# THE EFFECTS OF GRAPHICS <br> AND TWO-WAY INFORMATION GAPS <br> ON THE BUSINESS DECISION-MAKING LANGUAGE AND SKILLS OF SECOND LANGUAGE LEARNERS 

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#### Abstract

Research in both English for Academic Purposes and Business Communications suggests that task supports such as graphics and information gaps can influence cognitive performance on decision-making tasks. This is because they affect shared perceptions of the situational context, a key factor in effective group decision-making. This study compares results on four task combinations of information gaps and graphics to assess their effects on both the language and business decision-making skills of second language learners.

The study found that a graphic without an information gap was the only combination which resulted in significantly better decision-making test scores. This finding suggests that cognitive skills are being exercised in the business discussions of second language learners and that these skills can be enhanced by graphics, provided they are not combined with information gaps. There were no significant variations in the language measures used (output and the ratio of exophora to anaphora), which suggests that these language measures may be inadequate for assessing cognitive/academic language performance. Further studies may require new measures for assessing the simultaneous development of language and decisionmaking skills.


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## CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

In the 1980's, studies on input and interaction have examined talk primarily for negotiation of 'comprehensible input', a category defined in terms of language. This method of analysis has generally been applied to situations where language is taught exclusive of content and there is a growing concern that it may be less appropriate for academic language and content classrooms. There is a growing concern that EAP students need to develop not only language, but also cognitive skills (Cummins, 1984; Saville-Troike, 1984), and that both of these factors are influenced by shared perceptions of the task situation. Different learning dynamics, then, may call for an analysis of not only linguistic, but also contextual, input. 'Comprehensible input' could therefore be redefined as all aspects of the situational context which are comprehensible to the learners. This study will explore the application of these ideas to case study discussions in a college-level Business English course.

In Canada and the United States, there are several post-secondary academic ESL programs with both language and business content objectives, of which Eastern Michigan University is the largest. (Victor, 1985; Buckheister, 1985; Allen, 1984). In some of these programs, content objectives include functional skills in turn-taking (Micheau and Billmyer, 1988), cross-cultural business etiquette (Guessler, 1985), and negotiation (Neu, 1986). Others, such as Eastern Michigan University (Pozo and Antel, 1985), the Wharton School of Business (Landau and Laprade, 1983) and the University of Ottawa (Allen, 1984) use the case method to teach both language and decision-making skills.

The case method is becoming more prominent in college-level academic Business English courses because it satisfies the required criterion of authenticity (Johns, 1985) and prepares students for the demands of their future content courses. Case studies provide a basic orientation to the approach used in Business Administration (Belifore, et. al. 1983:4) which use cases extensively to teach decision-making skills (Piotrowski, 1982; DiStephano, 1979:435), a major part of managerial practice (Sawyer-Laucanno, 1987:xi; Willings, 1968; Roodman, 1973:51).

Cases are simulations of real business situations faced by real people (Gragg, 1954; Laktasic, 1976:2). They leave students at decision points with the kinds of information available to corporate decision-makers when they faced the same problems (Pearce and Burgoyne, 1977). Cases put students under considerable pressure to defend their decisions verbally and coherently in an atmosphere frequently described as 'cutthroat' (Micheau and Billmyer, 1988:87). In the process, they develop not only decision-making skills, but also skills in making inferences, drawing conclusions and making predictions (Uber Grosse and Grosse, 1988:xii).

Several Business EAP courses train students in the oral skills required in business content classes by 'continually putting them on the spot to present ideas and defend positions in English' (Sawyer-Laucanno, 1987:xi). These courses provide students with valuable experience in reasoning and supporting decisions as well as in self-expression in the English language (Uber Grosse and Grosse, 1988:xii).

To summarize, there are a growing number of Business English courses which use the case method to prepare students for their future business content courses. By preparing students to defend complex decisions rationally and coherently in a second language, these EAP courses are moving away from the traditional split between language, content and thinking skills. With training in authentic language use as their goal, it is difficult to see how these courses can avoid teaching decision-making and
reasoning skills as well as language.

## New Directions in EAP Research

The growing influence of the language and content approach has led to a reconsideration of the value of regarding comprehensible input as a purely linguistic phenomenon (Berwick, 1988; Wesche and Ready, 1985; Mohan and Helmer, 1988). Doubts are being raised as to whether variables appropriate for measuring oral proficiency can provide an accurate indication of the cognitive achievement of students who must acquire content knowledge through a second language (SavilleTroike, 1984:199; Cummins, 1984:131)

The notion that 'comprehensible input' could be considered as an understanding of the entire context of situation (including background knowledge, task supports and input format) is receiving increasing attention in current research. Wesche and Ready (1985) found that professors use graphics to make content more accessible for second language learners. Mohan and Helmer (1988) found that nonverbal context is not always obvious to second language learners. Gass and Varonis (1985) speculated that shared assumptions of the task situation are affected by twoway and one-way tasks in different ways. These studies point to new directions for research, away from an examination of surface forms and towards an emphasis on situational factors.

## Information Gaps

Information gaps have been the focus of numerous studies in input and acquisition, where they are generally perceived as effective for encouraging negotiation of comprehensible input (Pica and Doughty, 1985, 1986; Long and Porter, 1985). Several studies deal with information gaps in a decision-making context (Pica
and Doughty 1985, 1986; Gass and Varonis, 1985), a fact which reflects a widespread concern with decision-making in ESL textbooks (Pica and Doughty, 1985:116).

Most of this research, however, has been done with tasks which are trivial or unauthentic. One study involves a fictitious heart transplant decision (Pica and Doughty, 1985); another involves identifying a fictitious bank robber (Gass and Varonis, 1985). This tendency reflects the fact that most ESL research has been conducted in classrooms where language is taught exclusive of content. The dependent variables are typically language-based measures such as negotiation routines.

Yet information gaps are often used differently in authentic Business ESL classes where they simulate the real world of business (Suchat, 1987:7; Sinhaneti, 1984:127; Prescott, 1980:68). Students typically role-play businesspeople who pool information on topics such as market surveys, capital expenditures or sensitivity analysis and use it to make corporate decisions (Prescott, 1980:68; Gilligan et.al., 1983:129). Because of the language-based emphasis of ESL research, there are no studies on how information gaps function in these types of content-based languagelearning activities.

To summarize, although information gaps are widely used in authentic Business English classes, their role in this context is relatively unknown. Results from most ESL research studies may not be generalizable because of considerable differences in pedagogical environments and goals.

## Graphics

Graphics are generally recognized as useful problem-solving tools because they reduce cognitive complexity and memory load (Reinking, 1986; Glass, et.al. 1979). Research on graphics in content classes (Koeninger, 1985; Reinking, 1986)
suggests that they are effective for teaching concepts (Reinking, 1986) and reducing the time needed to solve problems (Koeninger, 1986).

Businesspeople working in their native languages often use graphics to focus their minds on key elements of problems and to clarify their structures (Gilligan, 1983:135). Graphics can help resolve ambiguity inherent in problems involving cause and effect (fish-bone diagrams), comparisons of alternatives (rating and criteria testing charts), and brainstorming (force field analysis). It is reasonable to expect, therefore, that graphics would also be useful for second language learners, for whom cognitive ambiguity is reinforced by language ambiguity.

In second language teaching, however, graphics have typically been used to provide a context for talk, rather than to clarify information required for problemsolving (Corder, 1969). Research in academic language and content classes is only just beginning (Early, 1988; Wesche and Ready, 1985), but there is evidence that graphics, by providing contextual redundancy, can promote comprehensibility of both language and content for second language learners in academic programs (Wesche and Ready, 1985; Berwick, 1988).

### 1.2 Purpose of the Study

Wesche and Ready (1985) and Early (1988) suggest that contextual variables can be manipulated so that content-based input can be made more accessible to second language learners. This research project examines the combined effects of graphics and information gaps on second language learners' linguistic and cognitive performance in an academic Business English class.

In this study, pairs of college students discuss four sets of alternatives facing a decision-maker in a case study about exporting. Each set of alternatives differs in the contextual support provided: with or without a graphic and with or without a two-way
information gap.
The study also attempts to operationalize and test relatively unexplored measures of success in language and content classes. Output is one measure which has rarely been used in ESL research but which has been deemed important by at least one researcher in EAP (Swain, 1987). Secondly, an analysis of anaphoric and exophoric language may provide a tentative indication of the extent to which participants focus on either the experiential or the expository dimension of an activity. Finally, decision-making skill is operationalized and measured through a researcherdesigned test.

To summarize, this study examines the effects of graphics and information gaps on output, the ratio of exophoric to anaphoric pronouns and decision-making skill in a series of business case study discussions.

### 1.3 Practical Significance of the Study

Although there are an increasing number of academic language and business content programs in both Canada and the United States, no research has been done on how graphics and information gaps can be combined effectively in an academic preparatory context. While there are studies of these task supports in content classes for native speakers (Reinking, 1986; Koeninger, 1985), the extent to which their findings can be generalized to second language content classrooms is unknown. This study presents findings which may be useful in the design and implementation of a Business English curriculum based on the language and content approach.

### 1.4 Definition of Terms

Anaphoric Pronouns: pronouns which refer back to spoken or written text.

Business English: the kind of language used in business.

Case Study: 'a record of a business issue which has actually been faced by business managers, together with surrounding facts... upon which decisions had to depend. These...cases are presented to students for considered analysis, open discussion, and final decision as to the type of action which should be taken' (Gragg, 1954).

Comprehensible Input: any or all aspects of the context of situation which are comprehensible to task participants.

Context of Situation: the entire context in which a task takes place. It includes students' background knowledge, concepts, non-verbal cues, input format and task supports. The term is synonymous with 'situational context'.

Decision: 'A decision is a judgement. It is a choice between right and wrong. It is...at best a choice between almost right and probably wrong but much more often, a choice between two courses of action, neither of which is probably more right than the other' (Drucker, 1977:378).

Decision Tree: a systematic way of diagramming a decision which involves more than one possible outcome, each associated with its own payoff.

EAP: acronym for English for Academic Purposes; a branch of Second Language Teaching which deals with academic and academic preparatory instruction at the high school, college and university levels.

Exophoric Pronoun: a pronoun which refers to a physically present object or person.

Graphic: a visual task support including, but not limited to, diagrams which structure key issues in business problem-solving tasks.

Information Gap Task: a task which requires some exchange of information among participants, each of whom possesses information not known to, but needed by, the other participant to solve a problem (Long, 1980).

Interaction: talk between one or more individuals.

Output: talk.

Shared Context: a 'fit' between two or more individuals' understanding of the situational context so that they are able to interpret and complete a task successfully.

## CHAPTER TWO

## REVIEW OF THE LITERATURE

### 2.1 Teaching Language and Content

Mohan's (1986) framework provides a way to organize key concepts involved in the theory of language and content instruction. Mohan argues that language is a system that relates content with its expression through language in the context of activities. 'Activities' are defined as 'social units with publicly acknowledged structures and standards' (p.55), for example, designing scientific experiments, composing music, driving cars and solving business problems (p.44).

Furthermore, Mohan argues that all human activities contain a decisionmaking component and that effective decision-making skills are important for people in all walks of life.

Human choice is central to action situations...From the decision-making view, a person in an action situation is making reasoned choices about what to do. (p. 55)

Mohan claims that language, content and decision-making are inseparable in all activities. It follows that authentic second language tasks, in order to reflect tasks which students encounter in the 'real world', must not separate language from content or decision-making. 'Language learning is talking about and learning about reasons for acting' (p. 55).

According to Mohan, all activities involve both experiential (practical) and expository (theoretical) dimensions (p.40). The experiential dimension consists of all aspects of the activity which are physically present, while the expository dimension is the theory on which the activities are based. Mohan (1986) claims that graphics promote the comprehension of both language and content by making the expository
dimension more accessible to learners.
Mohan's framework also sheds light on the nature of business decisionmaking and corresponds directly to the concept of the case study method, which, by requiring students to draw business principles from specific corporate experiences (Laktasic, 1976:2), merges theory with practice (Laktasic, 1976:1; Mohan 1986:41). While the framework links key concepts used in this study, however, it does not connect with research in information gaps nor does it provide a model of second language acquisition (Berwick, 1988:145).

### 2.2 Decision-Making in Business

Decision-making is the most important managerial skill (Drucker, 1977:374; Fraser, 1931) and the need for consistent and coherent decision-making is paramount in most firms (Moore, Thomas et.al., 1976:18). Furthermore, since the increasingly popular management by objectives approach gives subordinates more responsibility (Drucker, 1977:399), decision-making skills are becoming increasingly important at all corporate levels.

The current preoccupation with effective decision-making is reflected in the growing popularity of the case method (Faria, 1987:208). Like decision problems in the real world, cases are typically characterized by considerable complexity, with many alternative paths or orders of sub-tasks through which problems can be attacked (DiStefano, 1979:434). Because of this complexity, problem-solving is often done in groups, which research indicates make superior decisions to individuals (Hall, 1971; Piper, 1974; Pearce \& Burgoyne, 1977). The optimizing effect of the group decisionmaking process is known as 'synergy' (Hall, 1971; Gilligan, 1983:52). Synergy operates because more resources can be provided by a group than by an individual. (Hall, 1971; Gilligan, 1983:53).

To ensure that group participants share a common understanding of a problem, a set of scientific techniques known as decision analysis has evolved (Moore, Thomas, et.al., 1976:17). Decision analysis is a powerful, general and flexible tool which has been applied in diverse fields by a growing number of companies (Ibid, 1976:27). It frequently uses graphics to organize data so that all participants in the decision-making process have a common frame of reference (p.32), that is, that they share the same perceptions of a problem.

One graphic which is frequently used to structure a 'sequence of decisions or problems which follow one another in some natural order' (Moore, Thomas, et.al., 1976:21) is the decision tree (Appendix I). With decision trees, one starts at the left and works though the branches (each of which represents an option for the company) to the payoffs associated with each option. These graphics are often used for marketing decisions such as product launch and pricing (Ibid, 1976:28; Shore, 1978:135). Decision trees focus thinking on the critical issues, force into the open assumptions which would otherwise remain hidden, increase consistency and coherence in decision-making and increase effectiveness in communicating the reasoning behind the decision (Shore, 1978: 136).

To summarize, business decisions are frequently made in groups because of their complexity. Graphics are often used to promote shared perceptions, which appear to enhance the quality of the group decision-making process. The next questions to be examined are: (1) how are shared perceptions created and (2) what factors in the task environment can best promote them?

### 2.3 Shared Perceptions of the Situational Context

Brown and Yule (1983:255) speculate that individuals formulate their own 'mental models' or massively detailed mental representations of events in which they participate. These models lead them to make predictions about all aspects of the environment in which problem-solving tasks occur, including structure of the problem, background knowledge and task supports. Mutual familiarity with any or all of these task parameters may 'lead to a more expanded mental set' (Gass and Varonis, 1985:149) and a greater overlap or 'fit' between the mental sets of the participants. The importance of this 'fit' has also been referred to in the business literature (Drucker, 1977:393).

Brown and Yule (1984: 42) claim that communicating with individuals who have different mental sets is a sophisticated and demanding task because speakers must try to abstract chunks of experience and determine the likelihood of their listeners' background knowledge. Speakers must select, order, and verbalize information in ways that will be understood by the listeners in terms of their previous knowledge and present needs (Ibid, 1985:18).

The term 'negotiation' is increasingly being used to refer to the ways in which language users adjust to each other....When we are using language, our concern is with how much we need to say to make our point clear, with how much knowledge we share with other people. (Brumfit, 1981: 112).

A lack of fit among the participants' expectations of any or all task parameters can lead to a communication breakdown (Drucker, 1977:395).

As a rule, we perceive what we expect to perceive. What is truly important is that the unexpected is not usually received at all. It is not seen or heard, but ignored. Or it is misunderstood. (Drucker, 1977:393)

Gaies (1982), for example, found that when subjects are not acquainted with each other, there is a greater chance of a conversational breakdown. Similarly, Hall (1971) found that (1) established groups tend to make better decisions than ad hoc group and (2) groups whose members receive the same training program in group dynamics tend to make better decisions than groups without the training. One could speculate that, in the first instance, the individuals in the established group have a shared knowledge of each other and, in the second case, group members have a shared knowledge of effective group dynamics. Gaie's and Hall's research suggests that shared perceptions of contextual factors play a positive role in the group decision-making process.

While there is no generally accepted model of all the factors which comprise the context of situation in which problem-solving tasks take place (Berwick, 1988:154), there is a growing realization of the interdependence of language and context.

> There is therefore a complex and dynamic relation between the development of language and contextual understanding (Mohan and Helmer, 1988:278).
> The appropriate form will show sensitivity to subject matter, the occasion, (and) shared knowledge. (Pickett, 1984).

This notion has led researchers to take a closer look at context as a source of comprehensibility (Wesche and Ready, 1985; Early, 1988; Berwick, 1988; Mohan and Helmer, 1988).

Cummins (1984:138) makes a distinction between context-reduced language (which characterizes abstract reasoning) and context-embedded language (which characterizes social chat). He also distinguishes between cognitively demanding and cognitively undemanding discourse and suggests that the major aim of schooling is to
develop students' abilities to manipulate cognitively demanding, context-reduced discourse (p. 141).

Cummins suggests that minority students fail to develop high levels of second language academic skills because their instruction is context-reduced and unrelated to prior experience (p.141). He claims that the more context-embedded the input, the more comprehensible it is likely to be to all participants and the more successful in developing skills in context-reduced situations (p. 140). The reason is that contextembedded language is supported by meaningful paralinguistic and situational cues so that participants can negotiate meaning more easily (p. 138).

In their studies with first language learners, Brown and Yule (1984:141) conclude that students should not be expected to handle academic discourse initially without some contextual support.

In the early stages of any course, in order to ensure that the student experiences success in arriving at a reasonable interpretation of the foreign language, as many helpful support systems as possible should be provided. As the student progresses, reliance on external support can gradually be withdrawn (Brown \& Yule, 1983:87).

The researchers' (Ibid, 1983:14) work with high school students found that contextual supports reduced the number of students who gave up on an information transfer task to zero.

Second language researchers have tended to assume that an understanding of context is a given (Mohan and Helmer, 1988:277). In the social semiotic view proposed by Halliday (1978), however, context is seen not as a given but as a learned sociocultural reality. Mohan and Helmer's (1988) research supports the notion that non-verbal context may not be readily comprehensible to second language learners; it follows that context may have to be shaped to their needs and expectations.

In their research with second language learners in academic language and
content classes, Wesche and Ready (1985:112) found that native speaking professors routinely provide non-verbal signals such as gestures and graphics to guide and confirm listeners' expectations and they suggest that these signals reinforce meaning presented in a textual format. Wesche and Ready (1985: 112) conclude that professors tend to adapt the form and content of their presentations to the capacities of their students' expectancy systems.

The relevant perspective is that of the proficient speakers' ongoing perceptions as the discourse progresses of the non-natives' ability to generate hypotheses about what will be said next, what has been said already, knowledge of the world and aspects of the situation such as knowledge of the topic and familiarity with the speaker (Ibid, 1985:112).

To summarize, the comprehensibility of academic task input appears to be affected by diverse contextual factors. A shared understanding of this input appears to be necessary for effective group problem-solving and may be promoted by task supports shaped to the learners' needs. This raises the question of what kinds of task supports are most effective in promoting shared perceptions. A related question is whether task parameters generally believed to be successful in language-based ESL classes also play a positive role in promoting content learning.

### 2.4 Two-Way Information Gaps

Information gaps require different information held by two or more participants to be shared verbally so that a task can be completed or a problem solved (Crookes, 1986:7). Considerable importance has been attached to this task format in the literature of second language research (Long, 1980).

Most research on two-way gaps has examined opportunities for 'comprehensible input'. The discussion topics in these tasks have frequently been
artificial, for example, a futuristic adoption scenario (Pica and Doughty, 1985) or trivial, for example, the Odd Man Out game (Gass and Varonis, 1985) or an activity which involves placing flowers on a board (Pica and Doughty, 1986). Pica \& Doughty (1986) found that a required information exchange generates more negotiation than a discussion task where all participants have the same information. Long (1980) found that two-way information gaps necessitate more interactional modification for successful task completion than one-way tasks. This type of research indicates that information gaps may be beneficial for generating negotiation for meaning but gives no indication of their impact on decision-making skills.

More recent studies, however, have begun to examine information gaps within the larger context of shared perceptions of the task situation. Gass and Varonis (1985:151) found that there is less need to negotiate meaning in two-way tasks than in one-way tasks because the participants share a greater number of assumptions.

> There was less of an opportunity for breakdown in twoway tasks since there was greater shared background, i.e. a greater set of assumptions in that task than in the one-way task. The kind of task interacts with the amount of shared background that the participants bring to the task (Ibid, 1985:159).

Berwick (1988:153) found that two-way gaps require more moment-tomoment monitoring to keep the discourse on track. According to Berwick (p.31), his findings imply that more monitoring is needed either to make language comprehensible or to create shared perceptions of situational factors. The latter idea is supported by Gaies' (1982) study of two-way gap tasks, which found less likelihood of communication breakdown and dropping of topics among participants who are acquainted with each other than among those who are not.

Brown and Yule (1984) examined the effects of two-way gaps on the information transfer skills of native speakers. While the information gap consists of
information to be transferred and is therefore distinct from the speaker's assumptions of what the listener already knows (Brown and Yule, 1984:39), the speaker is still forced to assess the listener's background knowledge in order to transfer information which is relevant to him. Because both parties do not have the same information, the situation is subject to greater communicative stress than with one-way tasks (Brown and Yule, 1984:35). The two-way task is therefore cognitively more difficult for the speaker ( p .39 ) since a failure to assess the listeners' assumptions can lead to misunderstanding.

Furthermore, in business simulations, two-way gaps involve another factor which has hardly been explored in the literature of Second Language Teaching, i.e. students taking on roles which simulate those of the real world (Suchat, 1987:7). It seems reasonable to assume that communicative stress would be reinforced if the information gap extended beyond a straight-forward transfer of information to include different roles and conflicting motivations among the participants. The reason for this is that participants have to make more assumptions about their partners than they do when everyone has identical information, roles and motivations. This notion is supported by Duff (1986), who found that divergent tasks lead to more conflict between participants and less effective problem-solving.

The first thing anyone does in a new interaction is to place the individual in some sort of role... When the roles are unclear, the individuals will probe, like two strangers at a cocktail party, to find categories and structures into which they can fit each other. Unless they can find some congruent way of defining the situation, communication will be impaired. (Handy, 1976:75).

Handy (1976:216) also states that, in business discussion groups, different assumptions about goals and different sets of information may lead to different perceptions of problems. which may disrupt communication. If one accepts this
assumption, then one might also expect that divergent information gaps would make successful group problem-solving more difficult.

The literature of second language teaching supports the notion that information gaps may be beneficial for promoting negotiation for meaning, and by implication, language development. However, some content-based studies suggest that information gaps may increase communicative stress and cognitive difficulty, thereby disrupting the problem-solving process. There is no research on how information gaps affect content-based learning in second language classes.

### 2.5 Graphics

Graphics are used in both education and business to promote problem-solving skills (Reinking, 1986; Thomas, Moore, et.al., 1976). In Mohan's (1986) approach to teaching language and content, graphics are believed to provide cognitive support as students grapple with cognitively demanding abstract tasks involving choice and evaluation. Graphics have been perceived as a means of increasing the redundancy of signals through which academic language and content are communicated to second language learners (Wesche and Ready, 1985:112).

If (the professor) perceives the content to be unfamiliar or conceptually difficult, he may provide redundant content to guide and confirm listeners' expectations (Ibid, p.113).

There is also some evidence that graphics reduce both memory load (Brown, Yule et.al., 1985:43) and cognitive load (Glass Lewis et.al., 1979; Mohan, 1986; Reinking, 1986), factors which may promote more effective decision-making. Brown and Yule (1984:43) found greater accuracy of task completion in tasks with visual supports than in tasks without them.

We assume that the more external support is offered to a listener, the easier it is for him to understand the language use. The visual environment gives an enormously important extra dimension of information (Brown \& Yule, 1983:85).

Koeninger's (1985) study of two-way gaps in a Business Communications class for native speakers found that tasks with graphics result in greater accuracy of task completion than tasks without graphics. Finally, Crookes and Roulon (1985:10) found that tasks with visuals are less productive of immediately observable interlanguage destabilization than tasks without them. These findings support the notion that graphics may promote both conceptual and linguistic understanding.

Mohan and Helmer (1989) found that non-verbal situational cues can be misunderstood by second language learners; this contradicts the notion that context is readily accessible. Reinking (1986) found that the effectiveness of graphics often depends on the extent to which they are redundant or complementary of text information; if they are not, then they may be misunderstood. To be effective, graphics must be tailored to the background knowledge of learners and to information presented in a textual format (Wesche and Ready, 1985).

In conclusion, there is evidence in the literature that graphics may promote both conceptual and linguistic understanding, provided that they are tailored to the learners' needs and expectations.

### 2.6 Measures and Analysis

## Output

Krashen's (1980) notion that speaking is useful only as a generator of comprehensible input has resulted in numerous studies on input and interaction
(Long, 1980; Long \& Porter, 1985; Gass and Varonis, 1983; Pica and Doughty, 1986), but few on output (Long and Porter, 1985; Pica and Doughty, 1985). Swain (1987), however, has claimed that output is necessary for second language acquisition because it provides opportunities to practise new forms--this proposition has been termed the 'comprehensible output hypothesis'. Enhanced output has also been given as a rationale for group work and two-way information gaps (Long and Porter, 1985; Pica and Doughty, 1985).

Output has also been used as a variable in Business Communications research. Koeninger (1985) found that two-way gap tasks, when combined with graphics, generate less output but better cognitive performance. Koeninger's study differs from most research in Second Language Teaching in that he correlates language (operationalized as output) with accuracy of task completion rather than examining language alone. Koeninger feels that while output may be a useful measure of language production, it is less useful as an indicator of decision-making skill.

## Anaphoric/Exophoric Pronoun Reference

Since research in Second Language Teaching tends to focus on language isolated from content (either surface forms or input and interaction), there are few studies to assess how the learner is using language to string information together. Two studies in this area use anaphora as the dependent variable (Chaudron, 1983; Berwick, 1988).

Halliday and Hasan (1976) mention two classes of pronoun referents. The first is exophora, which consists of concrete referents to direct the interlocutor outside of the discourse to the context of the situation (p.18). Exophora characterizes language which is 'context-dependent' or 'context-bound' (Cummins: 1984). Anaphoric pronouns, on the other hand, refer back to the text for their interpretation
and require that preceding discourse be both remembered and understood in terms of background knowledge (Brown \& Yule, 1983:192). Anaphora serves to manage reduced contextualization and build links across the discourse as they are needed (Berwick, 1988:219). Anaphora characterizes 'context-independent' or academic language (Cummins, 1984).

There is evidence that anaphora and exophora are present in all discourse; consequently, it is their relative distribution which is of interest (Berwick, 1988). Berwick (1987:155) found that when there is a 'need to create a set of shared experiences and perceptions, anaphora is a great deal more frequent than exophora'. The relative distribution of exophora and anaphora, then, may be a rough indicator of the need to create a shared context and might be expected both to vary with two-way gaps or graphics. It seems reasonable to assume that the distribution of exophora and anaphora relates in some tenuous way to a focus on either the experiential (practical) or the expository (theoretical) dimension of discourse (Mohan, 1986:personal communication).

Decision-making Skills
While output and pronoun reference may be appropriate as language measures, they may fail to measure content learning. This is frequently measured in content classes by accuracy of task completion (Koeninger, 1985; Reinking, 1986). This measure is inappropriate for case studies, however, because they deal with problems which have no 'right answer' (Fraser, 1931:22). Since case studies teach the decision-making process, some measure must be found to distinguish between an effective and a less effective process.

Decision-making has been described in the literature as a linear process (from recognition of the problem to a solution) (Bales and Strodtbeck, 1968), a set of
systematic techniques (Berko and Wolvin, 1986:191) and a multi-thematic cyclical process (Segal, 1982: 341). Brown and Yule (1984:63) have devised a grading system for decision-making tasks consisting of: (1) opinion expressed, alternative considered and reason given, (2) opinion expressed, alternative not considered, reason given, (3) opinion expressed, no reason or alternative. Ross (1981a:280) contends that a review of high school decision-teaching programs reveals considerable heterogeneity in the skills addressed and substantial confusion between teaching skills and desired outcomes. Nevertheless,
despite the variety of tables and category schemes used to organize the skills, there is a consensus that effective decision-making requires the mastery of a minimal set of skills: a) identifying a set of alternative courses of action b) identifying appropriate criteria c) assessing alternatives by criteria d) summarizing alternatives e) self-evaluation. This (is a) minimal set of five core skills. (Ross, 1981a: 280).

Ross (1981b:2) points out that the relative importance of each of these five skills varies with the type of problem.

> Some decisions are difficult for students because good alternatives are hard to find. Other decisions are problematic because the criteria for choosing are nonexistent or unclear. Other decisions are hard to handle because of uncertainty about the most important assessment of the alternatives or because the problem is so complex that it is difficult to summarize the information to make a choice (Ross, 1981b:2).

While this description appears to apply to case studies, Brown, Yule et. al. (1983:62) point out that generic systems for analyzing the language of choice may be inappropriate for some subject areas which have their own specific structures of argumentation. Devising an appropriate measure, then, requires an analysis of the structure of argumentation specific to business.

According to Fraser, there is no general agreement on what constitutes the
business decision-making process.

> The methods of approach by which (business) decisions are reached are in most cases not included in any reasoned opinion similar to the opinion of the court (of law) and generally business cases admit of more than one solution (1931:22).

This difficulty is reinforced by the requirement of different specialties for different methods of analysis. A decision involving the cost of capital, for example, is approached in a different way (with a different set or order of steps) from one involving marketing strategies. Furthermore, decision processes may differ within the same specialty depending on the complexity of the case. The range of this complexity is illustrated by Leenders and Erskine's (1973:30) 'case difficulty cube'.

Even though there is considerable disagreement over the structure of business argumentation, it is generally agreed that decision-making is a process (Pearce and Burgoyne, 1977:88; Segal, 1982:333; Drucker, 1977). It follows by definition of a process that there are steps involved. These steps have already been alluded to in the literature, although there is no strict consensus as to what they are or in which order they occur. This section is an attempt to define a set of possible steps in the business decision-making process on which there is a general agreement in the literature.

Berko and Wolvin (1986:191) contend that the steps are: (1) identify the situation, (2) identify the problem, (3) brainstorm for possible solutions, (4) evaluate the solutions, (5) select the most workable, desirable and practical plan and put it into action, and (6) evaluate the results.

Drucker (1977:378) describes the essentials as: (1) decide what the decision is about, (2) bring out dissenting opinions, (3) focus on alternatives, and (4) choose among alternatives (1977:379).

Leenders and Erskine (1973:12) refer to 'personal analysis, discussion with others, definition of the problem, identification of alternatives, statement of objectives
and decision criteria, choice of action and plan for implementation'.
Pearce and Burgoyne (1977:88) refer to an analysis of the situation, determination of the problem, generation and evaluation of alternatives and implementation of an action plan.

A review of the above definitions reveals that almost every definition has elements in common with the others. Furthermore, it could be argued that the different lists of elements in the literature are really differences in emphasis, not in content. By definition, a decision must involve choice and a minimum of two alternatives (Drucker, 1977:379; Segal, 1982:334). In some case studies, the decision is already made and students are required to evaluate it. This type of case requires a comment on a decision instead of a decision itself and illustrates the fact that all case studies involve a choice (Leenders and Erskine, 1973:13).

Similarly, identifying the problem is frequently mentioned as a key decisionmaking element (Leenders, 1973:12; Berko and Wolvin, 1986:191). Drucker states that defining the question (determining what the decision is about) is a crucial step in effective decision-making. Fraser (1931:163) states that if a problem can be clearly stated, a long step has been taken towards its solution.

Identifying the problem correctly implies a clear understanding of the firm's situation. This element is mentioned by Pearce and Burgoyne (1977:88), Berko and Wolvin (1986:191) and is implied by Drucker (1977). In fact, the distinction between identifying a problem and identifying a situation is crucial. In the Bartram Tools case (Appendix II) used in this project, for example, the problem is not that sales are steady--that is the situation or symptom of the problem. The problem is that cheap foreign imports are making inroads into the firm's market.

Finally, alternatives must be evaluated (Pearce and Burgoyne, 1977: 88;
Drucker, 1977: 378). One of the reasons decision theory is widely studied in business
schools is that the business context provides a ready-made criteria of evaluation-money (Giere, 1979:297). Since profit is necessary to the survival of a firm (Drucker, 1977), evaluating an outcome is frequently a matter of determining the profit (or loss) associated with that outcome (Moore, Thomas et.al., 1976:298). Other subordinate measures might include a percentage change in market share or sales. Qualitative goals such as increasing worker satisfaction and improving product quality are generally considered irrelevant since they are not necessary to a firm's survival.

This discussion leads us to elaborate the following as possible key elements in the decision-making process: (1) identification of the problem, (2) identification of the situation, (3) criteria (profit), (4) assessment of alternatives, and (5) decision. One would expect that most of these elements would be present in an effective case study discussion and that a discussion would be less effective if some of these elements were absent.

Secondly, these categories can be assigned a given number of skill levels similar to those proposed by Ross (1981b:2). In Ross' system, the lower bound represents the behavior of someone with a primitive grasp of the skills while the upper bound represents sophisticated behavior (p.3). Ross points out that the number of skill levels assigned is arbitrary (p.3).

Finally, since all meaningful decisions are content-based (Mohan, 1986; Ross, 1981a:279), Ross' categories could be extended for the purposes of this study to include content relevant to an effective solution. In this way, successful task completion can be assessed effectively even when skills are being demonstrated in relation to content which may be off-topic or irrelevant.

In conclusion, it is possible to define a set of key elements which one would expect to occur in an effective business decision-making process. These categories can then be refined into content-based skill levels which can be used to systematically
grade the transcripts of case discussions.

### 2.7 Summary and Conclusions

To summarize, the authentic use of case studies in academic Business English classes seems to imply that language should not be separated from either content or decision-making. There is evidence in the literature that 'comprehensible input' should be redefined for academic content-based ESL courses to extend beyond language to include concepts and problems on which there is a shared agreement among members of a group. Contextual task supports such as graphics and information gaps appear to promote shared perceptions, which are important for successful business decision-making. As yet, however, no research has been done on the combined effects of these supports on non-native speaker performance in language and content classes. To assess the effect of these variables on decisionmaking language and skills, novel measures of analysis are required. Output, ratio of exophora to anaphora and scores on a business decision-making test are three such measures that can extend the analysis beyond language.

## CHAPTER THREE

## METHODOLOGY

### 3.1 Research Questions and Hypotheses

Based on the previous discussion of research findings in both Second
Language Teaching and in Business Communications, it is possible to formulate four research questions which can provide a focus for the hypotheses.

Q1: Do graphics and information gaps influence business decision-making test scores?

H1: Decision-making test scores are higher on tasks with graphics than on tasks without graphics.

H2: Decision-making test scores are higher on tasks with information gaps than on tasks without information gaps.

H3: Decision-making test scores are higher on tasks with graphics and without information gaps.

Q2: Do graphics and information gaps influence output?
H4: Output is higher on tasks with information gaps than on tasks without information gaps.

H5: There is no difference in output between tasks with graphics and tasks without graphics.

Q3: Do graphics and information gaps influence the ratio of exophoric to anaphoric pronouns?

H6: The ratio of exophoric to anaphoric pronouns is greater on tasks with graphics than on tasks without graphics.

H7: There is no difference in the ratio of exophoric to anaphoric pronouns between tasks with information gaps and tasks without information gaps.

Q4: Is there any correlation between decision-making test scores and any of the other two dependent variables?

H8: There is a positive correlation between test scores and the ratio of exophoric to anaphoric pronouns.

H9: There is no correlation between test scores and output.

### 3.2 Research Design

The design is a factorial one using a $2 \times 2$ repeated measures analysis of variance:

## Factor 2: Information Gap

 Minus Plus
## Factor 1: Graphic

| Minus | $?$ | $?$ |
| :--- | :--- | :--- |
| Plus | $?$ | $?$ |

Information gap, the within-subjects factor, has two levels--plus and minus.
'Plus' indicates that an information gap is present whereas 'minus' indicates the
absence of an information gap. Graphics also has one plus and one minus level. There are therefore four unique combinations of the two factors.

The instructional approach used in this experiment is based on four discussion tasks, each dealing with two choices facing Bartram Tools Company (Federal Business Development Bank, 1983) (Appendix II). Participants were assigned randomly to pairs; each pair was assigned all four task variations in the order prescribed by a Latin Square. The purpose was to randomize the order of tasks and thereby minimize any carry-over effects associated with the blocking variables of task familiarity and individual.

Two pairs of subjects, or replicates, were used to increase the amount of data within each cell to approach normality, thereby making the design more powerful (Neter and Wasserman, 1974:784). The appropriateness of a Latin Square design with two replicates per cell was tested by Tukey's test of additivity (Neter and Wasserman, 1974:785). To meet the assumption of independent observations in parametric tests (Wiersma, 1986:34) (that is, to counteract the influence of each member of a pair on his partner's score), the mean of each pair of observations was entered in each cell $(\mathrm{n}=32)$.

The data was compared for significance across task types. A two-way ANOVA was used instead of non-parametric measures because it is appropriate (1) for data which is 'continuous' rather than discrete and, (2) to assess interaction ie. the cumulative effects of two independent variables. The ANOVA was designed to control for the following blocking variables: graphic, information gap, interaction of graphic and information gap, individual and task content.

When the ANOVA yielded significant results, Tukey's q-test was applied to discover the source of significance. This method was selected because it has the same assumptions of normality, homogeneity of variance and independence as the ANOVA
(Glass and Hopkins, 1984:391); furthermore, it is more powerful than a one- or twotailed t -test.

### 3.3 Subjects

The subjects are two groups of sixteen Japanese university students in an intensive academic program at Vancouver Community College in British Columbia. Permission to conduct the experiment was obtained from the coordinator of the program (Appendix III). Subjects were briefed on the experiment beforehand and asked to sign a consent form if they agreed to participate (Appendix IV). To control for intervening variables such as sex and business knowledge, only data from pairs of boys majoring in Economics or Foreign Trade were used.

### 3.4 Experimental Procedure

Before the experiment, the participants read the case study, Bartram Tools (Appendix II) and answered some comprehension questions. They were then assigned randomly to pairs and given ten minutes to discuss task A and choose the best alternative (Appendix V). After, the pairs were given task B for ten minutes; this procedure was subsequently repeated for task C and D so that each pair worked through four different tasks.

Treatment varied by the presence or absence of a graphic and an information gap, with each group working through the same tasks but in a unique sequence of plus or minus graphic and information gap. The graphic consisted of one decision tree for each of tasks A, B, C and D; the branches of each tree specified the payoffs (monetary outcomes multiplied by a risk estimate) for the alternatives in that task (Appendix I). While the power of an authentic tree lies in its 'roll-back' feature (or ability to diagram several decision sequences simultaneously), the trees in this study have been
adapted to the perceived level of understanding of the subjects; consequently, each tree represents a simple choice between two options.

With information gaps, students were given different information and assigned roles of key decision-makers in the firm. Without information gaps, students had identical information and were not assigned roles of decision-makers.

### 3.5 Instrumentation

Each pair was tape-recorded and one pair was videotaped. Three graduate students took notes on the use of graphics as unobtrusively as possible. The data was subsequently transcribed and notes on the use of graphics were incorporated into the transcripts. Data was then coded for output, E/A (ratio of exophoric to anaphoric pronouns) and decision-making test scores. BMPD software (Dixson, 1985) was used to perform a two-way analysis of variance on the data.

### 3.6 Measures and Analysis

There are three dependent variables--business decision-making skill test scores, output and the ratio of exophoric to anaphoric pronouns.

## Business Decision-making Test Scores

In this study, a decision-making scoring system based on that of Ross (1981b) was adapted to include the business skills described in the review of the business literature (Appendix VI). Content specific to the discussion of Bartram Tools was added to control for ideas which were irrelevant or off-topic. The scoring system was then applied to the transcripts of the participants' discussions (Appendix VII). Each paired discussion was given one score, with the maximum possible being ten. Coding was replicated by an independent graduate student who received an inter-rater reliability score of $95 \%$.

Output
Output was measured by a count of total utterances per speaker. In the following dialogue, for example, eight utterances are counted for speaker A and two utterances for speaker B.

Speaker A: This option is uh risky.
Speaker B: I agree.
Speaker A: Let's look again.

Anaphoric/Exophoric Pronoun Reference
The pronouns being analyzed in this study were grouped in the following categories:

| Anaphoric | Exophoric | Anaphoric or Exophoric |
| :--- | :--- | :--- |
| he | I | them |
| his | me | that |
| him | my | this |
| theirs | me | those |
|  | us | these |
|  | our | their |
|  | ours | it |
|  | you | which |
|  | your | whose |
|  | yours | here |
|  | there |  |
|  | then |  |
|  |  | now |
|  |  | its |
|  | they |  |

'She', 'her', and 'hers' were not counted since there were no instances of these words in any of the transcripts.

Using the ratio of exophora to anaphora ( $\mathrm{E} / \mathrm{A}$ ) as the dependent variable is based on the assumption that both exophora and anaphora occur in all speech; consequently, it is their relative proportion which is of interest (Berwick, 1988: 155). This assumption was supported by the data, in which there were no cells where either E or A equalled zero.

## Correlations

Correlation plots were done between decision-making test scores and each of output and the ratio of exophora to anaphora to determine if there was any relationship between decision-making skills and language. A plot was also done on the combined scores of the same individuals to overcome confounding effects associated with individual ability levels.

### 3.7 Summary

The research design deals with the influence of two task supports--graphics and two-way information gaps--on the language and decision-making skills demonstrated in discussions of a business case study. Pairs of students discussed a series of options (assigned to them in the order prescribed by a Latin Square) which varied by the presence or absence of the two task supports. The transcripts were coded for output (the number of utterances), $\mathrm{E} / \mathrm{A}$ (relative distribution of exophoric and anaphoric pronouns) and decision-making test scores. A two-way ANOVA was used to determine main effects and interaction; Tukey's q-test was then applied to discover the sources of any significant variations. Finally, correlations between
decision-making test scores and each of output and the ratio of exophoric to anaphoric pronouns were plotted.

# CHAPTER FOUR <br> RESULTS 


#### Abstract

4.1 Results

This chapter presents the results of a series of two-way ANOVA's which may shed some light on the effect of two-way information gaps and graphics on the language and skills of business decision-making. Correlations between dependent variables are also examined in an attempt to determine whether the language measures are associated with superior decision-making skills.


## Appropriateness of the Model

A low value on Tukey's test of additivity of .5125 indicates that the experimental design chosen for this experiment--a Latin Square with 2 replicates per cell--is an appropriate one (Neter and Wasserman, 1974:785).

## Business Decision-making Scores

In this section, business decision-making test scores are presented and the results of an ANOVA are examined for significance. The following hypotheses are tested:

H1: Decision-making test scores are higher on tasks with graphics than on tasks without graphics.

H 2 : Decision-making test scores are higher on tasks without information gaps than on tasks with information gaps.

H3: Decision-making test scores are higher on tasks with graphics and without information gaps.

The test scores obtained for the transcripts are presented in Table 1. There appears to be considerable variation across both task and treatment.

Table 1
Business Decision-making Test Scores

| TASK | -G-S* | $\underline{-G+S}$ | +G-S | $\pm \mathrm{G}+\mathrm{S}$ |
| :---: | :---: | :---: | :---: | :---: |
| A** | 6.25 | 3.25 | 5.25 | 6.00 |
| B | 1.75 | 3.50 | 6.50 | 3.75 |
| C | 3.00 | 4.75 | 4.75 | 3.75 |
| D | 6.25 | 2.75 | 7.50 | 4.25 |
| Mean | 4.31 | 3.56 | 6.00 | 4.43 |

* S (shared information) is used throughout to indicate 'information gap'.
** A,B,C,D refers to the particular discussion task used in that cell (Appendix V).

Plus graphics minus shared has the highest mean score, while the mean score on minus graphics minus shared has the lowest (Table 1). The mean scores on plus graphics plus shared and minus graphics minus shared fall in the middle at 4.43 and 4.31 respectively. These results can be illustrated graphically (Figure 1).

Figure 1

## Bar Graph of Test Score Group Means by Treatment



The mean score for each factor--graphic and information gap--is given in Table 2. Plus graphic has a higher mean score than minus graphic, while minus information gap has a higher mean score than plus information gap.

Table 2
Business Decision-making Test Scores:
Group Means
Factor 2: Information Gap
Minus Plus Mean (g)

## Factor 1: Graphics

| Minus | 4.31 | 3.56 | 3.93 |
| :--- | :--- | :--- | :--- |
| Plus | 6.00 | 4.43 | 5.21 |
| Mean (s) | 5.15 | 3.99 |  |

Grand Mean $=4.57$

Table 3 reveals a somewhat greater dispersion of standard deviations around the mean for minus information gap than plus information gap and similar dispersions for minus and plus graphic.

Table 3
Business Decision-making Test Scores:
Standard Deviations

| Factor 2: Information Gap |  |  |
| :--- | :---: | :---: |
| Minus $\quad$ Plus $\quad$ Mean $(\mathrm{g})$ |  |  |

Factor 1: Graphic

| Minus | 2.47 | 1.34 | 1.91 |
| :--- | :--- | :--- | :--- |
| Plus | 2.05 | 1.29 | 1.67 |
| Mean (s) | 2.26 | 1.32 |  |

Table 4
Analysis of Variance:
Business Decision-making Test Scores

|  | Degrees |  |  |  | Two- |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Sum of | of | Mean |  | Tailed |
| Source | Squares | Freedom | Square | F | Prob |
| Mean | 670.69 | 1 | 670.69 | 282.82 | . 000 |
| Indiv | 32.71 | 3 | 10.90 | 4.60 | . 012 |
| Task | 12.02 | 3 | 4.00 | 1.69 | 198 |
| Graphic (G) | 13.13 | 1 | 13.13 | 5.54 | . 028 |
| Shared (S) | 10.69 | 1 | 10.69 | 4.51 | . 045 |
| GXS | 1.32 | 1 | 1.30 | 0.56 | . 463 |
| Error | 52.17 | 22 | 2.37 |  |  |

The results of the two-way ANOVA (Table 4) show that graphic is a statistically significant variable at $\mathrm{F}(1,22)=4.3<5.54 ; \mathrm{p}=.028<.05$. Results are also significant for shared $(\mathrm{F}(1,22)=4.31<4.51 ; \mathrm{p}=.045<.05)$. There is no significance for interaction which indicates that the effects of graphics and shared are independent and do not have a multiplier effect when combined. Results on individual are also significant $(\mathrm{F}(3,22)=3.05<4.6 ; \mathrm{p}=.0121)$. This finding tells us that individuals vary significantly in their decision-making abilities. Finally, there are no significant results for task, which indicate that task content is not an intervening variable.

The results of the ANOVA can be displayed graphically by a plot of the group means (Figure 2). The graph shows main effects for both graphic and shared but no interaction.

Figure 2
Plot of Test Score Means by Treatment


Tukey's $q$-test indicates that the source of the significance is between +g - s and all of the other three treatments (Table 5). It reveals that there are no significant differences among any of the other treatments.

## Table 5

Business Decision-making Test Scores:
Sources of Variance by Treatment

| Treatment | Significance Level | Result |
| :--- | :---: | :---: |
| +g-s $>-\mathrm{g}-\mathrm{s}$ | 6.20 | SIG |
| $+\mathrm{g}-\mathrm{s}>+\mathrm{g}+\mathrm{s}$ | 5.76 | SIG |
| $+\mathrm{g}-\mathrm{s}>-\mathrm{g}+\mathrm{s}$ | 9.18 | SIG |
| $+\mathrm{g}+\mathrm{s}>-\mathrm{g}-\mathrm{s}$ | 0.44 | $\mathrm{~N} / \mathrm{S}$ |
| $+\mathrm{g}+\mathrm{s}>-\mathrm{g}+\mathrm{s}$ | 3.19 | $\mathrm{~N} / \mathrm{S}$ |
| $-\mathrm{g}-\mathrm{s}>-\mathrm{g}+\mathrm{s}$ | 2.76 | $\mathrm{~N} / \mathrm{S}$ |

Tukey's test confirms hypothesis 3--that scores on a decision-making test are significantly higher on tasks with graphics and without information gaps. Hypotheses 1 and 2 are not confirmed by the test. In other words, the source of significance is the plus graphics, minus information gap combination. It should also be pointed out that the ANOVA revealed main effects but no interaction, which means that the beneficial effects of graphics and identical information operate independently, that is, without a multiplier effect when combined.

Table 6 summarizes the sources of significance.

$$
\begin{gathered}
\text { Table } 6 \\
\text { Main Sources of Variance: } \\
\text { Business Decision-making Test Scores }
\end{gathered}
$$

| Variable | F | p | $\mathrm{p}<.05$ |
| :--- | :---: | :---: | :---: |
| Graphic | 5.54 | .028 | SIG |
| Shared | 4.51 | .045 | SIG |
| Individual | 3.05 | .012 | SIG |

In summary, graphics and shared is the only combination of task supports which is a source of significant difference. Individual is a second source of significance.

## Output

The question being examined is whether graphics and information gaps influence the quantity of language output. This question leads to the following hypotheses:

H4: Output is higher on tasks with information gaps than on tasks without information gaps.

H5: There is no difference in output between tasks with graphics and tasks without graphics.

The output group means are given in Table 7 and the group standard deviations are given in Table 8.

## Table 7

Output: Group Means

|  | Factor 2: Information Gap |  |  |
| :--- | :---: | :--- | :---: |
|  | $\underline{\text { Minus }}$ | Plus | Mean (g) |
| Factor 1: Graphic |  |  |  |
| Minus | 367 | 378 | 362 |
| Plus | 433 | 439 | 436 |
| Mean (s) | 400 | 408 |  |

Grand Mean $=401$

Table 8
Output: Group Standard Deviations

| Factor 2: Information Gap |  |  |
| :--- | :--- | :---: |
| Minus | $\underline{\text { Plus }} \quad$ Mean (g) |  |

Factor 1: Graphic

| Minus | 201 | 188 | 194 |
| :--- | :--- | :--- | :--- |
| Plus | 218 | 261 | 239 |
| Mean (s) | 209 | 224 |  |

Grand Mean $=217$

The bar graph in Figure 3 displays a range of 23 words for the smallest difference and 61 words for the largest one.

Figure 3

## Bar Graph of Output Group Means by Treatment



The following statistical table, however, indicates that these differences are not large enough to be significant (Table 9).

Table 9
Analysis of Variance: Output

|  | Degrees |  |  |  | Two- |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Sum of | of | Mean |  | Tailed |
| Source | Squares | Freedom | Square | F | Prob |
| Mean | 5427688.78 | 1 | 5427688.78 | 142.13 | . 000 |
| Indiv | 214613.59 | 3 | 71537.86 | 1.87 | . 162 |
| Task | 140544.84 | 3 | 46848.28 | 1.23 | . 322 |
| Graphic | 19159.03 | 1 | 19159.03 | . 50 | . 485 |
| Shared | 4209.03 | 1 | 4209.03 | . 11 | . 074 |
| GXS | 2329.03 | 1 | 2329.03 | . 06 | . 811 |
| Error | 878313.71 | 23 | 38187.55 |  |  |

For output, there are no significant findings for graphics $(F(1,23)=.5<4.3$;
$\mathrm{p}=.485>.05)$ or information gaps $(\mathrm{F}(1,23)=.11<4.3 ; \mathrm{p}=.0742>.05)$.
Individual and task also fail as sources of significant differences. For individual, $\mathrm{F}(3,23)=3.03>1.87 ; \mathrm{p}=.162<.05$. For task, $\mathrm{F}(3,23)=3.03>1.23$;
$\mathrm{p}=.322<.05$. Output is constant across all task variations and there is no interference from individual or task.

In conclusion, there are no significant differences in output associated with any combination of graphics or two-way information gaps.

Exophoric/Anaphoric Pronouns.
This section addresses the question of whether information gaps and graphics influence the ratio of exophora over anaphora. The following hypotheses are tested:

H6: The ratio of exophoric to anaphoric pronouns is greater on tasks with graphics than on tasks without graphics.

H7: There is no difference in the ratio of exophoric to anaphoric pronouns between tasks with information gaps and tasks without information gaps.

At first glance, the group and standard deviation means (Tables 10, 11) lead one to suspect the possibility of significant variations.

Table 10
Exophoric/Anaphoric Pronouns:
Group Means

Factor 2: Information Gap
Minus Plus Mean (g)
Factor 1: Graphic

| Minus | 3.35 | 4.88 | 4.11 |
| :--- | :--- | :--- | :--- |
| Plus | 3.43 | 5.94 | 4.69 |
| Mean (s) | 3.39 | 5.41 |  |

Grand Mean $=4.40$

Table 11
Exophoric/Anaphoric Pronouns
Standard Deviations
$\frac{\text { Factor 2: Information Gap }}{\text { Minus } \quad \text { Plus } \quad \text { Mean }(\mathrm{g})}$

Factor 1: Graphic

| Minus | 2.47 | 1.34 | 1.91 |
| :--- | :--- | :--- | :--- |
| Plus | 2.05 | 1.29 | 1.67 |
| Mean (s) | 2.26 | 1.32 |  |

Grand Mean $=1.79$

Figure 4 indicates that $\mathrm{E} / \mathrm{A}$ is highest for $+\mathrm{g}+\mathrm{s}$, second highest for $-\mathrm{g}+\mathrm{s}$, and lowest for $-\mathrm{g}-\mathrm{s}$ and $+\mathrm{g}-\mathrm{s}$.

Figure 4

## Bar Graph of E/A Group Means

 by Treatment

The ANOVA, however, indicates that these differences are not large enough to be significant (Table 12).

Table 12
Analysis of Variance:
Exophoric/Anaphoric Pronouns

|  | Sum of | Degrees of | Mean |  | Tail |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Source | Squares | Freedom | Square | F | Prob |
| Mean | 620.84 | 1 | 620.84 | 64.41 | . 000 |
| Indiv | 73.66 | 3 | 24.55 | 2.55 | . 080 |
| Task | 20.49 | 3 | 6.83 | . 71 | . 556 |
| Graphic | 2.62 | 1 | 2.62 | . 27 | . 606 |
| Shared | 32.50 | 1 | 32.50 | 3.37 | . 079 |
| GXS | 1.93 | 1 | 1.93 | . 19 | . 664 |
| Error | 221.70 | 23 | 9.63 |  |  |

The results indicate that none of the blocking variables are associated with any significant differences. For graphics, $\mathrm{F}(1,23)=4.3>.27 ; \mathrm{p}=.606>.05$. For shared information, $\mathrm{F}(1,23)=4.3 ; \mathrm{p}=.079>.05$. Both graphics and shared fail the test of significance for the ratio of exophora to anaphora. Individual and task also prove to be insignificant at $\mathrm{F}(3,23)=3.03>2.55 ; \mathrm{p}=.080>.05$ and $\mathrm{F}(3,23)=3.03>.71$; $\mathrm{p}=.556>.05$ respectively.

## Correlations

This section attempts to determine whether there are any significant relationships between business decision test scores and either of the other two dependent variables.

Test Scores and E/A
The following hypothesis is tested with a correlation plot of business decisionmaking test scores and the ratio of anaphoric to exophoric pronouns.

H6: There is a positive correlation between business decision-making test scores and the ratio of exophoric to anaphoric pronouns.

The plot indicates a random distribution of data points around the regression line (Figure 5).

Figure 5

## Correlation Plot of E/A and Test Score



Table 13 supports the conclusion that there is no significant relationship between business decision test scores and the ratio of exophoric to anaphoric pronouns ( $\mathrm{R}=-.0383 ; \mathrm{p}(\mathrm{r})=.8309$ ).

Table 13
Correlation: Test Scores and E/A
$\mathrm{R}=-.0383$
$\mathrm{P}(\mathrm{R})=.8309$
$\mathrm{N}=32$

Mean
$X=4.57$
$\mathrm{X}=-.0226 \mathrm{Y}+4.67$
$Y=-.0650 X+4.70$
$Y=4.40$

Std. dev
1.98
4.06
3.36
11.68

To summarize, there is no significant correlation between test scores and the ratio of exophoric to anaphoric pronouns.

## Score and Output

This section examines the results of a correlation plot to test the following hypothesis:

H9: There is no significant correlation between test scores and output.

Figure 6 indicates that there may be a pattern in the distribution; however, since this pattern does not have a clear shape, it indicates only a very tenuous correlation.

Figure 6
Correlation Plot of Output and Test Score


Table 14 confirms this finding with a low value for $\mathrm{R}(\mathrm{R}=.3489)$ and a probability of .0426 . While this probability passes the .05 level of significance, it fails at the .02 level.

Table 14
Correlation: Test Score and Output
$\mathrm{R}=.3489$
$\mathrm{P}(\mathrm{R})=.0426$
$\mathrm{N}=32$
Mean
Regression Line
Std. dev.
Res.ms.
$X=411.84 \quad X=35.401 Y+249.77$ 201.35 367.96
$\mathrm{Y}=4.57$
$Y=.003 X+3.16$
1.984
3.57

One explanation for the results in Table 14 could be a confounding caused by similar values for the same pairs of individuals. This notion can be tested by a second correlation plot which combines the values of the cell means of the same pairs of individuals ( $\mathrm{n}-8$ ) (Figure 7, Table 15).

Figure 7

## Correlation Plot of <br> Output and Test Score Adjusted for Individual Differences



Table 15
Correlation: Test Score and Output
Adjusted for Individual Differences
$\mathrm{R}=.3097$
$\mathrm{P}(\mathrm{R})=.3969$
$\mathrm{N}=8$

|  | Mean |  | St.Dev |  | Regression Line |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  | Res.Ms. |  |
| X | 4.57 |  | 1.28 |  | $\mathrm{X}=.0023 \mathrm{Y}+3.60$ |  |
| Y | 411.5 |  | 170.07 |  | $\mathrm{Y}=40.851 \mathrm{X}+224.61$ |  |
|  | 4.7532 |  |  |  |  |  |
|  |  |  |  | 30507 |  |  |

These values confirm that the tenuous correlation found in the previous plot resulted from a confounding of similar scores for the same individuals. Controlling for this intervening variable (individual ability), we find no correlation between output and score $(\mathrm{R}=.3097 ; \mathrm{P}(\mathrm{R})=.3969>.05)$.

To summarize this section, there are no significant correlations between either of the language measures--output and E/A--and business decision-making test scores.

### 4.2 Summary and Conclusions

The ANOVA reveals a significant variation in business decision-making test scores with treatment. There are significantly higher scores on tasks with graphics and without information gaps than on tasks with any other combinations of supports. There are no significant differences among any other treatments. There is no interaction between graphics and information gaps, which indicates that the effects of the independent variables are additive. Finally, individual is a source of significant variation in decision-making test scores.

There are no significant variations with treatment in either of the two language
measures--output and the ratio of exophora to anaphora. Finally, there is no significant correlation between decision-making test scores and the ratio of exophora to anaphora. The same is true for the correlation plot of test scores and output, after the intervening variable of individual ability is controlled for.

## CHAPTER FIVE

## DISCUSSION OF THE ANALYSIS OF VARIANCE

### 5.1 Introduction

This discussion is organized into sections according to the dependent variables of decision-making test scores, output, exophora/anaphora and the correlations. It is an attempt to interpret the results in the light of previous research in Second Language Teaching and Business Communications.

### 5.2 Business Decision-making Test Scores

This study was conducted in a course which aims to teach both language and business content. The purpose of the study is to explore ways to develop both language and decision-making skills effectively. The rationale for examining graphics and information gaps is that both appear to affect shared perceptions of the context of situation. Research in Business Communications has found that task performance is enhanced when there is a greater overlap in individual perceptions of the task environment. 'Comprehensible input' can therefore be redefined to include not only language which is comprehensible to the individual, but also concepts and problems on which there is a shared agreement among the members of a group.

This study is based on the assumption that combinations of task supports can be manipulated to increase or decrease the need to create shared perceptions of the context of situation. It is assumed that this need is greatest on tasks with information gaps and no graphics and least on tasks with graphics and no information gaps. The results support the notion that decision-making is better on tasks with a minimal need to create shared perceptions. The combination of a graphic without an information
gap is the only condition which results in significantly better decision-making scores. The finding of no interaction indicates that the beneficial effects of the two task variables--plus graphic, minus information gap--are independent of each other and generate significant differences only when they are added together. Graphics fail to generate significance when they are combined with information gaps. This contradicts Koeninger's (1985) finding that graphics, when combined with information gaps, result in significantly better decision-making skills. How can this difference in findings be explained?

First, Koeningers' study uses native speakers as subjects. It seems reasonable to expect that communication in a common, native language has less potential than communication in a foreign language for generating incongruent perceptions. Secondly, Koeninger's tasks are not very cognitively demanding, consisting of communicating instructions to arrange Tinker toys in particular configurations. In other words, there are two sources of ambiguity (language and cognitive load) which are absent in Koeninger's study but present in this one.

Compared to constructing Tinker toy models, the case method makes considerable cognitive demands even on native speakers. Successful decision-making depends upon establishing congruent perceptions of a company's problem derived from a common interpretation of all sources of information. The case in this study, for example, requires sorting out the options, determining the relationship between probabilities and payoffs, and comparing alternatives. The conceptual difficulty of this task is reinforced for the participants by their relative lack of business knowledge, the novelty of the task situation and the fact that the discussion is in a foreign language. Each of these factors is a source of potential misunderstanding; in combination, they could reinforce any lack of congruence in the perceptions of the participants. Compared to arranging Tinker toys, defining and solving a case problem
is a difficult task which is subject to considerable ambiguity and misinterpretation. Under these conditions, it seems reasonable to provide task supports to clarify the issues.

Furthermore, given the many sources of potential ambiguity in case discussions, it is conceivable that shared perceptions can only be created effectively by two task supports working in combination to reinforce each other (in this case, plus graphic, minus information gap). This study supports the idea that graphics are appropriate when the content is new or conceptually difficult (Wesche and Ready, 1985:113; Brown and Yule, 1984:141; Early, 1988). Yet it also suggests that the beneficial effects of graphics on shared perceptions (increased redundancy and adjustment of input to the learners' expectancy systems (Wesche and Ready, 112)) may not occur in a task environment with information gaps. This raises the question of why information gaps inhibit the creation of shared perceptions.

To answer this question requires an analysis of the interaction of information gaps and content in the context of non-native speaker discussions. It should be pointed out that there are few studies in Second Language Teaching which can shed light on this question because most research is based on language, and not content, teaching. In addition, studies in Business Communications are not directly comparable because they are done with native speakers. As a result, the conclusions in this section are somewhat speculative and require support from future research.

One could argue that the information gaps in this study introduce three additional sources of ambiguity to an already ambiguous task. First, subjects are required to understand information which is transferred verbally. This is stressful since it requires an accurate assessment of background knowledge and creates the possibility that the message will be misunderstood. Secondly, subjects are required to determine the roles their partners are playing in the firm (Appendix V). This kind of
gap differs from gaps in most previous studies because it involves communicating not only data, but also assigned roles. This creates an additional element of uncertainty in the initial stage of the discussion since, when roles are unclear, individuals are forced to probe to develop congruent perceptions of the situation (Handy, 1976:75).

Participants must therefore develop a mutual understanding of both the data and their partners' roles, failing which, communication may be impaired.

Finally, a third source of ambiguity may arise from the fact that participants are role-playing key decision-makers in different sections in the firm. Although the information does not specify that participants should identify with their own section's interests, it is still conceivable that they would blindly argue their own points of view rather than considering the interests of the whole firm. It is reasonable to expect the possibility of this occurring since two-way gaps in case studies are simulations of the 'real world' of business where this situation occurs frequently as different sections routinely compete for resources and prestige (Moore, Thomas, et.al., 1975: 128). It should be emphasized that the effects of this kind of competition on communication are almost always detrimental (Ibid, 1975: 128). This notion is supported by Duff's study of divergent tasks, which she found led to increased competition and less effective problem-solving. Since group decision-making is a process of creating a set of shared beliefs (Mohan, 1988: personal communication), it is conceivable that this type of information gap might undermine the effectiveness of this process by introducing additional conditions which promote misunderstanding and/or competition.

One could speculate that the information gap tasks in this study are not associated with superior decision-making skills because they introduce three additional sources of ambiguity to an already ambiguous task. This disrupts the process of creating a shared set of beliefs about: (1) the data needed to solve the
problem, (2) the role played by one's partner, and (3) the partner's motivations. By reinforcing ambiguity in any or all of these ways, information gaps may make the process of creating a shared set of beliefs more difficult. This disruption may be so severe that it interferes with, and may even cancel out, the beneficial effects of graphics. This conclusion is supported by the finding in this study that graphics result in significantly better decision-making only when they are not combined with information gaps.

To summarize, this study supports the notions that decision-making skills are being practised in a Business English case discussion and that these skills can be enhanced by a combination of task supports. Since case discussion in a second language contains multiple sources of ambiguity, two task supports working together to reduce ambiguity may be required to create enough overlap in perceptions to significantly improve the quality of decision-making. By introducing additional sources of ambiguity, information gaps appear to exacerbate the process of creating shared perceptions to the point where they may even cancel out the positive effects of graphics.

### 5.3 Output

Output was selected as a dependent variable because of Swain's (1987) claim that it provides a measure of opportunities for language practice. In addition, maximizing output has been given as a rationale for using two-way information gaps (Pica and Doughty, 1985). This study attempts to answer the question: To what extent does output vary with combinations of task supports?

In this study, while there is proportionally more output in some combinations of graphics and information gaps than in others, these variations are not large enough to be significant. In other words, no combination of plus or minus results in any
significant difference in output. Based on this finding, output does not appear to be affected by changes in task supports aimed at manipulating the need to create a shared context.

This finding conflicts with Koeningers' (1985) result that output is significantly less in tasks with graphics than in tasks without them. The reason for this may be that the tasks in Koeninger's study are concrete and cognitively undemanding. They require subjects to give and carry out directions to construct identical Tinker toy configurations, a task where students to proceed through a limited number of relatively mechanical steps. It seems reasonable to assume that graphics would clarify the instructions so that less output is needed to negotiate these steps. Once the participants perceive that an identical configuration--the 'right answer'--is reached, discussion ends. This may explain Koeninger's second finding that graphics reduce the amount of time taken to solve problems.

Case studies, on the other hand, are cognitively demanding and reflect complex problems which have no 'right answer'. An effective analysis involves a thorough examination of the advantages and disadvantages of all options. Output is needed not only to negotiate language and content input, but also to explore the creative application of business theory to case facts. Even if a graphic did reduce the output used to create a common understanding of the structure of the problem, it is reasonable to expect that more output would be generated in the search for the most effective solution. In other words, the nature of the task is such that output would probably expand to fill up the allotted time, regardless of which task supports were provided.

This may also explain why there are no significant differences in output with information gaps. It is a generally held belief in Second Language Teaching that twoway information gaps enhance motivation to communicate by giving each participant
'something to bargain with'. However, the motivation factor may be less important in language and content classes because motivation is already built into the content in a way that it is not in language classes.

In the latter, tasks are typically artificial, being contrived to practice form or encourage input and interaction. In this situation, where the content may not be intrinsically motivating, information gaps may enhance motivation. In academic tasks which reflect those of content classes, however, it is reasonable to assume that students are eager to demonstrate their competence with content-based material. As a result, information gaps may play a less important role in generating motivation. Furthermore, it is likely that this effect would be reinforced by the open-ended nature of tasks like case discussions. As students search for the best solution, it is likely that output would expand to fill up the time allotted to the task. In other words, one could speculate that information gaps may not lead to greater incremental output in teaching situations where motivation to find the best solution is already built into the task.

In this study, there are no significant variations in output with task supports. The reason for this may be that the authentic, content-based nature of the tasks motivates participants to maximize output in order to find the best solution, thereby reducing the role of information gaps as generators of additional output.

### 5.4 Pronoun Reference

The rationale for choosing $\mathrm{E} / \mathrm{A}$ as a dependent variable is based on three assumptions: (1) all activities contain both practical and theoretical dimensions (Mohan, 1986), (2) exophora and anaphora occur in all activities (Berwick, 1986:115) and (3) the relative distribution of exophora and anaphora may provide a tentative indication of the extent to which students are thinking at the practical or the theoretical level.

This study supports Berwick's (1988:155) claim that both exophora and anaphora occur in some proportion in all tasks. The data contain no instances in which either anaphora or exophora equals zero. However, the results also contradict Berwick's (1988:155) finding that the proportion of anaphora and exophora varies with the need to create a shared context. In this study, the measure of pronoun reference, the ratio of exophora to anaphora, does not differ significantly with any combination of task supports.

Berwick claims that the type of task influences the ratio of exophora to anaphora. Since Berwick's computer-learning task is a different type of task from a case discussion, these two tasks may be characterized by different distributions of exophora and anaphora. In computer tasks, repeated references to a physically present object--the computer screen--may be necessary for effective problem-solving. Case studies, however, are highly theoretical, with the experiential dimension consisting of specific companies which are not physically present. Solving case problems requires the skillful application of business principles to companies described on paper. Even though the companies are real, they are removed from the learners in space and time. Repeated concrete reference may therefore simply not be required to arrive at effective solutions. In computer learning tasks, however, repeated references to the computer screen for feedback may be essential for successful task completion.

There is evidence in the literature that graphics, by introducing an experiential dimension to case discussions, make theory more accessible and play a critical role in creating shared perceptions. Since the purpose of the graphic in this study is to clarify the structure of the problem, it is conceivable that the graphic may be referred to only in the initial stages of discussions (problem-definition). Once the participants have developed a common understanding of the structure of the problem, they may not
have to refer to the graphic again in order to reach the best decision. A limited number of references in the initial stage of the discussions may explain why there are no significant differences in the ratio of exophora to anaphora between tasks with graphics and tasks without them.

As for information gaps, one could speculate that the ones in this study would generate more instances of exophora (for example, 'I' and 'you') as participants inform each other of their roles. The findings of the study, however, indicate that these references are not numerous enough to result in any significant differences with treatment. The reason for this may be the same as for graphics, namely that only limited references in the problem-definition stage are necessary for effective problem-solving.

To summarize, one explanation for the finding of no difference in the relative distribution of exophora and anaphora may be that all case discussions are characterized by similar E/A's. Since case studies are highly theoretical, repeated exophoric pointing may not be essential to arrive at the best decision. Secondly, the instances of exophora appear to be a function of the purpose for which visual task supports are used. If graphics are used to structure problems, they may be referred to only in the initial stage of the discussion, which would not be enough to generate significant differences. The same appears to be true for information gaps.

### 5.5 Correlations

Score/Output
In this study, there is no significant relationship between output and scores on the business decision-making test. This contradicts Koeningers' (1985) finding of an inverse relationship between output and accuracy of task completion when
information gaps are combined with graphics.
One explanation may be that there are critical differences in the type of tasks used in the two studies. It seems reasonable to assume that, in Koeninger's study, the incremental output between tasks with and without graphics is used to clarify understanding of language input. With graphics, the participants may require less output to negotiate the limited number of steps needed to complete the Tinker toy configurations.

Case studies, however, are more complex and open-ended so that, with graphics to clarify the structures of problems, more output can be devoted to the diverse theoretical considerations which impact on effective solutions. Conceivably, some of this output may be useful for decision-making and some less useful. Whether or not output is valuable may depend more on the business knowledge of the individual participants than on task supports. This conclusion seems to be supported by two results: (1) individual is a source of significant differences in test scores and (2) the tenuous correlation between output and score on the first plot (Figure 6) disappears on the second plot (Figure 7), which adjusts data points for individual ability. This indicates that there is a confounding effect from 'individual' on the first plot. Once this intervening variable is controlled for, there is no correlation between output and score.

To summarize, the findings seem to suggest that it is not output which is critical for an effective decision-making process, but rather the way in which output is used. When output is used to promote a shared understanding of context, it is used to define problems, not to solve them. When problems are clearly defined for all participants at the outset, more output can be generated to find the best solutions. Because of the theoretical complexity of case studies, output may or may not be used effectively and it seems reasonable to expect that this variation would be determined
largely by individual differences.

## Score / E/A

In this study, there is no significant correlation between business decision test scores and the ratio of exophora to anaphora. This finding suggests that variations in E/A are not associated with effective decision-making skills. The reason for this may be that there is an essential similarity in the nature of all case discussions which generates similar distributions, regardless of task supports.

How can one explain the finding that there are no differences in $\mathrm{E} / \mathrm{A}$ but that graphics are associated with superior decision skills? Presumably, graphics must be referred to in order to be effective. One explanation may be that, since the purpose of the graphics in this study is to create shared perceptions of the structure of a problem, references to the graphic are required only in the initial stage of any discussion. They may not be needed at all after the participants have developed a common understanding of the problem. This suggests that the relative distribution of exophora and anaphora may not be useful for indicating the effectiveness of language use in studies where graphics are used in limited and specific ways. A qualitative study of the ways in which pronoun references are used to solve problems may be more appropriate.

## Summary

To summarize this section, neither output nor $\mathrm{E} / \mathrm{A}$ is correlated with better decision-making test scores. These findings imply that the language measures used in this study may not be effective indicators of the usefulness of graphics for the decision-making process. They also suggest that the ways in which language is used to think through problems may be a more important issue than the production of
language. This suggests that research in academic language and content classrooms may need to supplement language measures with cognitive measures in order to present a complete picture of learning dynamics.

### 5.6 Summary and Conclusions

This study supports the notion that decision-making skills are being practised in Business English case discussions. Graphics, when not combined with information gaps, appear to enhance the effectiveness of the group decision-making process. Information gaps, by reinforcing the ambiguity of an already ambiguous task environment, appear to disrupt the creation of shared perceptions, which are crucial for effective group decision-making. 'Comprehensible input' could be redefined for the purposes of language and content classes as a shared understanding of all aspects, both verbal and non-verbal, of a task situation. Since the language measures used in this study do not correlate significantly with decision-making skills, EAP research might benefit from the development of novel measures of cognitive/academic language use.

## CHAPTER SIX

SUMMARY, LIMITATIONS, IMPLICATIONS, AND CONCLUSIONS

### 6.1 Summary

This study was conceived to explore the ways in which non-native speakers in academic language and content classes develop oral proficiency and decision-making skills. Underlying this theme are previous studies in Second Language Teaching and Business Communications supporting the notion that task supports can be manipulated to enhance performance. The theory behind the independent variables in this study--graphics and information gaps--is that these particular contextual supports affect shared perceptions of the task environment, an important factor in effective group decision-making. What has not been previously examined, however, is the relationship between combinations of these task supports and the decision-making language and skills of non-native speakers.

The concepts in this study are taken from the literature of Second Language Teaching and Business Communications and are linked together by Mohan's knowledge framework. The purpose of the project is to determine which combination of task supports is associated with higher decision-making test scores. Graphics were selected because there is evidence in the literature that they transform abstract problems so that they can be experienced directly. Information gaps were chosen because they are generally perceived as a beneficial aid for language learning. Both graphics and information gaps are used widely in college-level business content and EAP courses.

The research design involves a repeated measures analysis of variance with tasks assigned in the order determined by a Latin Square. The effects of graphics and
information gaps are assessed for main effects and interaction on output, $\mathrm{E} / \mathrm{A}$ (the ratio of exophoric to anaphoric pronouns) and scores on a business decision-making test. In addition, there is an interest in determining whether there are any correlations between decision-making test scores and either of the two language measures.

### 6.2 Limitations

The small sample size used in this study limits the confidence with which findings can be generalized. Since the subjects were selected from a homogeneous group, findings can be extrapolated with confidence only to similar groups. The same methodology, however, could be applied to other studies of language and content tasks.

Secondly, scores on the business decision test should be interpreted cautiously since, unlike other measures such as output, subjectivity can play a greater role in the coding of data.

Opinion-expressing tasks present difficulties in terms of developing appropriate...scoring procedures. It may be that this type of task can only be properly assessed subjectively and that no matter how objective we would like to be, we will always have difficulty quantifying levels of performance (Brown and Yule, 1983: 142).

In this study, the content of the scoring categories was progressively refined to minimize the ambiguity of the coding procedure; this refinement led to an inter-rater reliability of $95 \%$.

### 6.3 Implications

## Teaching

This study supports the notion that content-based language teaching is a viable alternative to a structure-based approach. It demonstrates that, in addition to language
skills, decision-making and reasoning skills are being practised in authentic EAP programs. The study reinforces the assumption that language and cognitive skills are inseparable in authentic activities and raises the question of how tasks can be manipulated to further the simultaneous development of both aspects of learning. This study lends credibility to the following ideas: (1) 'comprehensible input' extends beyond surface forms to include shared perceptions of the context of situation, (2) shared perceptions enhance cognitive performance, (3) contextembedded input such as graphics can provide the preconditions which may promote and facilitate the cognitive processes involved in skillful decision-making, and (4) in highly ambiguous tasks, graphics may help to create shared perceptions only when they are not combined with information gaps. While more research is needed to confirm this last notion, information gaps appear to disrupt the creation of shared perceptions by introducing additional sources of ambiguity. This study raises the consideration that the utility of task supports may be a function of the total environment in which they operate.

The study supports the notion that content classes provide useful models for academic second language classes, but poses the problem of sequencing cognitive input so that it is manageable for second language learners. A common complaint of instructors in language and content programs is a lack of clarity in defining dual objectives. Yet, the traditional alternative--defining goals in terms of language--does not address the development of thinking skills. Both Mohan's framework (1986) and Leenders' and Erskine's (1973) 'case difficulty cube' may provide some insights into this aspect of curriculum development.

## Research

The study suggests that teaching effectiveness in academic language and content classes may involve factors which have hardly been explored in the research of Second Language Teaching. The findings of this study demonstrate that the most obvious ways to measure language performance may fail to reveal variations in thinking skills. This criticism is particularly relevant for research in college-level academic preparatory programs.

To remedy this situation, new frames of reference and categories of analysis are required to target cognitive/academic language use. While the categories in Appendix VI appear to have been satisfactory measures of decision-making in this study, they may be less useful in other contexts. New measures, such as time to complete a task, accuracy of task completion and skill-based tests, could be adapted from content classroom research and applied in EAP research.

A second approach to EAP research could be based on discourse analysis. This approach rests on the assumption that discourse and thinking skills are inseparable. Thirdly, a qualitative study of behaviors associated with output such as Tarone's (1983) categories of communicative strategies could shed light on coping mechanisms such as language hypothesis testing and searching for new words.

While there is no model of all the factors which make up the context of situation, this study has suggested some elements which may be included in such a model and on which future research could be based. The choice of elements to examine depends on the purpose and context of the research study. Since many aspects of the context of situation operate simultaneously, future studies might use some form of multivariate analysis.

This study also suggests that the environmental conditions required for task
supports to be effective are not yet fully understood. The results on information gaps in this study, for example, demonstrate that they can interact with content in unpredictable ways. More research is needed on how information gaps can be tailored to specific contexts in ways which facilitate second language acquisition. Researchers could examine the effects of different kinds of information gaps, for example, gaps designed to simulate the real world of business as opposed to more artificial ones designed to facilitate language learning. The implication for teaching is that information gaps could then be structured more effectively to accommodate different types of learning.

The same appears to be true for graphics. While the simplified decision trees in this study seem to have had beneficial effects, more research needs to be done on whether and how graphics can be adapted to different pedagogical purposes. For example, graphics could be designed in ways to help students work through tasks rather than just comprehend data. This type of study would take longer than the present one and might benefit from a qualitative approach which would require students to give feedback on their perceptions of the usefulness of graphics.

### 6.4 Conclusions

In an authentic academic preparatory environment, 'comprehensible input' could be redefined to include a shared conceptual understanding of the entire context of situation. Research should examine how the situational context can be manipulated to enhance the development of both language and cognitive skills such as decision-making.

The feedback loop between research and teaching implies that further research can lead to a better scientific understanding and validation of the language and content approach. Since this approach is growing in college-level academic
preparatory programs,. educational practice might benefit from explorations into the ways in which tasks can be manipulated to encourage cognitive/academic language use. The alternative appears to be a return to unauthentic tasks which artificially separate language from both thought and from the purpose for which language is learned.

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## Appendix I <br> Decision Tree for Task A



## Appendix I (continued)

## Decision Tree for Task B





## APPENDIX II

## BARTRAM TOOLS COMPANY*

Bartram Tools is a Canadian company that sells high-quality hand tools such as hammers, wrenches and screwdrivers. $80 \%$ of their products are bought by home handymen and $20 \%$ by industries. Bartram's prices are $10 \%$ to $15 \%$ higher than their competitors' prices. Bartram's key selling points are: (1) high-quality, (2) brand name recognition, and (3) the promise to replace for free any tools which break (very few have broken).

Bartram sells $70 \%$ of their products in Canada and $30 \%$ in the United States. The company has been having problems lately because competitors from South East Asia have been taking a larger share of the Canadian tool market. Their tool prices are $15 \%$ cheaper than Bartrams'. Because of this new competition, Bartram's annual sales have remained steady at $\$ 5$ million for the last two years. Mr. Bartram, the President, wants to increase sales by at least $10 \%$ ( $\$ .5$ million) over the next year.

One day during lunch, Mr. Bartram found out that his Canadian competitors were exporting to Central America and Southeast Asia. He began to think that maybe he should export there too instead of trying to increase Canadian or U.S. sales.
*Adapted from Exporting your product: A case study, with permission from the Federal Business Development Bank.

## APPENDIX IV

## SUBJECT CONSENT FORM

PROJECT: The Effects of Graphics and Two-way Information Gap Tasks on the Production of Decision-Making Language in Business

INVESTIGATOR: Valerie Oszust

PURPOSE: This project compares oral communication between second language learners on a business decision-making task. The aim is to discover which of four independent task variables results in the greatest amount of effective decision-making language. The four variables are: (1) graphics (or pictures) and information gap, (2) graphics and no information gap, (3) no graphics, information gap, (4) no graphics, no information gap.

PROCEDURES: Students are given the reading, Bartram Tools and told that they will discuss the company's alternatives. Students work in pairs and discuss four sets of alternatives with ten minutes for each set. All students will tape-record their conversations. One pair of students will be videotaped. Research assistants will go around the classroom, take notes and answer any questions.

IDENTITY: The identity of students will be confidential. Students' names will not be used. Numbers will be used instead.

TIME: The research will take about one hour of the students' time.

REFUSALS: Students can refuse to participate at any time. If they do so, there will be no penalty of any kind. Classroom grades will not be affected by refusal to participate.

COMPENSATION: Students who participate will receive one dollar.

## APPENDIX V

## ALTERNATIVES FOR BARTRAM TOOLS COMPANY

## I) MINUS INFORMATION GAP

TASK A:
Alternatives:

1) Export to Cuba
2) Export to Trinidad

If Bartram Tools exports to Cuba, there is a $60 \%$ chance that sales will increase by $\$ 500,000$ and a $40 \%$ chance that they will increase by $\$ 200,000$.

In Trinidad, there is a $60 \%$ chance of a sales increase of $\$ 200,000$ and a $40 \%$ chance of a $\$ 400,000$ increase.

Mr . Bartram hates Communist countries.

TASK B:
Alternatives:

1) Increase salaries
2) Increase advertising

The sales manager wants to increase salesmen's salaries. He says there is a $70 \%$ chance that sales will increase by $\$ .5$ million and a $30 \%$ chance that sales will stay the same. Mr. Smith, the best salesman, will quit if salaries are not increased.

There is a $30 \%$ chance that more advertising will increase sales by $\$ 600,000$ and a $70 \%$ chance that they will increase sales by $\$ 300,000$.

## TASK C:

Alternatives:

1) make a new product--the electric screwdriver
2) reduce prices on all Bartram's products by $10 \%$.

If Bartram makes the screwdriver, there is a $60 \%$ chance of increasing sales by $\$ .5$ million and an $40 \%$ chance of decreasing sales by $\$ .1$ million.

If Bartram reduces their prices, there is a $30 \%$ chance that sales will decrease by $\$ .2$ million and a $70 \%$ chance that they will increase by $\$ .2$ million. Low prices, however, might hurt Bartram's high-quality brand name.

TASK D:
Alternatives:

1) Wait for the Canadian dollar to go down
2) Sell by mail to the U.S.

Bartram's sales to the United States are influenced by the value of the Canadian dollar. There is a $60 \%$ chance that the Canadian dollar will fall next year and Bartram's sales will increase by $\$ .5$ million. There is a $40 \%$ chance that the dollar will go up and sales will decrease by $\$ .75$ million.

If Bartram sells by mail, there is a $70 \%$ chance that sales will increase by $\$ .3$ million and a $30 \%$ chance that they will increase by $\$ .8$ million. Sales by mail, however, might hurt Bartram's high-quality brand name.

## II) PLUS INFORMATION GAP

TASK A:

Student 1:
You are Mr. Bartram, the President. You want to export to Trinidad because you think there is a $60 \%$ chance of a sales increase of $\$ 500,000$ and a $40 \%$ chance of a $\$ 200,000$ increase.

You hate Communist countries.

Student 2:
You are a consultant. You think that Bartram should export to Cuba because there is a $60 \%$ chance that sales will increase by $\$ 200,000$ and a $40 \%$ chance that they will increase by $\$ 400,000$.

TASK B:

Student 1:
You are the company's best salesman. You want to increase salesmen's salaries. You think that there is a $70 \%$ chance that sales will increase by $\$ .5$ million and a $30 \%$ chance that sales will stay the same.

You will quit your job if salaries are not increased.

## Student 2:

You are the advertising manager. You think that there is a $30 \%$ chance that more advertising will increase sales by $\$ 600,000$ and a $70 \%$ chance that it will increase sales by $\$ 300,000$.

## TASK C:

## Student 1:

You are the production manager and you want to make a new product--the electric screwdriver. You are sure that there is a $60 \%$ chance of increasing sales by $\$ .5$ million and a $40 \%$ chance of decreasing sales by $\$ .1$ million.

You don't want to reduce prices because it might hurt Bartram's high-quality brand name.

Student 2:
You are the sales manager and you want to reduce prices by $10 \%$. You believe that there is a $30 \%$ chance that sales will decrease by $\$ .2$ million and a $70 \%$ chance that they will increase by $\$ .2$ million.

## TASK D:

Student 1:
You are Bartram's economist. You think that there is a $60 \%$ chance that the Canadian dollar will fall next year and Bartram's sales will increase by $\$ .5$ million. There is a $40 \%$ chance that the dollar will go up and sales will decrease by $\$ .75$ million. You want to wait for the dollar to go down.

## Student 2:

You are Bartram's salesman in the U.S. You want Bartram to sell by mail in the U.S. You think that there is a $70 \%$ chance that sales will increase by $\$ .3$ million and a $30 \%$ chance that they will increase by $\$ .8$ million.

## APPENDIX VI

## BUSINESS DECISION-MAKING SKILL TEST

KEY DECISION-MAKING ELEMENTS
SCORING

## PROBLEM:

1) Not stated, or stated as other than in (2).
2) Mention of flat sales growth and/or increasing (foreign) competition in Bartram's domestic market.

## SITUATION

1) Discussion is largely off-topic.

Student fails to discuss Bartram Tools
0
2) Student stays on the topic of Bartram Tools.

## CRITERIA:

1) No mention of Bartram's goal to increase sales by $\$ .5$ million.0
2) Mention of Bartram's goal to increase sales by $\$ .5$ million.1

## ASSESSMENT OF ALTERNATIVES:

I) Content: Major factors:

1) No mention of sales (price $x$ volume), or profit (sales minus cost) in assessing alternatives.0
2) Mention of sales or profit in assessing options. 11
II) Content: Minor Factors:
3) No reference to minor factors such as specific costs, market characteristics, competitors' response, brand name, product demand, or product quality. (Irrelevant factors such as climate or geography of the target country or the anti-Communistic feelings of Mr. Bartram are graded zero.)
4) Minor factors are mentioned.
III) Thinking skills:
5) Student does not weigh major factors in his decision or repeats them without appearing to understand them.
6) Student does not weigh the major factors for both options, does not apply the same criteria to each option, focuses on one alternative only or subordinates major to minor factors.
7) Both alternatives are weighed in reference to the major factor and on this basis, one alternative is eliminated.
8) Both alternatives are weighed in reference to major factors and minor factors, with the latter subordinate to the former, and on this basis one alternative is eliminated.

## DECISION

1) The decision is either not made or is made spontaneously without reference to the previous discussion points.
2) The decision flows logically from and is consistent with previous discussion points.

The maximum score is ten and the minimum score is zero.

## APPENDIX VII

## SAMPLE OF CODED TRANSCRIPTS

The following excerpt from the transcripts is coded for the categories of the business decision-making skill test (Appendix VI). The underlined section indicates that that section was assigned the points for the category in the following set of parentheses. Once a point is given in any one category, no additional points can be given for that same category.

## TASK A:

M: Eh, Bartram Bartram Tools export to Cuba export to Cuba ...If we export to Cuba, he can sell we have a chance huh? We have 60 chance to sell to increase 5 million, thousand dollar and we have $40 \%$ chance that he will increase by 200,000 dollar. But in Trinidad there is a $60 \%$ chance of sales...we in- can increase 200,000 and a $40 \%$ chance of 400,000 increase chance. But I hate Communist countries so I want to export Trinidad better than Cuba.

K: So um Trini- Trinidad um good balance good balance but if you want want more uh make money (Assessment of alternative: 1 point)

M: So...
K: More make money so Cuba is good for you ...so now you you have a you have made steady of .5 million for the last year so now you you sell to Cuba is good for you (Statement of the problem: 1 point)
M: But Communist country is hard to know the country condition so... how was that?

K: Um. First you ask some information to Cuba's government so...
M: Um.
K: But if it's possible you try to both countries.
M: Both countries? But if I do both countries it's very cost money.
K: Uh. I think so so anyway so now you you need uh Cuba's information so some some people.
M: Some people?
K: You... you are some...

M: Ah...agent.
K: The Cuba.
M: Make agent in Cuba?
K: Uh.
M: Uh.
K: I forget. So but uh...
M: But if war is happen again if war is happen again I will lose money more than Trinidad. If I sell in Cuba and sometimes there is there is a revolution and I am afraid that kind of we sell that product and there is some kind of war or revolution happen we can't sell anymore. (Minor factor: market characteristics: 1 point) So I would like to try Trini- Trinidad better than Cuba.
K: So it's a good idea. Trinidad is safety so.
M: But...
K : And Trinidad is not so bad because it this underline...
M: Underline?
K : This low average is not so bad.
M: 200,000.
K: Uh.. $50 . .40 \%$ chance of 400,000 increase so it is not so bad for you so and it is very safely and it is not Communist country.
M: Ummm. But if our company sells uh high-quality hand tool hammers wrenches and screwdrivers...If I sell that kind of things do they use that kind of that kind of thing in Trinidad?
K: Trinidad...
M: Trinidad...
K: Uh I think so.
M: Um. Is our product selling point is our our product is product price is higher than other companies?
K: Yes I think so.
M: Do they... will they buy our products?
K: Uh...little but it is hard it is hard but Bartram Tools products is highest quality.
M: Um...
K: First at first they Trinidad people um (Japanese) worry.
M: Worry...suspicious...
K: Suspicious don't higher cost but...
M: Wait a little wait a little they know they will know they can know your product
is highest quality.
M: But it takes time? How long does it take?
K: Uh you need commercial.
M: Advertisement? Yeah Yeah.
M: How about Cuba?
K: Probably you can't advertisement Cuba's people so Trinidad is best for you you can more advertisement.
M: But in Cuba may be other companies doesn't want to sell product because of very danger so maybe if I sell the product however it cost expensive they will buy because of products.
K: But there is not so many product so I can sell but if you you sell the your product to Cuba so Cuba's can do and take a trade tax for your products your so your products is more...
K: Higher cost than...
M: More higher cost than...become the higher cost...
K: Because the higher cost... because Cuba take trade tax.
M: Cuba take trade tax? And the government will be...
K: We choose Trinidad.
M: Trinidad.
K: Trinidad.
(Situation: Students stay on the topic of Bartram Tools throughout their discussion. 1 point)
(Thinking Skills: Students subordinate major to minor factors such as market characteristics and government regulations. They should have assumed, however, that these factors had already been taken into account in the assignment of probabilities and instead have based their decision primarily on the profit potential (payoff $x$ probability): 1 point)
(Decision: The decision appears to have been made spontaneously, rather than after a thorough summary of all the relevant factors: 0 points)

TOTAL SCORE: 5 POINTS.

