPTER 7

Statistical Procedure and Description of Data-set

7.1. INTRODUCTION

In this chapter, the hypotheses presented earlier are tested empirically. The analyses focus upon differences between the two groups relative to the variables discussed earlier. These differences are tested with MANOVA (Multivariate Analysis of Variance)[10].

First, the data-material is presented along with a discussion of its general characteristics. Then, the results are discussed relative to each of the single hypotheses. When reporting the results of the hypothesis tests, their main features are first presented. Then, the actual data are reproduced in tables. At the conclusion, the results are discussed in relation to the hypothesis in question.

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[10] The analyses are made with the Systat (v. 5.0) statistical package on an Apple Macintosh personal computer.

7.2. TECHNIQUES OF ANALYSIS

The reasons for choosing the abovementioned statistical techniques are quite straight-forward. All the hypotheses are about group differences. In most of the hypotheses, the differences between the groups are tested on constructs reflected in several variables. When there is one categorical predictor variable (EXPERTOR = experienced or inexeperienced subject) and several dependent criterion variables, then MANOVA is a suitable method (Bray, & Maxwell, 1985). There is one other reason why MANOVA is the preferred method here. Most hypotheses tested involve the use of several dependent criterion variables which probably intercorrelate to a certain extent. For example, the variables SPESTRA (domain specific strategic concerns) and SPESEC (domain specific economy concerns) reflect the same level of knowledge abstraction. Therefore it is natural to suspect these two variables to intercorrelate to a degree. Inspection of table 7.2. confirms that the variables are indeed intercorrelated to a certain extent. The MANOVA test considers this intercorrelation by looking at the multiple-dimensional space of the criterion variables simultaneously, and this is one of its advantage over single ANOVA tests. Due to this characteristic, it may help reduce the risk of both Type I and Type II errors relative to ANOVA[11]. In addition, MANOVA lets one

[11] The latter technique only evaluate relationships between the predictor variable and one criterion variable at the time. Because intercorrelations between the criterion variables is not considered in ANOVA, valuable information may be lost relative to the hypotheses that is being tested. Consequently, the conclusion reached with respect to the acceptance or rejection of the null-hypothesis have a greater chance of being false.

investigate the relationship between the criterion variables so one may learn more about the data set as a totality.

Table 7.2.: Correlation Matrix of Variables Used in MANOVA

	EXPERTOR	ANALOG	PERSEX	SPESEC	SPESTRA	GENEC	GENSTRA	THEORY	ACTION
EXPERTOR	1.000[1]								
ANALOG	.354	1.000							
PERSEX	.553**	.873***	1.000						
SPESEC	.384	.201	.156	1.000					
SPESTRA	.539**	.370	.381	.106	1.000				
GENEC	.399*	.182	.10	.685***	.303	1.000			
GENSTRA	-.564**	-.535**	-.565**	-.188	-.694***	-.206	1.000		
THEORY	-.499**	-.196	-.287	-.222	.449*	-.222	.434*	1.000	
ACTION	-.416*	-.284	-.438*	-.193	.117	.001	.517**	.199	1.000

[1] Numbers are Pearson correlation coefficients based on proportions of total coded statements
[2] N = 19
* Indicate that the correlation is significant at the $\alpha<0.1$
** Indicate that the correlation is significant at the $\alpha<0.05$
*** Indicate that the correlation is significant at the $\alpha<0.01$

As in ANOVA, the interpretation of MANOVA proceeds in two steps. First one tests the overall hypothesis of no differences in the means for the different groups. Second, if the result of the omnibus test is significant, one conducts follow-up tests to explain the group differences. There is no procedure which has gained concensual support in the literature in any of these two steps. Therefore one have to choose these for oneself, necessitating some argument for the ones selected. Several omnibus MANOVA tests, comparable to the overall F test in ANOVA, have been developed. They have all in common the principle that they test the null hypothesis that for each variable all groups have the same population mean (Bray, & Maxwell, 1985). The alternative hypothesis is that for at least one variable there is at least one group with a population mean that is different from the others. In other words, just one inequality in the population is enough to make the null hypothesis false. Four different types of omnibus MANOVA tests have been offered. Here, the Pillai-Bartlett trace is reported because it is found to be the most robust (Olson, 1974; Olson, 1976). However, a statistically significant test is not necessarily an important one. And conversely, with small samples, as in the present case, meaningful sample differences may go undetected because of reduced statistical power. The average of the canonical correlations ($\widehat{\eta}^2_{multi}$) has been proposed as a measure of the strength of association between the groups and the set of criterion variables (Cramer, & Nicewander, 1979). The number of canonical correlations is the lesser of number of groups minus one and number of criterion variables (Bray & Maxwell, 1985:36). Therefore, there will only be one canonical correlation in this study. By squaring this measure, then, one has an indication with respect to the variance in the dependent criterion variables which is determined by group membership.

When the overall significance has been determined, the next problem is how to interpret this result. Several alternatives have been suggested. One may follow a significant MANOVA with ANOVAs on each of the criterion variables. Each univariate F ratio that reaches the specified alpha level is considered statistically significant and available for interpretation. The most important problem with this method seems to be the risk it entails for not rejecting the null hypothesis when it is in fact false (Bray, 1985). Where this risk is of lesser concern, univariate F tests is a viable method. In addition this method, when used in combination with other methods like Canonical Correlation Analysis[12], can give information concerning the contribution of individual variables. The canonical variate correlations involves calculating the correlation of each individual variable with each, in this case one, canonical factor. These are analogous to factor loadings, and represent how much variance a particular variable shares with the underlying composite (Bray, & Weber, 1985).

7.3. ASSUMPTIONS OF MANOVA AND STATISTICAL POWER

All inferential statistical techniques are based on a set of assumptions. So also MANOVA. These are: 1) The research units are randomly sampled from the target population, 2) Observations are statistically independent of each other, 3) The dependent variables have a multivariate normal distribution within each

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[12] MANOVA may be seen as one of several particular instances of Canonical Correlation Analysis (Hair, Anderson, Tatham, and Grablowsky, 1979.

group, 4) The groups (the categorical predictor variable) have a common within-group population covariance matrix (Bray, 1985). Assumption 1) is not a serious threat for this study, since external validity is not given priority. The second assumption is probably satisfied. MANOVA is known to be robust concerning violations of assumption 3), other than the risk of reduced statistical power (Bray, 1985). The last assumption is met by employing the optimal omnibus test (Olson, 1979). When the sample sizes are equal, the Pillai-Bartlett trace seems to be the most robust relative to violations of this particular assumption (Bray, 1985).

Some observations of a general character have been pointed out concerning the statistical power of MANOVA (Stevens, 1980: 1) power is reduced by large numbers of dependent criterion variables, 2) small to moderate group sizes reduce power and 3) power is affected by the magnitude of within-group intercorrelations. These points have to be considered in relation to the interpretation of the results later, not the least because the sample sizes of this study is undoubtedly on the small side.

7.4. DESCRIPTION OF DATA SET

In this chapter the protocols and their characteristics, after being coded, are presented. The means and standard deviations of statements, and no. of subjects recorded are first reported, relative to the four cases (Table 7.4.1.).

Table 7.4.1: Protocol Statistics According to Case

Case	Statistics [1]		
	Mean	SD	N
1	37.16	18.26	19
2	33.55	18.52	20
3	24.10	13.17	20
4	26.15	10.36	20

[1] The statistics are for statements of the verbal protocols

As is evident from the table above, there are small differences in verbal output between the various cases. The reason for the first two cases' higher content of verbalizations is probably that the subjects were less tired in the beginning of the session. This conjecture is supported by the fact that variability in verbal output, as evidenced by the standard deviation, is redused in the cases presented last. At this point all of the subjects presumably were tired and some of the sources of variance may have been weakened because of this. With respect to group differences, the managers have a higher verbal output than the students, except for case 3 (Fig. 7.4.1.).

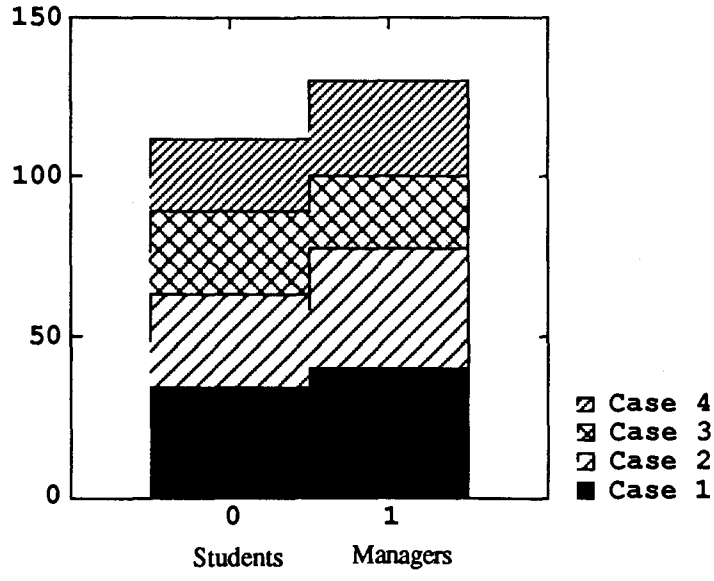

Fig. 7.4.1.: Frequency of Statements in Verbal Protocols according to Case and Group Membership

The protocols contain 2382 statements in total. Of those, 1515 (63.60%) were coded according to the categories reported here. The managers' protocols contained 1262 statements in total, and 921(72.97%) were coded. The students' protocols contained a total of 1120 statements, of which 594 (53.03%) were coded. In other words, 20 percent more of the manager group's protocols were included in the analysis. With respect to those numbers, it must be pointed out that the categories are not designed to be exhaustive with respect to the total material contained in the protocols.

The statements that were coded divided themselves unequally among the categories (Table 7.4.2.).

Table 7.4.2.: Means of Variables[1]

Variables	Statistics		
	Mean	SD	N
ANALOG	2.50	4.41	20
PERSEX	4.50	7.79	20
SPESEC	5.45	8.14	20
SPESTRA	42.10	28.66	20
GENEC	6.70	7.10	20
GENSTRA	27.70	16.91	20
THEORY	0.68	1.34	20
ACTION	15.25	10.56	20

[1] Absolute frequences

As the numbers above indicate, concerns with both context specific (SPESTRA) and general strategy (GENSTRA) related issues dominate the verbalizations coded. Statements about actions to engage in (ACTION) are also prominent. These frequences do not reflect group membership. Before addressing that question, however, another matter must be dealt with. This is related to the fact that the protocols vary in length. If this is not controlled for there is no way of telling whether group- or individual differences in the use of the various categories are a function of cognitive characteristics or simply having talked more. There are two ways of solving this problem. The first is to include length of protocol as a covariate in the statistical analyses. The other is to calculate the variables as proportions of the protocol length. The latter alternative was selected because it is the simplest and 'purest' measure of the two, reflecting each variable's relative importance directly.

Table 7.4.3.: Variable Statistics Across Groups

	CASES							
	Case 1		Case 2		Case 3		Case 4	
VARIABLES	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
ANALOG	1.56[1]	3.62	2.15	5.03	3.45	5.28	3.06	5.62
PERSEX	2.93	6.74	2.21	5.76	1.43	3.42	10.04	15.77
SPESEC	3.36	4.58	2.94	7.84	3.96	8.52	2.43	8.95
SPESTRA	36.63	28.37	33.02	21.90	66.35	23.96	30.27	25.71
THEORY	0.87	2.15	2.58	7.05	0.68	2.52	0.00	0.00
GENEC	1.59	2.93	4.30	7.83	11.66	12.77	10.05	13.94
GENSTRA	50.95	24.16	42.20	25.67	14.03	15.70	39.80	30.41
ACTION	9.50	9.65	16.65	15.75	6.80	8.90	4.54	7.72

[1] The numbers are proportions, i.e. percents, of total coded statements for each case
N = 20

As can be seen in table 7.4.3., the three variables SPESTRA, GENSTRA and ACTION dominate also when calculated as proportions. Further, the tendency is quite stable over the various cases. The hypotheses to be tested are about differences between the managerial and student groups. The two groups' means, of the proportions, are reproduced in table 7.4.4.

Table 7.4.4.: Means of Variables[1]

Variables	Managers		Students	
	Mean	SD	Mean	SD
ANALOG	3.96	5.18	1.18	2.18
PERSEX	8.18	8.56	0.86	1.49
SPESEC	9.06	11.52	3.27	3.49
SPESTRA	65.68	16.45	42.06	19.27
GENEC	11.85	9.34	5.80	3.77
GENSTRA	29.64	19.15	54.02	15.75
THEORY	0.00	0.00	2.30	2.90
ACTION	16.55	10.74	29.12	15.09

[1] Numbers are percents of total coded statements
N = 2x10

Inspection of table 7.4.4. reveals a pattern of relatively clear-cut group differences (fig. 7.4.4.): The manager group scores higher on the first five variables (ANALOG, PERSEX, SPESTRA, GENEC), while the student group are higher on the three remaining variables (GENSTRA, THEORY, ACTION).

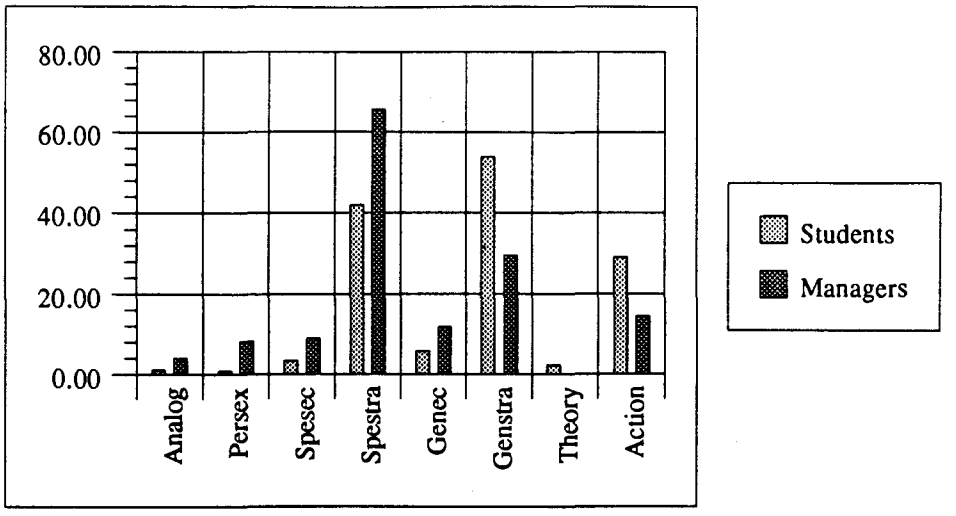

Fig. 7.4.4.: Means of Variables by Groups (proportions of total scored statements)

The interpretation of the data is postponed to the discussion of the hypotheses, but it is interesting to note that only students refer to theories (Level IV) associated with the field of strategy. Further, this group refers relatively more frequently to procedures (ACTION) in relation to the cases. Those two variables, in addition to general strategy and administrative issues (GENSTRA), are also the only ones *negatively* correlated with the manager group (Table 7.2.). The question remains, however, to what degree these results are statistically significant. This is dealt with when discussing the hypotheses.

Apart from the quantitative aspect of the protocols, there is the qualitative. This issue has been treated in association with the operationalization and the construct validity of the variables. For illustrating the content of the particular categories, one manager's and one student's protocol

were translated in full from Norwegian and annotated with the actual codes (App. 4).

CHAPTER 8

Empirical Analysis

In this chapter, the hypotheses introduced earlier are evaluated relative to the results of the statistical analysis. There is some degree of intercollinearity in the dependent criterion variable set (Table 5.6.). Therefore, all the criterion variables are tested in a MANOVA model with group membership (EXPERTOR) as predictor variable in order to take advantage of the method's ability to take intercorrelationships between the dependent variables into account. Thereafter, the variables' group means and univariate F-ratios are used to evaluate the various hypotheses.

8.1. Overall MANOVA Model

Apart from taking advantage of the MANOVA's ability to handle intercorrelationships, the test of all the dependent criterion variables with respect to group membership is also a test of the underlying assumption that the experienced managers' EI differs from those of the inexperienced subjects'. All the dependent criterion variables relate to aspects of cognitive representations relevant for strategic issues. Consequently, testing them all

together in one model implies testing the overall prediction that the two groups have different EIs.

The model results in a multivariate F ratio of 2.532 (Table 8.1.). With 8 and 10 degrees of freedom, the model reaches a probability level of .085.

Table 8.1.: MANOVA for Determining the Relationship Between Group Membership and Environmental Image

SOURCE		UNIVARIATE F TESTS				
		SS	DF	MS	F	P
ANALOG		40.37[1]	1	40.37	2.43	0.14
	ERROR	282.27[2]	17	16.60		
PERSEX		289.08	1	289.08	7.47	0.01**
	ERROR	657.73	17	38.69		
SPESEC		212.54	1	212.54	2.94	0.11
	ERROR	1230.01	17	72.35		
SPESTRA		2221.35	1	2221.35	6.96	0.02**
	ERROR	5429.00	17	319.35		
GENEC		172.50	1	172.50	3.22	0.09*
	ERROR	912.03	17	53.65		
GENSTRA		2492.47	1	2492.47	7.93	0.01**
	ERROR	5343.94	17	314.35		
THEORY		25.11	1	25.11	5.63	0.03**
	ERROR	75.84	17	4.46		
ACTION		621.27	1	621.27	3.55	0.08*

MULTIVARIATE F TEST			
Pillai-Bartlett trace = 0.669			
F-statistic =	2.532	DF = 8, 10	P = 0.085*

[1] These are between-groups sums-of-squares (BSS)
[2] These are within-groups sums-of-squares (WSS)
N = 19
All statistics are based on statements, being proportios of coded statements
* Indicate that the correlation is significant at the $\alpha<0.1$
** Indicate that the correlation is significant at the $\alpha<0.05$

The significance of this result is a function of the alpha-level accepted. The statistical power of MANOVA is reduced by small samples and many dependent criterion variables, as well as intercollinearity among the dependent criterion variables. This is obviously the case for this model. Consequently, an alpha-level of 0.1 is probably acceptable as the lower values may be overly conservative and increase the chances for Type II error. In other words, one may conclude that there is reasonable support for the contention that the two groups EIs are different from one another, and that this is not just due to chance variation in the present samples. This is in accord with the basic assumption that is point of departure for this study in general.

One other point is of interest with respect to the MANOVA. Statistical significance is no guarantee that the relationship detected is of a meaningful magnitude. This question may be addressed by way of the canonical correlation squared ($\widehat{\eta}^2_{mult}$). In the current model, the $\widehat{\eta}^2_{mult} = 66.91$. In other words, group membership explains close to 67% of the variance in the criterion variables. This must be considered a large enough share of the total variance to count the relationship as substantial and meaningful.

So far, we have established that the two groups' EIs are different. What may be more important is **how** they differ. The answer to that question lies in the analysis of the individual dependent criterion variables. As noted earlier, the canonical loadings, or correlations between the dependendent criterion variables and the dependent canonical factor, indicate the various variables' contributions to the variable set's underlying composite. Consequently they may, as a whole, be interpreted as the EI-profile. As can be seen from fig. 8.1.1., the composite, which may be interpreted as the profile of the experienced strategists' EI, is particularly associated with statements

reflecting personal experiences (PERSEX), concerns with context specific strategy related issues (SPESTRA) and economy related matters of a general (GENEC) and domain specific (SPESEC) character.

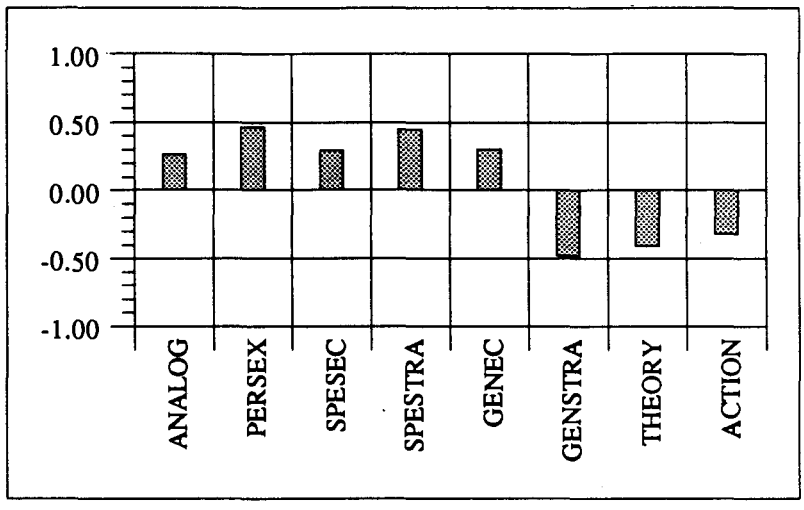

Fig. 8.1.: Graphic Representation of Canonical Loadings

Since these statistics may be seen as ordinary factor loadings, generally accepted rules apply as to what magnitudes to accept as cut-off points. In the literature (see for example Hair et al., 1979), only loadings exceeding the value |.3] is recommended to be viewed important. If this limit is applied here, ANALOG is eliminated (Table 8.1.1.) as is SPESEC, leaving the variables PERSEX, SPESTRA and GENEC to be considered with respect to the experienced subjects. Further, the composite seems to be inversely associated with statements reflecting concerns with context free strategy related– and administrive issues (GENSTRA), things to do (ACTION) and theories (THEORY). Those last three variables may be interpreted as the attributes of the inexperienced subjects' EI.

Table 8.1.1.: Canonical Loadings between Criterion Variables and Dependent Canonical Factor

Criterion variables	Canonical loadings
ANALOG	0.266
PERSEX	0.466
SPESEC	0.292
SPESTRA	0.449
GENEC	0.306
GENSTRA	-0.480
THEORY	-0.404
ACTION	-0.321

N = 19

From this analysis a pattern emerge relative to the general qualities associated with the two groups' EI. However, this can only be viewed as preliminary conclusions. After discussing the empirical results relative to the various hypotheses we will return to the above findings, better equipped to assess their statistical robustness.

8.2. HYPOTHESIS 1

In the first hypothesis it was stated that: **Experienced strategists' verbal protocols will contain more statements referring to episodic material than those of the inexperienced.**

Earlier, it was argued that episodic representations may serve as an important resource for semantic processing, and development and change of semantic representations. Problem solving, and by extension, the formulation of strategy and strategic issues, are posited to be heavily dependent upon semantic representations. Consequently, the EIs of managers experienced with strategic work is expected to be more integrated with respect to the three representational modes. As a result, it was argued, their verbalizations should contain more episodic material because they probably have easier access to this mode when working on strategic tasks.

Two variables reflect episodic material in the verbal protocols: 1) analogical prosessing (ANALOG), and 2) references to personal experiences (PERSEX). As can be seen from studying the means of the two groups on these variables (Table 8.2), the experienced managers have a higher content of both variables in their protocols than the inexperienced group. However, the difference between the two groups are

Table 8.2.: Means of Variables Reflecting Episodic Material in Protoco

GROUP	VARIABLES			
	Analog		Persex	
	Mean	SD	Mean	SD
MANAGERS	3.96[1]	5.18	8.18	8.56
STUDENTS	1.18	2.18	0.86	1.49

[1] Proportions of total coded statements
N = 2x10

most pronounced concerning the variable PERSEX. Further, inspection of the univariate F-ratios (Table 8.2.1.) reveals that only this varible is significantly related to group membership.

Table 8.2.1.: ANOVA for the Variables Reflecting Episodic Content of Protocols, With Group Membership as Predictor Variable

SOURCE	STATISTICS				
	SS	DF	MS	F	P
ANALOG	40.37	1	40.37	2.43	0.14
ERROR	282.27	17	16.60		
PERSEX	289.08	1	289.08	7.47	0.01**
ERROR	657.73	17	38.69		

[1] Table is part of, and reproduced from, table 8.2.1. (general MANOVA model)
** Indicates that the correlation is significant at the $\alpha<0.05$
N = 19

The results seem to support the hypothesis. Both the variables reflecting episodic content are higher for the experienced group, as predicted, and the relationship between PERSEX and group membership is statistically significant (F = 7.47, 1, P<.05). On the other hand, the content of analog

processing found in the verbal protocols are generally low, in addition to not being significantly different for the two groups as expected. This is an interesting finding, because the opposite result have been reported in another, comparable study of managers vs. students (Isenberg, 1986). In that study, analogical processing was seen as one of the distinguishing traits of managerial thought. As noted above, the managers did refer to analogues more frequently in the present study also (table 8.2.) but the difference is not statistically significant (P=.14). Even if allowing for the small sample size, the mean is low and do not point to this kind of processing as a 'dominant trait'. One may only speculate the reasons for this difference in empirical support as the operationalizations used is almost identical in the two studies, at least as reported by Isenberg (op. cit.). One reason may be the dissimilar stimuli; Isenberg (1986) employed one complex case while the present study presented the subjects with four very general ones. If the answer is found in the dissimilar stimuli, then the use of analoges is not a general trait of managerial thinking. Instead, it is a processual characteristic associated with some dimension of the particular stimulus. In other words, analogous processing may be an option associated with experience and chosen when the stimulus reach a certain degree of complexity. The stimuli in the present study, as compared with that of Isenberg's, may not have reached this level of complexity. Therefore it was not necessary for the managers to choose the option of analog reasoning.

Another explanation for the variable findings with respect to analogous reasoning may be found in the cultural differences between the subjects in the present study and those of Isenberg's study, as they belonged to two different nationalities. It is reasonable to expect those different backgrounds to reflect themselves in their language patterns. If this is the case,

then the variations between the two studies concerning the use of analogous reasoning are of most concern to comparative studies of managers belonging to different cultures. The communication and cooperation between managers across nationalities and cultures are example of phenomena which might be adversely affected by such differences.

To sum up the results so far, the experienced managers seem to have different EIs, relative to the inexperienced group. This difference is in part due to the better access they have to episodic material that is relevant to strategic tasks. This is particularly evident in their use of personal experiences when discussing strategic problems. The present results disconfirm some prior findings with respect to managers and the use of analogies, and at the same time open up for some new interpretations of those findings.

8.3. HYPOTHESIS 2

In the second hypothesis it was stated that: **Experienced strategists' verbal protocols will contain more statements referring to procedural material than those of the inexperienced.**

The theoretical rationale for this hypothesis was as follows: Problem solving of the sort engaged in when dealing with strategic issues is an activity primarely drawing upon semantic prosessing. When necessary, the semantic mode is supported by episodic material, and procedural knowledge is accessed when design and/or implementation of plans are called for. Again, it was argued that experience with strategic tasks probably endows managers with effective access to relevant procedural material, because of its salience generated by frequent use.

As it turns out, this hypothesis is definitely not supported. The inexperienced group has a mean (29.12) almost twice to that of the experienced managers (16.55; Table 8.3.). The relationship between procedural content of the verbal protocols

Table 8.3..: Statistics of Variable Reflecting Procedural Material (ACTION) in Protocols

GROUP	STATISTICS	
	Mean	SD
MANAGERS	16.55[1]	10.74
STUDENTS	29.12	15.09

[1] Proportions of total coded statements
N = 2x10

and group membership is statistically significant (Table 8.3.1.). Since the inexperienced student group is coded 0, and the experienced manager group is coded 1, this result means that the use of procedural material is related to the students' verbalizations.

Table 8.3.1.: ANOVA for the Variable Reflecting Procedural Content of Protocols (ACTION), With Group Membership as Predictor Variable [1]

SOURCE	STATISTICS				
	SS	DF	MS	F	P
ACTION	621.27	1	621.27	3.55	0.08*
ERROR	2975.09	17	175.01		

[1] Table is part of, and reproduced from, table 8.2.1. (general MANOVA model)
* Indicates that the correlation is significant at the $\alpha<0.1$
N = 19

In light of the hypothesized relationship, and the theoretical rationale preceding it, this result is somewhat surprising and deserves some further comment. One explanation is that the alpha-level is too high; the result reported is expected by chance variation alone in 10% of all cases. The counter-argument is that lower alpha-levels would be too conservative for tests including so small samples and high number of variables as in the present model. Besides, a no-relationship should also be considered an unexpected result. So how are these results to be explained?

One answer may be that, for some reason, the experienced strategists did not see any point in generating a large number of plans, even if they could. The proper measurement might therefore have been the **quality** and not the quantity of procedural elements. This makes sense, because it is better to do

one thing right than many things wrong. Further, experience may have provided the managers with knowledge of the proper procedures under particular circumstances. In other words, generating a mass of different courses of action may simply be irrelevant for this group. The inexperienced subjects, on the other hand, naturally lack this knowledge of the constraints that use to apply in various situations, and the consequences of engaging in the particular actions. Therefore, they may have felt freer to report whatever their imagination could generate. This is exactly why 'new blood' is often sought for in managerial positions; to loose up established ways of thinking and conquering the 'it has been tried before'-syndrome.

The suggestion that the quality of procedural statements may demonstrate an other pattern than their frequency can be checked against some samples from the actual protocols. One protocol belonging to the inexperienced group contains the following statement codes as reflecting procedural content: "*I would compute graphics illustrating how their market shares had developed relative to ours*". The next statement is also coded as procedural, and belongs to the same subject: "[if I was the manager here], *then I would have to get those things* [generating analyses of competitors] *going in order to find the problem, and from what I found out about the problems I would choose reactions in order to reconquer the marketshares*". The first statement is an example of a quite redundant suggestion containing no substantive value. The subject is using his imagination and comes up with an idea that is not wrong, but on the other hand it is in a sense outside the sphere of relevance. The other statement is highly general, and could be made by anyone having glanced through the introductory chapter of a text-book in marketing or business strategy. Again, it carries no informative value except for common sense, and may be generated without concern about any practical constraints. The next couple of statements

are taken from protocols of the experienced subjects: "*Probably, I would also work on the organization to shape it up for the goals I had set up, because that is decisive—if you want to reach them the people must share your belief that the goals are realistic and reachable*"; "*An alternative strategy could be that I let him aquire this expensive funding and underbid on loans so that he did not manage to take his preferred interest on loans, for example., and squeeze him that way*". The first statement is an example of a procedure of a middle-level abstraction, where the information-content is richest. It is a suggestion carrying useful information in specifying constraints with respect to the implementation aspect. The second statement is illustrative of knowledge of context-specific procedures that takes into account factual constraints and probable outcomes of certain lines of action.

To sum it all up, the hypothesis was not supported by the empirical results. In fact, the results were opposite to what was predicted. The most probable reason for this is that the managers' EI are better adapted to a real-world situation where a host of practical constraints render many options irrelevant. This could explain the lower frequency of procedural statements in their protocols. Besides, the practical nature of their work probably induces in them a habit of thinking in a middle-level of abstraction, further limiting the range of options they consider. In contrast to this group, the inexperienced students would not be restrained by other factors than their own imagination and common sense. In this light, it is not surprising that their protocols contain a higher number of procedural statements.

8.4. HYPOTHESIS 3

In the third hypothesis it was stated that: **Experienced strategists' verbal protocols will contain more statements reflecting context specific semantic-representational material than those of the inexperienced.**

With this hypothesis, we are moving over to the semantic representational mode. In this mode, it is proposed, most managerial problem solving is done. The other two representational modes are conceptualized as supportive resources to the semantic. Because of its centrality, the last three hypotheses are tied to the semantic mode and its different abstractional levels.

Experience is, by necessity, domain related. Empirical studies were cited demonstrating high levels of skills to be domain-specific and related to experience with the particular field in question. For example, it was noted earlier that chess masters, as a group, are not more intelligent than novice players, and their memory for game positions was particularly efficient only with respect to games they recognized from earlier exposure. Experts are masters of their field but not everything else as well. On the background of the above line of argument, it is predicted that the experienced subjects' protocols will contain relatively more contextual material, because of the salience of such knowledge relative to strategic problems.

Contextual knowledge (Level II) is operationalized by the variables SPESEC (domain specific economy related concerns) and SPESTRA (domain related strategy related concerns). As expected, the means of those two variables are higher for the experienced subjects (Table 8.4.). However, the relationship between

Table 8.4.: Means of Variables Reflecting Domain Specific Material

GROUP	VARIABLES			
	Spesec		Spestra	
	Mean	SD	Mean	SD
MANAGERS	9.06[1]	11.52	65.68	16.45
STUDENTS	3.27	3.49	42.06	19.27

[1] Proportions of total coded statements
N = 2X10

SPESEC and group membership do not reach statistical significance (Table 8.4.1.). SPESTRA, on the other hand, do ($F = 6.96, 17, P<.05$). In other words, the

Table 8.4.1.: ANOVA for Testing the Relationship Between Domain Specific Material and Group Membership [1]

SOURCE	STATISTICS				
	SS	DF	MS	F	P
SPESEC	212.54	1	212.54	2.94	0.11
ERROR	1230.01	17	72.35		
SPESTRA	2221.35	1	2221.35	6.96	0.02*
ERROR	5429.00	17	319.35		

[1] Table is part of, and reproduced from, table 8.2.1. (general MANOVA model)
* Indicates that the correlation is significant at the $\alpha<0.1$
N = 19

results support the hypothesis, but this is only due to the relationship between statements reflecting strategy related concerns tied to context and experience. Surprisingly, economy related statements specific for the banking industry constitute a very small part of the bank-managers' verbalizations ($\bar{x}$ = 3.27).

On the basis of this result one must conclude that domain specific economical issues are not judged relevant by the managers nor the students in solving strategic problems. Or alternatively, none of the groups posess this kind of knowledge. This is somewhat puzzling, as strategic matters are inherently tied to economic parameters. It is even more surprising considering this is the banking industry with the wealth of specialized concepts referring to economic issues employed by workers of this field. Somehow at least the managers, who presumably have this conceptual apparatus accessible, do not judge this domain to be relevant for strategic analysis. This may reflect learning of a substantial nature with respect to banks and their relations to their environment, on the part of the managers. On the other hand, it may as well indicate just the opposite; that the managers have not integrated well enough knowledge pertaining to strategic issues. Some support for this contention may be found in the crisis facing the Norwegian banking business at the time the data were gathered, the cause of which has later been identified, in large part, as incompetent management (Dagens Næringsliv, 14 mars 1990).

When using contextual knowledge, the experienced strategists seem to prefer things that are related to their industry as such. Some light may be thrown on this result by sampling some of the actual statements: "*Within a local market we see changes in how and where people live, in the choice of careers and it might be that my earlier localization, my earlier services are not so attractive any longer i relation to these changes*". Here, the subject is referring

to phenomena he has observed in the market, and is concerned about his products and how they match the needs of the customer. What is expressed here, then, is a concern with adaption to the specific environment of the banking industry. Another example: "*If you look at it from a historical point of view, the banks knew much less about the status of a particular branch than now*". Here, the subject is commenting on the management of local branches, and the small degree of control that Norwegian banks typically have exercised over their subsidiaries. As a matter of fact, one manager remarked that banks typically, even now, have little insight into what business areas they really profit from. In both these examples, the subjects are expressing themselves authoritatively based on close familiarity with the banking business. In contrast to this, the inexperienced subjects, even when concerned with context specific material, use information that may be gathered through following the media coverage of the banking business and their competence as students of economics and business administration: "*Well, here it says you are losing market shares—the question is if it is about the deposit-market or loans-market*". And another example: "*I think, then it would be largely a matter of macroeconomic—that is macroeconomic politics would have great importance for how large the margin of the interest—what kinds of restrictions and all that which the authorities decides on—to what degree they will go in for free interest and* -". In the first statement, the subject merely repeats concepts that have become commom knowledge with respect to the banking business, through the coverage by popular media. In the second statement, the subject seems to be groping for some solution by combining the very general principle of macroeconomic constraints on all kinds of enterprises and the rather well-known source of banks' income; the margin of the interest. The statement does not lead to a clear-cut conclusion, even though the intention behind it is

perceivable. In this case, then, there may be some reason to believe that the experienced strategists' protocols contain qualitatively better as well as quantitatively more statements relevant for the hypothesis.

In sum, the hypothesis was supported by the empirical results. For some reason, statements reflecting context specific economy related issues did exhibit the direction but not the strength of association with experience that was predicted. On the one hand, this may reflect some adaptional function on the part of the managers' cognition: Those may simply not be important matters at all, at least in the context of the cases that the subjects were presented. On the other hand, the results may indicate an area potentially of importance, but largely overlooked by the subjects. It is impossible to decide which answer is the correct one, but the issue is of enough interest to warrant further investigation.

8.5. HYPOTHESIS 4

In the fourth hypothesis it was stated that: **Inexperienced subjects' verbal protocols will contain more statements reflecting context free semantic-representational material than those of the experienced.**

The rationale for this hypothesis lies in the understanding that cognition is organized in levels. As was demonstrated in Hypothesis 3, experienced subjects made use of a basic context specific level of abstraction more frequently than the inexperienced. It was argued earlier that the students, having roughly the same educational background as the managers, would probably compensate for the lack of domain specific material through the use of more general-level knowledge. Allthough this level of information is less rich in its implications, it is still possible to relate to problems with such knowledge by resorting to general problem solving strategies (Greeno, & Simon, 1988).

This level of representational abstraction was measured by two variables: 1) GENEC; economy related statements generally applicable to all kinds of businesses, and 2) GENSTRA; statements related to organizations and their adaption to the internal and external environment. Both variables are at a level of abstraction that makes them applicable to all kinds of industries, and they are both relevant for working with strategic problems.

Inspection of the two groups' means (Table 8.5.) reveal that the results are not quite as expected. Statements referring to economic issues are actually higher for the experienced manager group, which is contrary to the predicted direction. With respect to GENSTRA, however, the results conform to expectations. These results are exactly

Table 8.5.: Means of Variables Reflecting Context Free Material

GROUP	VARIABLES			
	Genec		Genstra	
	Mean	SD	Mean	SD
MANAGERS	11.85[1]	9.34	29.64	19.15
STUDENTS	5.80	3.77	54.02	15.75

[1] Proportions of total coded statements
N = 2X10

the opposite to what was found for the domain **specific** level. Before commenting further on this point, however, we will look at the variables' F-ratios. These inform us that both GENEC and GENSTRA are significantly related to group membership (Table 8.5.1.). In other words, the hypothesis is supported allthough the results leave GENEC for further analysis.

Table 8.5.1.: ANOVA for Testing the Relationship Between Context Free Material and Group Membership [1]

SOURCE	STATISTICS				
	SS	DF	MS	F	P
GENEC	172.50	1	172.50	3.22	0.09*
ERROR	912.03	17	53.65		
GENSTRA	2492.47	1	2492.47	7.93	0.01**
ERROR	5343.94	17	314.35		

[1] Table is part of, and reproduced from, table 8.2.1. (general MANOVA model)
* Indicates that the correlation is significant at the $\alpha<0.1$
** Indicates that the correlation is significant at the $\alpha<0.05$
N = 19

The experienced strategists are clearly more prone to discuss the cases in relation to general economy related issues (GENEC) than the inexperienced subjects. This may be accounted for by the reasonable contention that strategy, in the world of managers, are about dispositions closely tied to costs and revenues. Students, on the other hand, probably don't perceive this relationship as strongly, because without the proper experiences strategy and economy are two separate disiplines. At least this is the impression one gets by studying a typical business school curriculum and most relevant textbooks. Some support for this argument is found in the fact that very few students are able to integrate economical concerns in their Business Strategy tests[13]. This implies that the managers' EI are better adapted to the world that they are facing in their daily work because economical issues are so central to their decisions relative to strategy. The weak relationship between domain specific economical concerns (SPESEC) and group membership found in Hypothesis 3 may actually confirm this line of reasoning, because GENEC are mostly statements about economical *results*, while SPESEC are statements of a more technical nature. The managers' EI, as exhibited here, are therefore developed with respect to financial *results*[14]. Some samples from the actual protocols may illustrate this point: *"In other words, I have lost because I aquired an expensive funding and he* [a competior] *has lost since he didn't get the money* [deposits] *that he wanted*". Another: *"Let's say the accounts indicate one have ten millions in profits from trading foreign valuta: What one forgot earlier was that*

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[13] Based on personal communication with professors censoring this kind of tests.

[14] One interesting aside here is that the current crisis of the Norwegian banking industry is often explained as a result of the managers' focus on acquisition of market shares and their concurrent neglect of their 'craft' of sound banking principles associated with finance management.

financing a portifolio of, say a hundred millions with an average of 16% interest, would come to about 16 millions—leaving a loss of six millions instead, in addition to other costs like salaries, telephone, telex and all such things". In both these instances, the subjects (experienced strategists) are concerned with economy related issues relative to strategy, and it is clearly results in the form of economical consequences for the firm that is in focus. Allthough the inexerienced subjects also touch this matter, they do so less frequently and are often quite vague or simplistic when referring to such matters: "*I don't know—I could possibly think of some kind of value chains—but I am not sure how this might be applied*". And another: "*Well, it might be that you found yourself in such a position that you had offered too many loans to people you didn't know and thereby could have some losses*". In the first statement, the subject evidently recalls a concept he feels is relevant, but it is not really integrated with other kinds of knowledge, so the end-result of his effort is not very useful. The other statement is quite relevant, but compared to the experienced subjects above it is very simplistic and carry little informative value.

In sum, the hypothesis is supported by the empirical results. The inexperienced subjects' verbalizations are significantly more context free in terms of statements referring to organizations' internal or external environments. This is taken as indicative of their EIs being less adapted to strategic problems. Contrary to expectations, the experienced strategists' verbalizations more often than the students' contain context free economy related matters. This is interpreted as indicative of EIs more oriented towards actual economical results, on behalf of the experienced group.

8.6. HYPOTHESIS 5

In the fifth hypothesis it was stated that: **Inexperienced subjects' verbal protocols will contain more statements reflecting theory based semantic-representational material than those of the experienced.**

As was pointed out, theories of strategy and strategic management may be seen as cognitive representational contents at still a higher level of abstraction than context free elements. Such material can serve at least two purposes: 1) it is an inventory of principles from which to deduce ideas at lower and more applicable levels of thinking, and 2) it is a stock of 'ready made' schemas which may be applied in order to recognize and understand strategic stimuli. As noted earlier, the literature is of small help in predicting whether there should be goup differences with respect to the use of such material, or alternatively, which group should use it the most. On the other hand, it was argued that the inexperienced subjects probably would verbalize this kind of statements the most, since theories probably are most salient with this group due to their status as students.

Inspection of the groups' means on this variable (Table 8.6.) demonstrates that the inexperienced group's protocols do contain more statements referring to theories. While it is used sparingly by this group ($\bar{x}$ = 2.30), the managers don't refer to theories at

Table 8.6.: Means of Variable THEORY

Group	Statistics	
	Mean	SD
MANAGERS	0.00[1]	0.00
STUDENTS	2.30	2.90

[1] Proportions of total coded statements
N = 2X10

all. Evidently, this result supports the hypothesis. But the number of statements is low, even for the inexperienced group. Therefore it is necessary to check the group difference against what would be expected by chance variation.

Table 8.6.1.: ANOVA for Testing the Relationship Between References to Theory and Group Membership [1]

SOURCE	STATISTICS				
	SS	DF	MS	F	P
THEORY	25.11	1	25.11	5.63	0.03**
ERROR	75.84	17	4.46		

[1] Table is part of, and reproduced from, table 8.2.1. (general MANOVA model)
** Indicates that the correlation is significant at the $\alpha<0.05$
N = 19

As demonstrated by table 8.6.1. the relationship between references to theory and group membership is statistically significant ($F = 5.63$, $P<.05$). In

other words, the hypothesis is supported by the results. Since there was some ambiguity with respect to the interpretation of this relationship there may be some value in studying some of the actual verbalizations contained in this category: "*With respect to the environment I think I would use a Porter line of thinking as frame of reference, and look into what competitive forces there may be*". And another: "*A third issue would be what Porter calls suppliers*". In the first statement, the subject is evidently searching for some kind of guidance for his/her thinking, and finds it in a well-known author on competitive strategy. In the second statement, the subject seems to refer to the same conceptual model, and places his/her ideas in that context. In other words, the subjects use relevant theory to guide their cognitive processing. Since the managers don't utilize this kind of material, they have to make use of some other frame of reference. In light of the other findings reported earlier, it is probable that they are guided by their experience-based contextual knowledge. Finding your way in your own city is not dependent on knowledge about the general architecture of cities. A tourist, on the other hand, is helped by knowing that reasonable priced motels are usually found in the outskirts of a city, and that most entertainment is usually found downtown.

In sum, the hypothesis is supported by the empirical results. The inexperienced subjects refer to theory, probably in order to find some guidance for their problem solving processes in an area where they lack familiarity.

PART V

Discussion

CHAPTER 9

Discussion of Findings

9.1. RESULTS OF THE TESTS OF THE HYPOTHESES

The hypotheses addressed the issue of the relationship between experience and certain qualities of managerial EIs, or cognitive representations relative to strategic issues. Those hypotheses were tested empirically through the analysis of verbal protocols produced by two groups with varying degrees of experience, in response to four written cases designed to emulate important dimensions of strategic stimuli. This resulted in the following findings:

1) The EIs of experienced strategists differed from those of the inexperienced. In other words, the managers did use the three representational modes different from the students; experience is associated with attributes of cognitive structures as measured by verbal output. The importance of this finding is twofold. First, it demonstrates that the experienced strategists, as a group, respond differently to strategic stimuli relative to the inexperienced subjects. This will probably also be true for their responses to actual strategy

related situations, even though external valididy is not given priority in the present study. Second, the finding implies that experience is not only growing older; it is also associated with an adaption of cognition to the demands posed by a particular environment.

2) The experienced strategists made more frequent use of the episodic representational mode. This finding conformed to what was expected from the conceptual model used to generate the hypotheses, and is of importance for the following reasons: First, personal experiences must be of some use, since practised strategists use them at all in solving strategic problems. Second, the finding supports the conjecture that episodic memory can serve as a resource for the semantic. Taken together, these points imply that personal experiences are a resource in themselves with respect to working with such problem domains as business strategy.

3) With respect to the semantic mode, experience was associated with more frequent use of contextual knowledge pertaining to organizations' internal and external environments, and economical results. In contrast to this profile, the inexperienced subjects seemed to compensate through the application of theories, and context free knowledge pertaining to the environment. These results are interesting because they imply that the semantic mode, by itself, is different for experienced strategists. The importance of this point lies in the centrality afforded to this mode relative to the other two, in the conceptual model. It is, after all, in this mode that the symbolic manipulation of the environment, so important for intelligent adaption and problem solving, takes place. The preference for contextual material tell us that domain specific knowledge afford some kind of advantage over the context free, since the experienced strategists have the same educational background as the

inexperienced. Earlier, it was argued that this advantage probably had to with the opportunity for the use of stronger problem solving strategies and more efficient problem frames. The more frequent use of general economy related issues and results is interpreted as an indication of a higher integration between knowledge and purpose; in the world of business, growth and survival is the main objective, and the experienced strategists' cognition seem to have adapted to such circumstances. It is interesting to contrast the inexperienced subjects' cognition relative to those of the experienced: Those are dominated by generalities far away from any particular circumstances and purposes other than solving the cases, and seeking authoritative support in theories rather than the phenomenal world. Again, experience seems to be associated with interesting cognitive qualities relative to particular circumstances, adding to the subjects' level of competence.

4) Concerning the procedural mode, the results are less conclusive. On the one hand, the empirical results were opposite to what was predicted: The verbalization of procedural material was less frequent for the experienced strategists. The interpretation of this result is, however, somewhat more complicated for this mode. Procedural statements will to a large degree be conclusions in the form of what to do, given by the subjects argumentation up to that point. If it is the case that the experienced strategists have a better knowledge of the constraints that is usually under operation in the given circumstances, the present result is the natural one. Consequently the quality, and not the quantity, should be considered for measuring this mode. Since this study did not take the quality aspect under consideration it is not possible to confirm this line of reasoning. Still, the finding has some value in this light since the recommendation of how to proceed in a given situation is very close to an actual strategic formulation.

It has been emphasized that associations between variables, and not causal relationships were tested. On the other hand, it is still reasonable to speculate that the differences found is a function of experience; it certainly is not the other way around and the internal validity is controlled for to a certain degree at least. In addition, this speculation is supported by other research on expertise (see for example Lesgold, 1984). Concerning the actual qualities found, these may not be conceived of as the total set of actual distinguishing traits. The reason is of course that what was found in this respect was determined by the hypotheses that guided the research effort. Still, the picture emerges of the managers as problem formulators and -solvers that make use of a cognitive apparatus tuned to a particular domain. Strategic management may be seen as a function which has adaption to circumstances as the ultimate goal. In this process, the reduction of uncertainty and risk is of prime concern for the manager (Thompson, 1967). The managers' environmental images are probably developed in response to these challenges, and may therefore be seen as one way of controlling uncertainty. Viewed this way, experiential 'intelligence', as described here, becomes a valuable asset for the firm to develop and protect.

The study does not answer the question of whether the experienced strategists' representations are better than those of the inxperienced subjects'. Still, some tentative conclusions can be reached by studying a typical protocol from one subject belonging to each group.

9.2. EXAMPLE OF DIFFERENCES IN PERFORMANCE

While the analysis of performance would demand careful independent expert evaluation of the protocols, some flavor of the differences may be had by sampling one manager and one student protocol for illustrative study (Appendix 4). One notes that the manager, in reflecting on Case 1, promptly categorizes the situation as a problematic one (Line 7), and a little later has something to say about the circumstances under which the problems might be serious (Lines 13 -16). Inspecting the student protocol, one notes the contrasting concern with what the *reasons* for the situation might be and what information he/she would like to have in order to proceed (Lines 4 - 24, which are the complete set of responses for the this case). This behavior may be explained this way: The manager recognized the rudimentary description of the situation presented to him/her as belonging to some category associated with a schema for 'problem situations', and used this knowledge structure to generate the data needed for elaborating on the situation and even generating some actions to take in relation to it (Lines 40 - 52). Whatever the processual explanation, the result is evidently a more efficient handling of the material.

In Case 2 the difference is at least as pronounced. The manager systematically tabulates the information he/she would need, where to find it and how he would proceed. In contrast, the student is quite vague and superficial in these respects (for instance: *"Then there would be something like getting in touch with them in writing -"*). Again, this is an indication that the experienced manager has access to knowledge and cognitive structures making possible a more efficient behavior relative to the case.

A somewhat dramatic effect of having access to the right kind of knowledge is demonstrated in Case 3. While the student is concerned with turning a problematic situation (weak customers) into a better one through long range planning, the manager do not perceive the situation as problematic at all. This is because he/she knows that the authorities subsidize the loans in question, and he/she is prepared to cooperate with other institutions in order to secure a profit for the bank. This approach may be seen as illustrative of a completely different way of solving strategic problems based upon contextual knowledge. The manager knows what to do because he/she knows the consequences as well as the contingencies of the particular situation. This is reminiscent of the problem solving strategy called 'Working Forward' by Newell & Simon (1972), being one of the most powerful strategies of experts but completely dependent on concrete experience.

The differences in perception and how to handle the situation are also evident in the last case. The student explains the background of the situation as he/she sees it, and then very generally proposes some administrative actions. The manager, on the other hand, acknowledges the constraints inherent in this situation but points out that it really do not signify any real change of affairs. This difference in responses may be taken as indication of the manager's 'deeper' processing of the case material, giving him/her a picture of the situation not evident in the surface of the case. Other research, with problems from the physics and mathematics domain, have also concluded that this may be the case (Chi, Feltovich, & Glaser, 1981).

This admittedly sketchy comparison of the two subjects do not offer evidence for the conjecture that experienced managers are more efficient or clever strategists than the students. It does, however, illustrate how the

differences already documented in the testing of the hypotheses may work in practise. Still, the fact that the findings seem to conform with results from other studies do of course not reduce their validity.

The present study do not address the causality issue: It is impossible on the basis of the present finding to state that experience caused the differences in the EIs. It simply indicates how the human mind seems to respond to prolonged exposure to a particular field of practise. Since the experienced strategist group consisted of individuals raised to relatively high positions within the banks, presumable on the basis of merit, it is still possible to raise some temporary suggestions regarding matters like managerial training, – development and recruitment. The results also have some implications for the functions of management teams and Strategic Issue Management. In short, the results presented point to some directions for practical applications, in addition to suggesting some ideas for further resarch efforts.

CHAPTER 10

Applications and Future Research

10.1. MANAGEMENT DEVELOPMENT

Recently, the topic of business schools' training, and the education and development of managers have received some attention (Leavitt, 1989; Marais, 1982). Earlier, it was simply a matter of what courses to include in the curriculums of the business schools educating the managers or managers to-be. Now, however, there is a growing concern that the leaders need skills not easily acquired through conventional training. One of them is that of strategic problem finding and -formulation which is closely related to innovation (Haukedal, 1987b) and the perception of weak strategic signals (Ansoff, 1980; Ansoff, 1975).

The results of this study suggest that the learning of strategy related principles, and other theoretical models, are not enough to prepare one for work with strategic tasks. If the nature of the managers' environmental images, as contrasted with those of the students, are a valid indication of what

should be sought for concerning strategic competencies, then a relevant set of personal experiences, contextual knowledge, purposeful thinking and, probably, procedures for implementation, are at least as important as learning theoretical strategic models. The results from the present study seems to advocate the development of **both** cognitive structures and knowledge. The results also point to the utility of being conscious of ones own cognition, as one's output clearly depends on structures and processes here. It is by no means enough with a determination to accomplish. The question then emerges of how to ensure potential strategists with this kind of competencies?

One answer is of course that education gives the students the conceptual groundwork and experiences gives them the rest. The problem with this line of thinking is that the skills in question are not legitimized by the educational system. Therefore, energy will not be directed to its development later on. In addition, a large part of the students will probably end up with strategy related responsibilities before they have had the opportunity to develop their experience to any degree. There is even some evidence suggesting that individuals giving priority to entrepreneurial tasks within organizations are rewarded with shorter paths to the top (McCall, & Segrist, 1980). That would also imply that top managers could end up being the people with the least experiential knowledge and therefore being the least competent! Moreover, leaders' career patterns seem to be characterized by frequent moves across different businesses which do equip them with varied, but also more superficial experience relative to their work.

There seems to be some reason, then, to argue that the development of experiential knowledge should be formalized. This is not the place to discuss that problem in depth, but the results of the study suggest that self-involvement

is necessary. In a learning context this might be secured through the use of simulation and long-range programs containing both work with projects, regular theory courses and some kind of counsel. In addition, the use of experienced managers as patrons for those less experienced is probably an effective way of sharing practical insights. Last, the use of tests and some kind of encounters could provide subjects with information about their own patterns of thinking. Some of the suggestions above could be implemented in students' curriculae, while others are probably best included in the development of subjects engaged in practical work.

10.2. MANAGEMENT RECRUITMENT

The search for and choice of managers is a growing industry, reflecting the belief in their importance for the organization. The methods used to select those individuals reveal the current opinions on what make an individual an effective manager: A whole range of tests focus upon personality traits and attitudes, simulations address their decision-making qualities and researching past record is a way of capitalizing on some assumed stable personality.

Relative to this study and the results presented here, these procedures fail in one respect. They all ignore the fact that as strategic decision-makers managers have to relate to one particular environment with its own laws, actors and parameters. In addition, when the thinking they are paid to do is developed in another field or business there is no way they can utilize it before having the kind of experience that is the reason why they are hired in the first place! The problem is perhaps not important for all levels nor roles of management. The

manager has many tasks of which decision-making is only one (Mintzberg, 1973). Therefore, these objections are only relevant when the manager to be hired is to be directly involved in the perception and formulation of strategic issues, and where the individual is of prime importance. When this is the case, the organization is probably best advised to search for new managers within their own industry.

10.3. MANAGEMENT TEAMS

If cognitive power, as a function of experiential knowledge, really is important for the firm then this has some implications for the composition of management teams. First of all, increasing the number of individuals do not automatically make the team more efficient because cognitive power is an individual trait that cannot be emulated by a collective. This is a principle well known from computer soft-ware developing projects (Brooks, 1975). Second, the communication in such groups is partly responsible for the validation and development of individual knowledge and belief patterns (Schutz, 1967; Weick, 1979; Weick, 1979a). Therefore, it is essential that they contain individuals with domain specific experience to ensure that this kind of data is not overlooked. Third, individuals without this kind of experience should also participate because in such a forum there is potential for transmission of learning through dialogue.

10.4. STRATEGIC ISSUE MANAGEMENT (SIM)

The results also have some implications for the management of strategic issues. Recently, there have been some interest in organizational systems dealing with the detection and response to weak or developing strategic signals (c.f. Ansoff, 1975; Ansoff, 1980). Practical directions on how to design such systems have focused on where to find information, how to systematize it and report it (see Rentro, 1982; Brown, 1981; Ansoff, 1980). What has been missing in these contributions is a concern with the actors doing the interpretation of this information. The results of the present study at least inform us that it is not unimportant who do this work. More specifically, experience in the domain of the organization probably influences how the material is interpreted.

In designing MIS, therefore, the factor of experience somehow has to be considered at least in the evaluation stage of the processing of the gathered data. A perusal of the methods available shows this stage to be a crucial one. In one such system, for example, one is advised to gather data, assess their implications for importance as well as timing relative to the organization's activities (Ansoff, 1980). While the system is quite simple to administer (at least in principle), it obviously is quite demanding when it comes to deciding their meaning for the organization. It is here that the element of experience may have a significant influence. It was pointed out earlier that the human mind is constrained in its capacity for handling information. Experience with the strategy domain, on the other hand, has been demonstrated to covary with cognitive structures and content, proven (c.f. Chi, Feltowich, & Glaser, 1983; Weaver, & Carrol, 1984) to enhance information processing in other domains. This points to the usefulness of including people with that kind of competence in MIS-systems, preferably in its later stages of evaluation and synthesis. This

advise is in direct opposition to the tendency to assign this kind of operations to freshly educated MBAs.

10.5. THEORETICAL IMPLICATIONS

The theoretical point of departure for this study was taken from the literature about business strategy, cognitive representation and expert problem solvers. The goal was to have a better understanding of the association between experience with strategic tasks and images of the environment accessed when working with strategy related problems. Several findings emerged. First, the use of episodic material was demonstrated to covary with managerial group membership as expected. This is interpreted as support for the view that human cognitive representation is a multimodal function, and serves as further validation of that construct since earlier research has largely been confined to laboratory experiments and the learning of nonsense-word lists (Tulving, 1985). Second, experience seems to be associated with the kind of cognitive structures needed for efficient information processing with a mental apparatus limited in its capacities. The preference for contextual knowledge and concern with economic results are cases in point. These are qualities of experienced problem solvers' representations that have been hypothesized from studies of such individuals' processing *strategies*. The representations as such have not, however, been studied in the context of experience. Therefore, the present study is informative in the context of expert problem solving. Moreover, most such studies have focused on well-defined and structured problem situations like the 'Tower of Hanoi' puzzle, while relatively few have concerned

themselves with the kind of unstructured and ambiguous problem situations confronting managers. This study, therefore, serves to extend such research to more applied domains like management of organizations.

One other perspective deserves to be mentioned. As noted in the beginning of the theory chapter, most studies of managerial thinking so far have concerned themselves with various shortcomings and biases. In contrast, this study has focused upon the thinking of presumably efficient 'thinkers' in order to elicit some principles that could be used for the development of efficiency rather than just limit a problem. In that sense, the results of the present study are at least a step towards a better understanding of a neglected focus for resarch in the field of strategic management.

10.6. FUTURE RESEARCH

Implications for future research are found from two considerations. First, weaknesses of the present study may be improved in future efforts. Second, some of the findings point to further development of the ideas serving as point of departure for this study.

With respect to the first issue several refinements could be made, rendering the empirical results more robust. It is probably unrealistic to opt for a classical experiment with random assignment of subjects to the various groups in the kind of questions pursued here. On the other hand, it is possible to operate with more levels and kinds of experience. For example, managers of different levels within the organization and with various extents of experience could be

included in the study, in order to control more efficiently for the experience variable. Likewise, both BA students, professors of this field and people not affiliated at all with business administration or economics, could be included in order to control for the different levels of abstract knowledge. The inclusion of 'naive' subjects would be valuable for the conclusions regarding inexperienced people's representations. Such a design would offer a more complex, but also a more informative, measure of the 'experience' variable. A study with that many factors would necessitate a larger sample of subjects. As was pointed out earlier, the sample of this study is already a bit too small, resulting in reduced statistical power. Therefore, having larger samples is certainly a requirement for later efforts. Concerning the reliability of measures, the chosen procedure could be refined by having assistants unfamiliar with the reseach hypotheses doin all of the coding. In the present case, I did the bulk of the work myself, only controlled by another person coding a sample of the material. While the intercoder reliability was high, construct validity is weakened by this procedure. As pointed out earlier, construct validity is to some degree indetermined in this study. It could be enhanced by adding other types of stimuli to the situation. The most difficult construct to measure is that of episodic referents. A special study could be made concerning the correspondence between verbal reports and the activation of experiential memories. This could be attained through measuring differential brain activity in connection with verbal output. Having access to such empirical material would greatly enhance the construct validity of this measure. The various levels of knowledge could be measured more validly with the help of techniques such as the Q-sort methodology or the Rep-grid. Both these techniques allow for intraindividual grouping and hierarchical ordering of concepts. The procedural mode should be studied from a qualitative point of

view, in order to assess the contention that experienced subjects have qualitatively better representations with respect to this mode, and that this is the reason why they use them more sparingly. Behind the study lies the basic premise that the experienced subjects' EIs are better and more efficient than those of the inexperienced. This belief should be tested, which might be attained through having an expert panel evaluate the protocols of the experienced against those of the inexperienced. One could also take actual, real-life decisions and present the background information in such situations as cases to students. Their decisions might then be compared to the actual ones, made by experienced strategists. Again, the two sets of decisions could be evaluated by an expert panel. While the design of the present study offered data on the differences between experienced and inexperienced subjects, a longitudinal design would give more reliable data concerning the causal role of experience in accounting for the development of the environmental images. Such an approach would also provide one with a more complete understanding of the role of different events like training, education, management development programs, crises and problems experienced and projects engaged in, just to mention a few.

The above discussion of implications take weaknesses of the study as point of departure. The results offer some opportunities for future developments as well. The most important of them is probably related to the contextual nature of the experienced strategists' EIs, and their relative lack of theory and abstract principles. On the one hand, the results may be interpreted as indicative of an effective and functional adaption to the demands of their work. On the other hand, the results may reflect attributes of the particular sample studied here. The question is then whether particularly successful strategists would demonstrate the same pattern of attributes; if the media and

other similar sources of information is taken seriously, there is reason to believe that the variation concerning competence within this group is large. The best way to address this problem is to select strategists with the qualities referred to, and the practical problems associated with securing their cooperation is probably the hardest to solve.

One other line of investigation implied by the results reported here is related to experience. If the differences found in experienced strategists' EIs are valuable, and if they are related to experience, then it would be of value to accellerate the process labelled as experience. Some paralell may be found in research on the process of psychoterapy, where techniques like self-management have been found to speed the process. Within this context, one may speculate whether corresponding techniques might be developed for inclusion into management development programs, in order to compress the time-span needed for the cultivation of the kind of cognitive structures reported here. Actually, very little is known about such programs and particularly about their effects. Considering the resources channeled into such activities and the importance of strategy for organizational growth and survival, this is an area of great potential gain.

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PART VI

Appendix

APPENDIX 1

CODING MANUAL

Manual for coding the verbal protocols

INSTRUCTIONS

The following is a manual for the coding of a particular set of verbal protocols transcribed from audio tapes. The subjects are analyzing and responding to four problems having to do with business strategy. The intent of this analysis is to code the occurrence of particular classes of statements according to some specified categories.

In order to enhance uniformity of coding, some guide-lines of a general nature are presented beneath. Please read them carefully and follow the instructions.

1. The protocols consist of numbered sentences/statements. You code the whole sentence. Try to think of the statements as units of thought with one recognizable characteristic.

2. You may look to the preceding and/or following sentences in order to understand the meaning of a given statement, when necessary.

3. Read carefully the descriptions of the various categories; it is important that you have a thorough understanding of their meaning-content. This is made easier if you also look at the examples, together with their annotations.

4. In this manual, you will also find a glossary which may be referred to in order to identify key concepts associated with the specific categories. As the glossary is not exhaustive, it must be thought of as indicative and not decisive.

5. Use the supplied coding sheets when analyzing the protocols, and follow the guidlines there.

GENERAL STRATEGY RELATED KNOWLEDGE

Knowledge of general strategic principles

Statements related to strategically relevant circumstances or matters. These are observations not restricted to any industry in particular, in the sense that they reflect knowledge of general principles which may be applied to all kinds of industries/businesses. They may focus upon the internal or external environment of an organization, matters pertaining to choice of or navigation within domains of action, and other broad areas of concern related to business strategy. General administrative issues are also comprised by this category.

Example: "I will have to know more about this industry's degree of competition".

Remarks: The subject is here focusing on the organization's external environment, and reveals knowledge associated with the element of competition, and its importance for a firm's strategy. It is general in the sense that such knowledge is applicable to all kinds of businesses.

Glossary

Nyetableringer

Konkurrenter

Omgivelser

Kunder

Produkt

Markedsandeler

Service

Kundeforhold

Markedet

Potensielle kunder

Kunders behov

Interne styrker

Interne svakheter

Trusler

Muligheter

Markedsandel

Strategisk kjerne

General economy concerns

Statements expressing concerns or references to economic matters of a general type. These verbalizations are of a sort which apply to all kinds of enterprises regardless of industry, as long as economic matters are relevant at all.

Example: "This is the kind of situation that calls for a review of the cash-flow situation".

Remark: The subject is concerned about an economy related theme which might be applied to all kinds of businesses.

Glossary

Inntjening

Inntjeningssiden

Tjene penger

Lønnsomhet

Inntjeningsmessig

Beskatning

Overskuddet

Bidrag

Inntekter

Utgifter

Kostnader

Lønnsomhetskriterium

Koster penger

Intern prising

Resultatene (økonomiske)

Lønnsomhetssammenheng

Fortjeneste

Underskuddet

Driftskostnader

Investeringer

Investeringskostnader

Kostnadsgevinster

Egenkapital

References to theory

References to models, theories or well known authors from the business strategy– or related fields.

Example: "Here I would apply the Porter-model concerning the forces of competition".

Remarks: The subject refers to Porter, who is well known for his work on business strategy. The model referred to is a theoretical model designed to apply to the analysis of industries in general.

DOMAIN SPECIFIC KNOWLEDGE

Strategy related knowledge

Statements about, or references to, the banking business in relation to elements of business strategy. General theory, or translations of general theory into 'banking' language does not qualify, but expressions implying use of industry-spesific cognitive models do.

> Example: "Eh, we are heavy in, let us say you were heavy, found that you were heavy in people of 55+ [*years of age*], OK, but you were weak on new salary-accounts, evidently this is a conveniant situation today but unpleasent situation in 5-10 years.".

Remark: The subject is here referring to some market–characteristics particular for the banking industry, associated with demographic segments of the market. These characteristics are only relevant for the kind of products offered by banks.

Knowledge of industry specific economical matters

Statements expressing, or based upon, economy related issues specific for the banking industry. These may be processes, mechanisms, transactions, and the like particular for this industry, as well as direct references to the banking business.

> Example: "If the market shares are those of savings accounts it would be a catastrophe because he would have to go out and buy more expensive capital".

Remarks: This statement explicitly refers to economic matters ('expensive capital'). It is coded as industry specific because of the concepts 'savings accounts', the implied sources of operation capital and their different profiles of cost. Such financing is unike for banks and related businesses.

Glossary

Tidsinnskudd

Utlånsrente

Rentemargin

Utlånsrente

Innskuddsrente

Tap

Funding

EPISODIC PROCESSES

Personal experiences

These are statements containing personal pronouns in referring to experiences of self or ones organization.

Example: "This is exactly what we were discussing at the staff meeting yesterday".

Remarks: The subject is clearly referring to his memory of an event, and uses the personal pronoun 'we'.

Analogical processing

Statements involving the use of analogies, which may be taken from own or own organization's behavior, events generally, behavior of customers or other firms and the like. Analogies may take the form of examples or illustrations of the point made.

> Example: "You will get the various business areas isolated, like the Stocks and Shares Dept. where there has been some problems recently".

Remarks: The subject is here argumenting for the effect of a particular act, and use the Stocks and Shares Dept. as a parallel.

REFERENCES TO ACTIONS

These are statements of procedural nature. Typically, these are in the form of hypothetic intentions of actions to take in relation to the situation referred to.

Example: "First of all, I would do an environmental analysis".

Remarks: 'Would do' indicate a concern with activity. Although it might never be actualized in reality, the subject is referring to knowledge about a specific act that is held to be appropriate in the context of the case as it is perceived.

Glossary

Jeg ville...

Jeg må...

- ville satset...

INSTRUCTION FOR CODING SHEETS

The following instructions are for the use of the coding sheets. Please read them carefully and follow the steps as numbered, as this has implications for the statistical processing of the data.

1. Start from the beginning with the first statement. Try to match it against the categories I, II ,III and IV, in that order. If match, write down the number of the statement.

3. Proceed with the rest of the statements.

4. When in doubt, consult the examples and the notes associated with them. The Glossary may also be of help. If there seems to be no reasonable match, go to the next statement.

CODING SHEET

Document i.d.:_____ **Coder's initials**_____

Date _____ **Page** _____ **of** _____

Category I

a Analogical processing.

Statement #

b Personal experiences.

Statement #

Category II

a Industry specific economy knowledge.
Statement #

b Industry specific strategy knowledge.
Statement #

Category III

a General economy concerns.

Statement #

b General strategic principles.

Statement #

c References to theory.

Statement #

Category IV

Action
Statement #

APPENDIX 2

VALIDATION DATA

Table 1.1.: Multimeasurement of ANALOG

	CASES[1]			
CASES	Case 1	Case 2	Case 3	Case 4
Case 1	1.00			
Case 2	0.92***	1.00		
Case 3	0.37	0.47*	1.00	
Case 4	-0.26	-0.25	-0.12	1.00

[1] Numbers are Pearson correlation coefficients based on proportions of total coded statements
[2] N = 19
* Indicate that the correlation is significant at the $\alpha<0.1$
** Indicate that the correlation is significant at the $\alpha<0.05$
*** Indicate that the correlation is significant at the $\alpha<0.01$

Table 1.2.: Statistics of Variable ANALOG for Each of the Four Cases

	STATISTICS				
CASES	Min	Range	Mean	Variance	Skewness
Case 1	0.00	12.00	1.56	13.07	2.16
Case 2	0.00	19.05	2.15	25.26	2.41
Case 3	0.00	14.28	3.45	27.88	1.08
Case 4	0.00	16.67	3.06	31.55	1.39

N = 20

Table 2.1.: Multimeasurement of PERSEX

	CASES [1]			
CASES	Case 1	Case 2	Case 3	Case 4
Case 1	1.00			
Case 2	0.29	1.00		
Case 3	0.01	0.69***	1.00	
Case 4	0.59***	0.66***	0.41*	1.00

[1] Numbers are Pearson correlation coefficients based on proportions of total coded statements
[2] N = 19
* Indicate that the correlation is significant at the $\alpha<0.1$
** Indicate that the correlation is significant at the $\alpha<0.05$
*** Indicate that the correlation is significant at the $\alpha<0.01$

Table 2.2.: Statistics of Variable PERSEX for Each of the Four Cases

	STATISTICS				
CASES	Min	Range	Mean	Variance	Skewness
Case 1	0.00	28.26	2.93	45.43	3.03
Case 2	0.00	23.81	2.21	33.21	2.96
Case 3	0.00	13.04	1.43	11.72	2.43
Case 4	0.00	50.00	10.04	248.75	1.37

N = 20

Table 3.1.: Multimeasurement of SPESEC

	CASES [1]			
CASES	Case 1	Case 2	Case 3	Case 4
Case 1	1.00			
Case 2	0.08	1.00		
Case 3	0.16	0.85***	1.00	
Case 4	0.06	0.95***	0.85***	1.00

[1] Numbers are Pearson correlation coefficients based on proportions of total coded statements
[2] N = 19
* Indicate that the correlation is significant at the $\alpha<0.1$
** Indicate that the correlation is significant at the $\alpha<0.05$
*** Indicate that the correlation is significant at the $\alpha<0.01$

Table 3.2.: Statistics of Variable SPESEC for Each of the Four Cases

	STATISTICS				
CASES	Min	Range	Mean	Variance	Skewness
Case 1	0.00	14.29	3.36	21.01	1.38
Case 2	0.00	34.48	2.94	61.44	3.51
Case 3	0.00	35.29	3.98	72.67	2.74
Case 4	0.00	40.00	2.43	80.04	3.98

N = 20

Table 4.1.: Multimeasurement of SPESTRA

	CASES [1]			
CASES	Case 1	Case 2	Case 3	Case 4
Case 1	1.00			
Case 2	-0.20	1.00		
Case 3	0.49**	-0.15	1.00	
Case 4	0.04	0.39	0.09	1.00

[1] Numbers are Pearson correlation coefficients based on proportions of total coded statements
[2] N = 19
** Indicate that the correlation is significant at the $\alpha<0.05$

Table 4.2.: Statistics of Variable SPESTRA for Each of the Four Cases

	STATISTICS				
CASES	Min	Range	Mean	Variance	Skewness
Case 1	0.00	100.00	35.67	657.70	0.79
Case 2	0.00	74.19	33.02	479.59	0.16
Case 3	0.00	100.00	66.35	573.89	-0.20
Case 4	23.53	84.62	30.27	661.13	0.37

N = 20

Table 5.1.: Multimeasurement of GENEC

	CASES [1]			
CASES	Case 1	Case 2	Case 3	Case 4
Case 1	1.00			
Case 2	-0.13	1.00		
Case 3	0.30	-0.04	1.00	
Case 4	0.03	0.07	-0.21	1.00

[1] Numbers are Pearson correlation coefficients based on proportions of total coded statements
[2] N = 19

Table 5.2.: Statistics of Variable GENEC for Each of the Four Cases

	STATISTICS				
CASES	Min	Range	Mean	Variance	Skewness
Case 1	0.00	10.00	1.59	8.60	1.86
Case 2	0.00	33.33	4.30	61.29	2.73
Case 3	0.00	47.06	11.67	163.03	1.17
Case 4	0.00	50.00	10.05	194.22	1.40

N = 20

Table 6.1.: Multimeasurement of GENSTRA

	CASES [1]			
CASES	Case 1	Case 2	Case 3	Case 4
Case 1	1.00			
Case 2	0.70***	1.00		
Case 3	0.50**	0.23	1.00	
Case 4	0.54**	0.52**	0.45*	1.00

[1] Numbers are Pearson correlation coefficients based on proportions of total coded statements
[2] N = 19
* Indicate that the correlation is significant at the $\alpha<0.1$
** Indicate that the correlation is significant at the $\alpha<0.05$
*** Indicate that the correlation is significant at the $\alpha<0.01$

Table 6.2.: Statistics of Variable GENSTRA for Each of the Four Cases

	STATISTICS				
CASES	Min	Range	Mean	Variance	Skewness
Case 1	6.00	79.00	50.95	583.65	-0.45
Case 2	0.00	94.74	42.20	659.15	0.17
Case 3	0.00	53.66	14.03	246.20	0.87
Case 4	0.00	95.46	39.80	924.93	0.21

N = 20

Table 7.1.: Multimeasurement of THEORY

	CASES [1]			
CASES	Case 1	Case 2	Case 3	Case 4
Case 1	1.00			
Case 2	0.56**	1.00		
Case 3	0.01	-0.011	1.00	
Case 4	.	.	.	1.00

[1] Numbers are Pearson correlation coefficients based on proportions of total coded statements
[2] N = 19
** Indicate that the correlation is significant at the $\alpha<0.05$

Table 7.2.: Statistics of Variable THEORY for Each of the Four Cases

	STATISTICS				
CASES	Min	Range	Mean	Variance	Skewness
Case 1	0.00	7.41	0.87	4.61	2.19
Case 2	0.00	27.27	2.57	49.72	2.73
Case 3	0.00	11.11	0.68	6.33	3.85
Case 4	0.00	0.00	0.00	0.00	0.00

N = 20

Table 8.1.: Multimeasurement of ACTION

	CASES [1]			
CASES	Case 1	Case 2	Case 3	Case 4
Case 1	1.00			
Case 2	0.57**	1.00		
Case 3	-0.05	-0.16	1.00	
Case 4	0.24	0.307	0.31	1.00

[1] Numbers are Pearson correlation coefficients based on proportions of total coded statements
[2] N = 19
** Indicate that the correlation is significant at the $\alpha<0.05$

Table 8.2.: Statistics of Variable ACTION for Each of the Four Cases

	STATISTICS				
CASES	Min	Range	Mean	Variance	Skewness
Case 1	0.00	30.00	9.50	93.12	0.84
Case 2	0.00	57.14	16.65	247.96	0.88
Case 3	0.00	25.00	6.80	79.12	1.01
Case 4	0.00	28.00	4.54	59.57	1.73

N = 20

APPENDIX 3

MINICASES

1.

You are manager for a savings bank in a small Norwegian town. After a long period of time with stabile growth your bank start losing market shares.

2.

Imagine that you are recently hired as manager for a large Norwegial commercial bank. Your most important job is to formulate an applicable strategy for the next five years.

3.

Imagine that you are the manager in a bank-branch in an area where the population has increased strongly, mainly because of people moving in. You have received directives that home-loans to first-time home-loan applicants should have priority.

4.

Imagine that you are executive manager for a an exchange department (trade with foreign currency) in a large commercial bank. The bank has through a long time made a good profit on this operation. Presume that the authorities have decided that this department are to be separated as an independent firm, that is as an independent unit, legally and economically, with its own accountancy.

APPENDIX 4

TRANSCRIBED AND CODED PROTOCOLS

MANAGER INTERVIEW[1]

CASE 1

1. [First of all I want you to describe this situation as you perceive it][2].

2. I am to describe this situation?

3. [Yes].

4. You are manager in a bank in a small Norwegian town, for a long time - you start losing market shares (reads loud).

5. Yes, this could sure be a difficult situation, a troublesome situation.

6. It might be.

7. Mm, I don't know what you are after when you want me to describe the situation.

8. [Well, if you could say something about when it is troublesome and when it is not, for example].

9. Yes, I would have to 'behind' it and see what is happening in this market.
GENSTRA

10. It could be a competitor who has entered the market.
GENSTRA

11. Mm, since it is about lost markedshares it is implied that the total market, i this context, mm is of significance.
GENSTRA

---

[1] Coding is marked in large bold ledders: **ANALOG**

[2] Text in brackets are my comments

12. Is this a market that is growing such that I in reality maintain that which I am concerned about and my profit, then this is less troublesome than if this is a totalmarket where I notice that I cannot take a share of the growth and that it starts having effect on my profit.
GENSTRA

13. So - in any case I would say that I would halt if I started losing market shares, even if I were in an attractive market because it would be a signal to me that I did not have the share of the growth that - that I could.
GENSTRA

14. But, as I said - the seriousness of the situation depends on what market situation the total market is in -.
GENSTRA

15. Eh - and I would look at what the causes might be -.

16. I would study the competition situation: Are there new direct competiors, are there indirect competitors in the sense that other types of financing, other types of investment - where do these funds go that I don't get to partake in.
GENSTRA

17. This would be the place that I would start looking for causes.

18. The first I would have to start analyzing was what is this caused by.

19. [Are there other things in addition to new types of competitors and new products you would look for?].

20. Yes

21. Well, I would, I would look for external cause, as I said for competitors, at the total market.
GENSTRA

22. Eh, for mm demographical changes that could explain that I did not grow as much. **GENSTRA**

23. And, - I would also look for internal causes.
GENSTRA

24. Eh, concerning myself - this means, for ex., that I am no longer - shall we say - positioned in the market the way I should.
GENSTRA

25. Within a local market we see changes in how and where people live, in the choice of carreers and it might be that my earlier localization, my earlier services are not so attractive any longer i relation to these changes.
SPESTRA

26. So it is evident that I would also look for possible causes with myself.
GENSTRA

27. [Your position relative to the customers that -].

28. Yes, it might be localization, or it might be the services that I offer, or it might be my way of marketing myself in that market.
GENSTRA

29. [If you should do something in relation to a situation like this, in addition to the analysis, if you were to design a strategy, could you say something about what you would -].

30. I would in any case wait with choosing my strategy till I had these - this analysis of causes on the table.

31. Because I believe it is very dangerous [jump on any solutions before I know something about the cause.

32. It is evident that this causal relation is the most important basis for what I will and should do.

33. So I will not point to any particular strategy here and now, I thing this would be to beg the issue.

34. [So you would get yourself a kind of symptom profile or causal explanation and take action relative to it?].

35. Yes I would

36. But it is clear that I would try to see - try to evaluate the consequences of a continuing development in a causal anaysis like this:
GENSTRA

37. Is it an aggressive competior that has entered, OK: how long may such an attacker be aggressive, should I that in this context might be called a defensor, should I accept the attacker's premises of should I rather 'sweat it out' and let him work till he meets his own shall we say aggressive marketing acts?
ACTION

38. That is appraisals that I - I would do in the continuation of a causal analysis like this.

39. [If a competitor engages in aggresive acts, as you say, what might this be in a concrete sense?].

40. Well, this might be that a new bank establises itself in the market here and he really goes at it with a giant investment offer where - that is well beyond what I offer for savings.
SPESTRA

41. It is clear that the market share, i that context, will be - then be - will then be - loan - no, will then be the depositmarket.
SPESTRA

42. Eh, he would steale deposits from me but he would, at the same time, have a substantially more expensive funding than I do.
SPESTRA

43. And then my choice og strategy is to sit - accept that he steals funding that he prices up.
GENSTRA

44. Then he sits more expencively in the market with his money than me, and consequently he must lend them more expensive than I to earn - he lives by and large of the same margin as everybody else - and then I may either, as I said, either respond in order to keep the money.
SPESTRA

45. Which means that I also sits with an expensive funding.
GENEC

46. And none of us has neither earned nor lost.

47. That is, I have lost because I now sits with a more expensive funding and he has lost because in the sense that he don't get, probably, the money he wanted.
GENEC

48. An alternative strategy could be that I let him aquire this expensive funding and underbid on loans so that he did not manage to take his preferred interest on loans, for example., and squeeze him that way.
ACTION

49. So there are a lot of possibilities, but that I had to look into after I knew why and where I lost market shares.
GENSTRA

50. CASE 2

51. Well, what am I supposed to do with this then?

52. [If you could just work from the assumptions which you might find reasonable.].

53. Am I to formulate a strategy or how I would proceed to establish a strategy.

54. [Yes, how you would proceed and which elements you would attend the most closely to.].

55. Well, it will to a large degree paralell what we discussed in the former case, because clearly a strategy takes first and foremost the market I serve as a point of departure. **GENSTRA**

56. It may be Norway, if it is a large national commercial bank, or it may be a local market if it is a small commercial bank.
SPESTRA

57. It always starts here.

58. And the first thing I would have to know about then is what is the market and how is the market developing.
GENSTRA

59. And as a rule a bank market consists of several submarkets.
SPESTRA

60. A lot of submarkets if you start splitting it up.
SPESTRA

61. Eh, in any case I would start with the main markets 'private/commercial' and look at the magnitudes - absolute magnitudes and what trends I might find there. **SPESTRA**

62. There is a lot to be found in public statistics, and industry statistics that could offer me a lot - I would collect market data, that would be my first job.
GENSTRA

63. In parallel with this I would try to position my own bank in this - eh picture of the market: where are we strong, where are we weak?
GENSTRA

64. [Do you then think of such things as competence and structure of finance or - ?].

65. First I would look at - not that - I would look at absolute magnitudes of market shares **GENSTRA**

66. [What the bank has got?].

67. What the bank has got in this market, that is when I have collected my market data then I would find out where are we in this market, and again I would say that you would very soon experience that there are many markets and even if you would look at it nationally you would experience that you may split it into demographic submarkets or industries etc., etc.
SPESTRA

68. So I would prefer to do a somewhat thorough job in this field.

69. And then I would try to - on the basis of that - to draw some opportunities/threats (- some unintelligible here on the trends found in the analysis).
GENSTRA

70. Eh, we are heavy in, let us say you were heavy, found that you were heavy in people of 55+ (*years*), OK, but you were weak on new salary-accounts, evidently this is a conveniant situation today but unpleasent situation in 5-10 years.
SPESTRA

71. You were maybe heavy in some industry exhibiting typical tendencies of stagnation while you were weak in others.
GENSTRA

72. So then you would try to look for where I am and where I will be if I do not do something.
GENSTRA

73. And I would also try to calculate the profitability in serving these markets, which in bank can be very difficult because they are so interrelated. **GENEC**

74. But I would, all the same, try.

75. And then you are approaching - I had almost said - the beginning of the formulation of a strategy.

76. Then I have a material enabling me to say: if we do like this then we may expect that to happen.

77. If we do like this we may expect that it happens.

78. So I would hopefully find some areas to fokus upon (*invest in*), I would find some submarkets that I ought to follow up and others to downplay. **GENSTRA**

79. And then the next stage is to see - if you are going towards that market - what resources have to do so? **GENSTRA**

80. Have we got the people, are we located where they expect us to be, have we got the services that we must expect them to demand, have we got the competence etc., etc. **GENSTRA**

81. And then you might say that relative to which areas of investment I chose to focus upon I had to go back to myseld and see - if we are going towards that market we have to do so and so concerning personnell, we have to do this concerning the technical side - our technology, and we have to do that with the product side and so I would build my strategy after that submarket. **GENSTRA**

82. This way I would proceed after this.

83. The problem is, of course, especially in the bankmarket I believe, is that there are - formidable changes, and it is very dangerous I think to build a strategy that is too tightly locked.
SPESTRA

84. What I would, what I would have in the back of the mind all the time when construing the strategy, was one word, which is flexibility.

85. Because I believe it is dangerous if you, if you become so strategic in your way of thinking that you in a way commit yourself to costs and personnell that suddenly is become a straight-jacket because the market turned.
GENSTRA

86. There are after all some examples where, if you asked med a year ago then I would say that I would go for the new instruments, I would build up a broker-apparatus that could trade for my customers because it is on the stock exchange the money are. **ANALOG**

87. Then maybe today I would sit with a damned costly broker apparatus that would not have the damnest thing to do - the word 'flexibility' I believe is a word that I would have with me in a strategy like this.
SPESTRA

88. In other words I would not expose - I would be very concerned about that the investments I do in my market strategy, they should not be larger then I could stand a mistake.
GENEC

89. [This is the way you could be flexible, is that it?].

90. Yes, in other words I would - it is very easy when you are turned on by a market - area of investment, that you invest yourself to death also within the banking industry in the form of personnell, technical equipment, new localities etc., etc.
SPESTRA

91. Consequently you build up very fast a lot of things and what is quite sure is that you will have the costs but revenue allways come later than you have planned for in your strategy.
GENSTRA

92. So it is kind of the old rule that you - costs are as a rule greater than you have budgeted while revenue as a rule allways are less.
GENSTRA

93. I would, as I said, be careful about formulating a strategy that was not very flexible such that I all the time had room for maneuring for shifting course when basic conditions change.
GENSTRA

94. [And that flexibility can you attain by not investing more than you can afford to lose?].

95. That is for ex. one way of doing it, it is one way to do it.

96. Then I will rather lose a part in a growth market in a startup stage to be - to be quite sure that I go, you see now and then - it pays to be, not the first but the second, to put it that way.
GENSTRA

97. CASE 3

98. Well, if I was in a bank branch then - and was given directions to do so, then I would manage to earn money on this (venture).
GENEC

99. Because then I would squeeze the head quarter that issued these directions and say that OK for me but then you have to pay.
ACTION

100. An other thing is that authorities have established subsidization arrangements which will enable us to earn more on these things today then we did - or I am going to earn more on these things than I did two months ago.
SPESTRA

101. [So the authorities are also a factor here then?].

102. Yes, today they are.

103. [Not only in a regulatory sense?].

104. No, they have established economical systems of subsidizing for first time housing appliers (*shopping for a home for the first time*) which give me some percent from the authorities for the loans I give them, and this helps a lot.
SPESTRA

105. But, mm - I don't see this as, as a problem per ce - because what I would say is that I have a market that has a need.
GENSTRA

106. And that market has a need for homes, that is rather straight forward.
GENSTRA

107. If shall survive in this market then I at least have to satisfy that demand.

108. So in that sense the market situation and the directions agree.

109. I have not much to do in that market if I cannot give home loans.
SPESTRA

110. That would be to push the customers over to the competitors, anyway.
GENSTRA

111. So I have to satisfy the marketneed.
GENSTRA

112. And then it is the question of how I might do that and in the same time maintain my profitability: I perceive that as the problem.
GENEC

113. And then I will say it may be solved in several ways.

114. The most important for those applying for home is a favorable, let us say liquidity situation, and then it is not allways necessarily the loan interest that is decisive, then it is the total payment which is of consequence.
SPESTRA

115. So I would take the price I would - I need in order to earn money on the the funding I have, but instead let these have a more favorable situation, either by letting them have a payment free period or by changing the payment profile for them such that they had a lighter load, so I don't perceive this as an impossible situation.
GENEC

116. I may very well take what I want in loan interest and still, and still earn a decent amount of money on it, but I may have to accept that it take longer time before these money return to me.
GENEC

117. But to me it is indifferent whether it is one person borrowing or if it is three borrowing the money as long as I make a profit.
GENEC

118. It is evident that some would say that I could made more money by lending them out for consumtion and obtained a higher interest, which is probably correct. The risk is, on the other hand, much higher on loans for consumption, the security of a home (*in relation to the loan*) is damned good so I would not perceive this thing here as - as an impossible situation.
GENEC

119. What I see is that I would also try to help these by placing some of the demand with alternative fundingsources so that I did not sit as sole home financer, that I retained the top financing (*generally second priority security in the home in question*) which is the most profitable in the lending perspective.
ACTION

120. There are, after all, a whole range of money institutions that cannot accept anything less than first priority, I would try to establish a good cooperation with the local insurance company, the local Realcredit and the local Home Financing Bank (*owned and operated by the Government in order to secure reasonable loans for some categories of home buyers*) and try to channel as much as possible of the first priority and the lowest prized home loans there and then I would take the top financing wich after all is the most expensive and shortest termed (*must be payed back over a shorter span of time*) money.
GENEC

121. And this way satisfy the customer's need and simultaneously get the most profit from the money.

122. [So there are more ways than one to go, then?].

123. Yes

124. CASE 4

125. [Could you first comment on your reactions to the situation?].

126. Well, the situation in itself would I say that if - I don't react to it in the sense that when the circumstances change then this is something we have to live with.
GENSTRA

127. If the authorities decide that the bank as such no longer may do exchange business (*buying and selling foreign currency*) and this has to be separated into

a company of its own - well, then it is just to separate it into a company of its own.

SPESTRA

128. It won't influence on the market situation and it won't influence the situation of supply.

GENSTRA

129. It implies for me, as it is described here, just that this has to be organized in a legally independent unit (*a new firm*) instead of a department as it was earlier.

GENSTRA

130. But whether i am executive manager for a department or executive manager in a firm owned by the bank or whatever, I can't see any dramatic problems here.

GENSTRA

131. [It has no great consequences?].

132. No.

133. Because we even now operate our departments, as f. ex. Department of Exchange, as profit centres.

PERSEX

134. I have a requirement-, as manager for a department like that I would have a requirement of profiability.

GENSTRA

135. So for me this is only a formality in relation to what is the situation right now.

136. [But might it imply greater possibilities for control or visibility in relation to the rest of the accounts, or the organization do you think?].

137. Naturally - no not in relation to the rest of the organization.

138. It is possible that - it is possible that - you would have an indepentent board of directors established with its own responsibility, with its own 'general meeting'

and if this was a firm owned a hundred percent then these people would be the same that you reported to whether it was a 'general meetin' or a regular department meeting, so I conceive this as more or less the same thing.
GENSTRA

139. Exchange trade is not a very visible operation at all because it is an expert function where you - shall we say - aquires, buys and sells foreign currency on behalf of either the bank itself or on behalf of large customers and I believe that those customers you will still have.
SPESTRA

140. The bank would have to trade through this firm.

141. You would have two different accounts, as I said, and it is possible that it might be of some consequence for the authorities but concerning our internal accountency then we have already this, shall we say overview, to see what profit have we here and what losses here.
PERSEX

142. [So this mean that you would not do anything dramatic about it?].

143. No, I would not quit the company or hang myself, or, for that matter, started writing in the newspapers on this account.

STUDENT INTERVIEW

Case 1

1. It probably means that another bank take over our former customers, in one way or another.
   GENSTRA

2. Either because they had a better offer or because they [bank in the case] have made worse offers on interersts and things.
   GENSTRA

3. [Interests and things–are there other things you might think of?]

4. Sure, there are other things–it could be like service and treatment of customers, general information and attitudes toward the customer, you might say.
   SPESTRA

5. [Have you any opinions of what might cause these things?]

6. It has to do with competition because it is market shares.
   GENSTRA

7. Say it is about the that part of the finance market that the banks control, then it has to be something the other banks have done.
   GENSTRA

8. But what is behind this—then one must look at what the bank, or its employees, have been doing through the years, and the strategy it has chosen.

9. [If you found yourself in such a situation and wanted to find out what was behind it—which questions would you ask yourself?]

10. The first I would do was looking at competing banks and their actions, and compare this with what we had been doing in the same period.
    GENSTRA

11. If there was not a big difference there, I would look at what happened at the front desk; ask customers that had quitted about their reasons for doing so. **SPESTRA**

12. [Other things?]

13. Yes, there are a lot of procedures to engage in to have such information.

14. But in general, you have to find information about customers and the competitors. **ACTION**

15. [If you found yourself in this situation, what do you think you would do?]

16. You mean, to get out the situation?

17. That would depend on what I found in the earlier stage.

18. I would go for offers to our customers, match those to the customers if they were less attractive then other's new offers that was better—designed them to those variables that was critical to the customer. **ACTION**

19. [So the work would really be put into the analysis?]

20. At first, yes.

21. Then I would approach the critical customers that might be won back. **ACTION**

22. [Tried direct contact, is that it?]

23. Yes, direct contact.

Case 2

24. Then I will ask you—if you look towards the environment, what information would you like to have to do this job?]

25. The goal would be to have a high revenue, that is the greatest possible difference between interest on deposits and interest on loans.
GENEC

26. What you do in this situation is dependent on getting those customers willing to pay them, and that is a special type of market.
GENSTRA

27. This is customers that may be grouped.
SPESTRA

28. Well, group those customers that are especially strong and that was willing to pay the money.
GENSTRA

29. And the same for the deposit side.

30. Have an account to disposal with a low interest and what offers we might give them—access to loans—maximize the difference between interest on deposits and interest on loans.
SPESTRA

31. This would be the content, then, but then there is the strategy for realizing it—that is a large thing indeed.

32. [You only need to take the principal—. Are there other things you—?]

33. Yes, say you had some kind of survey view of the cusomers that is adequate and relevant.

34. Then it would be to approach them in writing with some kind of marketing things—. **ACTION**

35. [So you would have a marketing problem relative to these important customers?].

36. Yes, and some kind of contact information.

37. And then one would have to play several cards.

38. There are various types of commercial banks.
SPESTRA

39. The more Oslo-type of banks and banks like them have secured for themselves special customers by personal contact.
SPESTRA

40. But if you are a general commercial bank then—of an ordinary type—then you might perhaps use the same kind of strategy there too, but there you must also go for the type of strategy that fits [their type of market].
ACTION

Case 3

41. [Could you first say something about the situation here?]

42. You have to reckon with people moving in—that is, if those moving to the area are of the same type that we are supposed to give priority—first time home loans applicants—unge people in their 20/30s—.

43. Well, what am I supposed to—?

44. [First about how you perceive the situation].

45. This could be a somewhat difficult customer group—this is a directive which is issued centrally from the bank or the government, and to follow such a strategy is not automatically profiable—if you cannot have a high interest, and you probably cannot even though it doesn't say here.

GENEC

46. But even though this is not a tempting strategy immediately one could try to turn it to ones own bank's interest in the longer run.
SPESTRA

47. [What do you mean by that?].

48. These here are going to get older—they establish themselves, get a job and family. They will develop to become more average kind of customers as the years pass and then this group will be just as attractive as other groups.
SPESTRA

49. And then of course you can follow the same strategy in relation to this group, but with the difference that that you would have to think more in a long time perspective, and the investment placed in this is that you must give them cheaper loans and you are dependent upon having some return on this investment in the long run.
SPESTRA

50. An other thing is to compensate for the extra cost through some contribution from the government or centrally.
SPESTRA

51. This might be the interest from The Bank of Norway and degree of revenue relative to the central management of the bank.

52. I would secure my position as manager.

53. [Are there anything you would seek more information about or things you would like to know more about?].

54. Concerning this group it depends on what kind of carrier they could be expected to have in the future.

Case 4

55. [Can you say anything about this situation?].

56. This is a decision that is connected with the fact that this valutaenterprise have a different character then the rest of the banking business; it has a special risk associated with it which the central management of the bank perceive as important that the compartment itself takes responsibility for.
SPESTRA

57. I suppose this is the situation they find themselves in.

58. Then there is the question how this manager choose to handle this situation strategically and operative.

59. [Is there anything in particular you would be careful to do—?].

60. Well, the authorities, I didn't think of them, it is the authorities that have decided this. **SPESTRA**

61. That means it could have something to do with the less fortunate aspects of the banking business—stocks and valuta trading—so they want to enforce independent accounts for this particular business.
SPESTRA

62. [If you was responsible for this operation, what would you do to ensure a successful completion?].

63. Then I would have to have a special agreement and some rules about sharing of risk and profit between this compartment and the rest of the bank.
GENSTRA

64. And that would be dependent upon how risky this enterprise is, how speculative it is, the quality of the transaction with the customers and the customers of the bank—I suppose it is more or less the same customers.
SPESTRA

65. When I had made clear the mutual relationship to the rest of the bank—negotiated a deal there—how this should be organized and handled, then I would design a strategy with respect to our stance relative to the rest of the market.
ACTION