To the Graduate Council:

I am submitting herewith a dissertation written by Michael Andrew Boerger entitled "The Role of Figurative Language in Collaborative Discourse: A Cross-Modal Comparison." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

Michael Johnson, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Associate Vice Chancellor and
Dean of the Graduate School

THE ROLE OF FIGURATIVE LANGUAGE IN COLLABORATIVE DISCOURSE: A CROSS-MODAL COMPARISON

A Dissertation

Presented for the

Doctor of Philosophy Degree

The University of Tennessee, Knoxville

Michael Andrew Boerger

August, 1995

ACKNOWLEDGEMENTS

There are a number of people to whom I am grateful for their contributions to the success of this dissertation. First and foremost, I would like to thank the members of my committee; Michael Johnson, Howard Pollio, John Lounsbury and Bruce MacLennan. In particular, I would like to extend my thanks to Michael Johnson, my committe chair, who allowed me the freedom to follow my own interests in choosing a dissertation project, and supported me throughout. I would also like to recognize the other members for their suggestions and advice.

There are a number of others whose contributions I would like to note. Tracy Henley, who aided me through his advice and support. Patricia Adams, who lent me equipment that made data collection possible. Sandy Anderson, DeAnna Timmermann and Laura Skinner for assisting me in word processing, a skill which I am sadly lacking. Finally, I would like to thank all members of the Cognitive Science Lab, past and present, who have offered ideas and suggestions at every stage of the project.

ABSTRACT

The purpose of the present study was to examine the ways in which various aspects of figurative language production vary as a function of mode of communication. Four groups of subjects, representing four modes of communication; intercom, face to face copresence, written (e-mail) and full copresence, were used. Within each group, subjects worked in pairs, with an expert instructing a novice in the construction of an hibachi (a small, portable grill). A total of 160 subjects were used, with 20 pairs appearing in each of the four modes. The resulting conversations were recorded for analysis.

Significant differences between groups were noted in the frequency and rate of occurrence for figurative expressions, including interrogative analogies and unique figures. On various measures, subjects in the intercom and face to face copresence modes produced a greater number and variety of figures of speech than did those in other modes. In looking at the rate of occurrence per 100 words, however, the rates were similar across all modes with the exception of full copresence, which produced significantly lower rates. Differences also were noted concerning the point in conversations when they appear, as a function of mode of communication, and in the terms used as metaphoric vehicles by conversants communicating in different modes.

Modal differences are discussed in terms of Clark and Brennan's (1991) model, which argues that varying media have different constraints and affordances associated with them, which typically result in the form and content of communication

varying across media. The present paper argues that several of the factors mentioned by Clark and Brennan, in addition to other factors, impact on the use of figurative expressions. In particular, the present study relates the use of figurative language to Clark and Brennan's (1991) concept of "grounding" . In addition, implications of the present study for cognitive science, psycholinguistics and education are discussed, and recommendations for additional research were presented.

TABLE OF CONTENTS

CHAPTER PAGE

I. INTRODUCTION 1
The collaborative view
Grounding
Factors that affect grounding
Expertise
Familiarity
Audience
Medium
Problem
Differences explained: The collaborative model
Grounding and figurative language
Economy
Making the unfamiliar familiar
Figurative language and education
Purpose of the present study

II. METHODS 30
Subjects
Apparatus
Procedure
Transcribing the data
Dependent variables
Interrogative figures
Unique figures
Selection of figures

III. RESULTS 40
Word counts
Frequency of figurative language
Modal effects on rate of figurative expression
Interrogative figures
Unique figures
Noun based and verb based figures
The use of body-based metaphors
Context of appearance
Effects of mode on satisfaction with communication
Relation of figurative usage to communication

IV. DISCUSSION 59
Limitations and recommendations

BIBLIOGRAPHY 72

APPENDIX 79

VITA 83

LIST OF TABLES

TABLE PAGE

1. Number of words by mode 41

2. Rate of figurative expressions by mode 44

3. Rate of interrogative analogies by mode 47

4. Unique figures by mode 49

5. Nouns used as figures 51

6. Verbs used as figures 54

CHAPTER I

INTRODUCTION

Cognition, which historically has been studied at the level of the individual, is currently in the process of being reconceptualized. A growing number of cognitive scientists are becoming interested in its social aspects. One example of this emerging interest is in the domain that has come to be known as shared cognition (e.g., Resnick, Levine & Teasley, 1991). Incorporating perspectives from anthropology, psychology, sociology, and linguistics, this field seeks to explore the various ways in which cognitive abilities are shaped by social forces. The central concern of socially shared cognition is a recognition of the fact that people live in communities, interact with others, and exchange information. This basic fact influences the way that knowledge is constructed for the individual (e.g., Freyd, 1983; Resnick, 1991).

In a sense, this approach is a contextualist one. Its adherents view cognition as situated within a context, the social world, that must be taken into account for a full understanding of cognitive processes. This represents something of a departure from much of traditional cognitive science which characterizes the mind as context independent.

One consequence of this new perspective has been its impact on psycholinguistics. The shared cognition program has precipitated a shift in the study of language towards an emphasis on its shared or communal aspects. This has led to an increased interest in the analysis of discourse and conversation as language domains (e.g., Potter, & Wetherell, 1987; Joshi, Webber, & Sag, 1981), for as Clark and Wilkes-Gibbs (1986)

note, "Conversation is the fundamental site of language use" (p.1). Consequently, psycholinguists have developed models that focus on the interactive nature of conversation, with an eye towards understanding how this nature shapes and constrains language use in everyday contexts.

Concurrently, cognitive science is seeing a shift in its treatment of figurative language (e.g., Pollio, Smith, & Pollio, 1990). Once considered as a special and infrequently occurring aspect of discourse, figurative language is now recognized as a frequent and central component of communication. Lakoff and Johnson (1980) have gone so far as to suggest that the human conceptual system is metaphorical in nature, and that the use of metaphor affords insight into those cognitive factors that structure human experience and comprehension.

The focus of the present study was to add to this growing body of literature by examining the role of figurative language in contexts where the sharing and coordinating of cognition is a primary goal. As Resnick (1991) states, "Language not only functions to shape and constrain world views, but it also embodies tools for coordinating multiple cognitions during direct social interactions (p.9)". The study was designed to test the assumption that figurative language, specifically metaphors, similes and analogies, provides one such tool. In task oriented dialogues, where two people must work together to achieve a mutual goal, the sharing of information is critical. Figurative language can prove useful in facilitating this process.

In addition, the study examines the effect of various contextual factors on the production of figures of speech. A number of studies have shown that factors such as

mode of communication and relationship between conversants affect various aspects of language production (i.e., Chapanis, Ochsman, Parrish, & Weeks, 1972; Cohen, 1984; Fussell & Krauss, 1989; Isaacs & Clark, 1987). The present study extends this research into the area of figurative language. The interpretation of the data will be framed within the context of what has come to be known as the collaborative model of conversation.

The collaborative view

Clark and colleagues at Stanford, in a number of articles in the psycholinguistic literature, have articulated what is known as the collaborative model of conversation (e.g., Clark & Brennan, 1991; Clark & Wilkes-Gibbs, 1986). In essence, this model is built upon the idea that conversation is a collaborative effort in which participants work together to achieve the shared goal of arriving at mutual understanding. Rather than viewing conversation as a one-way process, where a speaker feeds information into a passive recipient, this model conceives of conversation as highly interactive in nature. Both participants take an active part in achieving success.

For example, when a speaker makes a reference to something, she cannot simply assume that the reference has been understood by the listener, and then move on. Rather, she will wait for some indication from the listener, who will take steps to convey to the speaker that the message has or has not been fully understood. In turn, the speaker is sensitive to this feedback from the recipient, and is expected to act on it. When it is indicated that understanding is lacking, the speaker may make additions or corrections to the message until it is clear that both parties are in agreement about what

is being discussed. While this is somewhat of an idealization, it does seem to come close to describing what happens in most ordinary conversations.

Implicit in this model is the idea that the presence of the recipient has some impact on the speaker's message. The message is not being produced in a vacuum but in the context of an interaction with another person. This dictates that the message must be constructed in a way that makes it inherently "shareable" (Freyd, 1983), a constraint that is a hallmark of "social speech" (Krauss & Glucksberg, 1977). In addition, the identity of the recipient, and his or her relationship with the speaker, will have some impact on the content of the message, a point that I will return to later.

Another fundamental component of the collaborative model is the notion of economy, which suggests that conversants will adopt strategies that minimize collaborative effort. That is to say, they will work together to define an optimal strategy for enabling understanding to be achieved with a minimum expenditure of energy and the use of as few words as possible (Clark & Brennan, 1991; Clark & Wilkes-Gibbs, 1986). For example, when making a reference, speakers will eschew lengthy, wordy descriptions in favor of briefer descriptions if the shorter descriptions can produce the same effect. It should be noted, however, that the principle adopted by these authors is a principle of least **collaborative** effort, which means that what is minimized is the work done by both participants, not merely that done by the speaker.

Empirical support for this claim is evidenced in a number of studies involving communication tasks of a type originally designed by Krauss (e.g., Krauss & Glucksberg, 1977; Krauss & Weinheimer, 1964, 1966, 1967) and later adopted with

some variation by Clark et al (Clark & Wilkes-Gibbs, 1986; Isaacs & Clark, 1987). The basic structure of the task is that two participants, who are separated by a screen, must work together to arrange a series of stimulus items in matching order, over a series of repeated trials.

Typically, a pattern emerges where over the course of trials, conversations become progressively more streamlined. Repeated references to the same object require fewer words with each successive trial. Thus, while the initial reference to an item may involve a lengthy description, subsequent references become shorter to the point where a one-word description may suffice. This point is reached collaboratively, as conversational partners make it clear through their feedback that protracted descriptions are no longer necessary.

Krauss and Glucksberg (1977) suggest that this process is a laboratory analog of the way that social groups develop specialized jargons for referring to things of interest to their group. For the sake of convenience and economy, cohorts develop shorthand descriptions for things that are frequently addressed in conversations. Of course, these "in-group" references may be meaningless to outsiders who are not versed in the jargon of the group (Schober & Clark, 1989).

Grounding

One of the most provocative ideas to come from the collaborative model is that of "grounding" (Clark & Brennan, 1991; Clark & Carlson, 1982; Clark & Marshall, 1981). In any form of communication, people make use of their common ground as a

backdrop against which references in conversation are framed, and as a context in which understanding can occur (Johnson, 1990). This fact serves as the foundation of Clark et al.'s theory of grounding. The common ground is the shared background of mutual knowledge, mutual beliefs and mutual assumptions that conversants bring with them to any given conversation.

Defining the common ground is a collaborative process. As Clark and Brennan (1991) state, grounding occurs when:

> The contributor and his or her partners mutually believe that the partners have understood what the contributor meant to a criterion sufficient for current purposes. This is called the grounding criterion. Technically, then, grounding is the collective process by which the participants try to reach this mutual belief (p.129).

Thus, conversants will take steps to insure that they are in accord with each other about what is shared; that is, that they are both "on the same page" regarding the topic at hand. If a reference is made that is understood, the addressee acknowledges this through what have been called back-channel responses (Schegloff, 1982), such as saying "yeah" or "uh huh", and the conversation may proceed. If, however, the reference is not understood, as when it refers to something that the addressee is not familiar with, the speaker must take steps to remedy the situation. This may be accomplished in different ways, such as expanding on the reference, or by replacing it with another term or description, until affirmation is signified. In this way, it becomes known what is and what is not in the common ground.

Grounding is also a dynamic process. The common ground is continuously being updated as the conversation progresses. As new information is shared, it gets added to the existing common ground. Repeated interactions between participants lead to the accumulation of a greater and greater store of shared knowledge. This means that more background knowledge can be assumed in subsequent interactions, and the need to explicate facts that have already been agreed upon diminishes.

Obviously, this parallels Clark et al.'s notion of economy. The more common ground that acquaintances accumulate, the more shared knowledge they can simply assume, with no need to make specific reference to it. Consequently, conversants can exchange fewer words and still achieve mutual understanding. This is part of what these authors have in mind when they discuss the minimization of collaborative effort.

Factors that affect grounding

In keeping with the contextualist nature of shared cognition, Clark and Brennan (1991) suggest that the process of grounding is affected by various aspects of the context in which a specific conversation occurs. In the ensuing sections, I will review various studies that give some insight into the ways that different contextual factors affect the form and content of messages and the dynamics of establishing common ground. These will include the following: characteristics of the recipient, the medium of communication, and the purpose of the conversation (which includes the nature of the task engaged in).

Audience

As numerous studies have demonstrated, speakers take characteristics of their audience into account when framing messages, and tailor the message accordingly. Factors such as the level of expertise of the recipient, shared knowledge between speaker and recipient, familiarity, and respective social status all play a part in determining what is said in conversations.

An early demonstration of this fact was provided by Kingsbury (1968). In a simple experiment, he approached people on the streets of Boston and asked for directions. For some passersby, he delivered his query in a local accent, while for others he affected a Midwestern accent and prefaced his request with the statement, "I'm from out of town". In this second condition, the directions he received were substantially different from those he received when he was perceived as a local resident. Those who thought that he was from out of town provided him with lengthy and detailed directions, including descriptions of landmarks along the route taken. In contrast, as a local he was given brief, succinct directions.

Krauss and Glucksberg (1977), in discussing Kingsbury's study, interpret his findings as suggesting that people take the assumed background knowledge and experience of their audience into account when framing a message. Thus, when Kingsbury was taken to be a local resident, a certain amount of knowledge about the local geography could be assumed which made lengthy descriptions unnecessary. In the other condition, a deficit in background knowledge was assumed, which prompted speakers to elaborate more on their directions.

Expertise

The relative level of expertise possessed by conversants can affect the message. As Isaacs and Clark (1987) note, participants in a conversation differ in the amount of knowledge they have about the subject at hand. The participant with the higher level of expertise will adjust the message to accommodate to the level of the other. Thus, when an expert is conversing with another expert about a topic they may use specialized jargon or technical terms that they would not use with a non-expert. Conversely, with a non-expert they might add details that would be omitted from a conversation with a peer.

In an experimental study, Isaacs and Clark (1987) tested for the effect of speaker expertise on references in conversations. The experimental task required one subject, the director, to describe postcards from New York City to another subject, the matcher, such that the matcher could arrange the postcards in a predetermined order. Some of the directors were native New Yorkers (experts) while others had never been to New York (novices). The same was true of the matchers. Thus, some subject pairs were composed of two experts, some of an expert and a novice, and some of two novices.

As expected, the relative expertise of participants did affect the content of messages. Conversations between experts were brief and direct. Landmarks were referred to by name, with no need for descriptions. In contrast, expert-novice pairs initially required lengthy descriptions, although over time the references became shorter. Assuming that their audience was ignorant of the geography of New York City, the director had to provide more detailed, descriptive references.

Isaacs and Clark interpret their findings in terms of a collaborative model of reference whereby participants work together to insure that what is said is understood. The authors describe a process whereby experts and novices accommodate to each other that includes three steps; assessing, supplying, and acquiring expertise. That is to say, participants who may not be familiar with each other must first determine each other's level of expertise in the course of conversation. From that point on, the more expert of the pair must provide the proper level of explanation so that the novice is to be able to understand. If the other is at a similar level of expertise, much of this will be omitted since it is unnecessary and might even be considered an insult.

Familiarity

As a general rule, one shares a greater common ground with friends and family than with strangers. A common history and shared experiences imply knowledge that strangers are not privy to, as well as a recognition that this shared knowledge exists. Consequently, implicit knowledge that can be assumed between familiars cannot be assumed in conversations between strangers, and messages are framed accordingly. With strangers we are unsure about what they do and do not know, and may need to provide more information than we do in conversations with people with whom we are close.

Thus, we find differences between messages intended for strangers and those intended for friends. For example, in an experiment using the Krauss and Glucksberg task, directors use different labels to describe unfamiliar objects depending on whether the matcher is a friend or a stranger (Fussell & Krauss, 1989). In an unpublished

dissertation, Jordan (1973) had subjects describe photographs of unfamiliar people to a partner so that they could make a match. He compared deaf and hearing subjects. By chance, not by design, the majority of the hearing subjects were strangers, while most of the deaf subjects knew each other prior to the experimental sessions. The descriptions of the deaf subjects incorporated a high degree of shared knowledge. It was common for the deaf subjects to compare the people in the photographs to people with whom both subjects were familiar, such as a mutual friend or a teacher. In Clark's terminology, they were making efficient use of their common ground to complete the task successfully.

Medium

It has been suggested that the mode of communication, the medium through which messages are being transmitted, affects the dynamics of communication. Clark and Brennan (1991) argue that different media afford different possibilities and impose different constraints on the channels through which participants may collaborate and, hence, the process of grounding will vary from mode to mode. Several studies exist to provide evidence that discourse is, in fact, affected by the context of the medium in which it is conducted.

Findings reported by Chapanis et al. (Chapanis, Ochsman, Parrish, & Weeks, 1972; Chapanis, Parrish, Ochsman, & Weeks, 1976; Ochsman & Chapanis, 1974; Stoll, Hoecker, Krueger, & Chapanis, 1976) describe numerous ways that communication differs as a function of communication mode. These authors employed an ecologically valid experimental design to assess how natural language is affected by the various

devices people communicate through. They compared subjects performance on two separate problem solving tasks across four different communication modes.

The problem solving tasks were ones that required two person teams to coordinate their efforts to reach a solution. The first of these was a geographic orientation problem, which required subjects to locate various addresses on a map. The two partners had different pieces of the needed information, and hence could not solve the problem independently thus necessitating collaboration. The other problem was an equipment assembly problem, in which one subject had instructions for assembly of a household item, and the other had the required parts. This task was also collaborative in nature.

The four modes of communication studied were designated as typewriting, handwriting, voice, and communication-rich. The typewriting mode had subjects typing messages on a computer terminal and transmitting messages via terminals located in adjacent rooms. The handwriting mode had them sending hand-written messages back and forth through a chute that connected adjoining rooms. In the voice only mode, subjects were in the same room but were separated by an opaque screen. These subjects could talk to each other but could not see each other. In the communication-rich mode, subjects were in verbal and visual contact with each other. In all modes, subjects were permitted to interact as freely as possible within the confines of the particular mode as part of an attempt to insure that language production occurred in a natural manner. On various measures, these authors found effects for both problem type and communication mode on linguistic output. The results for problem type will be discussed at a later point.

Regarding the mode of communication, Chapanis et al. reported numerous effects. The most significant differences occurred in the amount of time required for completion, with the voice only and communication-rich modes requiring far less time (roughly half the time) than the written modes (Chapanis et al., 1972). This occurred despite the fact that a far greater number of words were used in the oral modes (Chapanis, et al., 1977).

In fact, Chapanis et al. cite numerous measures that point to the greater verbosity present of oral relative to written communication. For example, on measures of number of messages, number of sentences, number of words, and number of words communicated per minute, the two oral modes had values that ranged from 6 to 19 times as great as corresponding values for the two hard-copy modes (Chapanis, et al., 1977). In addition, oral modes were characterized by a greater number of unique words used. As Chapanis et al. (1977) state, "To sum up, the oral modes of communication are very fast but extremely verbose, no matter how one measures verbosity (p.11)".

Further differences were found between the two oral modes, voice only and communication-rich. In the communication rich, face to face mode, subjects were significantly more talkative than in the voice only mode. This was true on virtually all measures of verbal output (Chapanis et al., 1977). Problems took somewhat longer to solve in the voice only mode than in face to face situations, but these differences were not dramatic.

Working from the same data set, Stoll et al. (1976) note differences in the relative proportion of different classes of words across modes. For example, subjects communicating in oral modes used more pronouns in their exchanges than did those in

the hard-copy modes. In addition, oral communicators used more function words (particles, prepositions, connectives and the like), which led the authors to remark that the written modes are characterized by a more telegraphic style and oral modes contain more redundant information. Despite this redundancy, however, the fact remains that the oral modes afforded solutions far more expediently.

A more detailed analysis of cross modal differences in linguistic structure comes from Cohen (1984). Cohen had subjects engaged in a task similar to the equipment assembly task used by Chapanis et al, in which an "expert" directed a "novice" in the assembly of a pump. He compared subjects communicating in five different modes; face-to-face, by telephone, by keyboard (linked CRT's), audiotape (non-interactive) and written (non-interactive). Cohen was particularly interested in the act of referring, wherein the expert uses a noun phrase to signify a specific object that the novice can then identify (which in this case, amounts to perceptually searching for and finding the correct part).

The key finding of this study was that the experts in the oral modes attempted to achieve more detailed referential goals than did those using keyboards. Specifically, those in the oral modes made far more use of identification requests than those using hard-copy modes. Identification requests are acts, such as questions, where experts explicitly request of novices that they provide some indication that they have identified the referent of a noun phrase. For example, an expert might state, "Do you see a part that is blue and round?", and then wait for the novice to respond. This class of acts was far more common among telephone conversants than in communication through

keyboard. In the keyboard mode, one would be more likely to encounter a phrase of this sort, "Pick up a piece that is blue and round."

Thus, Cohen concludes that mode of communication does indeed have an effect on both the form and function of discourse. His interpretation is embedded within a contextualist framework, as he states, "...the goals people achieve with language are a function, in part, of the communication situation,- i.e., of how the speaker(s), hearer(s), object(s) under discussion, and discourse itself are situated in the world (p.98)". In turn, his findings also lend themselves to interpretation within the collaborative model, a point I will discuss in more detail later on.

Further medium differences emerge in the literature on stuttering. Petrunik (1982) compared the interaction patterns of stutterers conversing on the telephone with those engaged in face to face conversations. He found that the absence of visual cues in telephone talk (i.e., cues that would indicate to a stranger that the speaker is a person who stutters) forced stutterers to alter certain interaction patterns in order to accommodate for this lack. For example, they might adopt a strategy of using oral cues in their stead.

Problem

In any conversation, the nature of the thing being discussed will affect the form and content of messages, as well as the process of grounding (Clark & Brennan, 1991). In interactions centered on problem solving, such as those occurring in the experiments

discussed thus far, the nature of the problem itself has been shown to have such an effect.

In discussing the studies of Chapanis et al. (1972), it was mentioned that in addition to varying the mode of communication, these authors also assessed differences between two problem-solving tasks; an equipment assembly problem and a geographic orientation problem. Chapanis et al. did find an effect for problem type in language output. Although the differences were not as dramatic as those for mode, some differences did emerge, and these are worth noting.

Regarding verbosity measures, Chapanis et al. (1977) found that sentences used in equipment assembly problems were longer than those used in the geographic orientation problem. In addition, there were differences in the proportion of different classes of words used in the two problems (Stoll, et al., 1976). For example, more pronouns were used in the geographic orientation problem, whereas in the equipment assembly problem the majority of nouns used were simple names of parts. Likewise, subjects working on the assembly problem used a greater number of function words (prepositions, articles, etc.) than did subjects in the geographic orientation problem.

Stoll et al. (1976) attribute these differences to the kind and amount of information available in the different problem tasks. In the assembly problem, a focal concern for solution was how the various parts related to each other, i.e., how they were interconnected or oriented to each other in space. This contributed to the greater frequency of words such as "behind", "next to", "larger than", etc., in these

conversations. In the geographic orientation problem, this information was provided to both the seeker and the source, hence its discussion was not necessary.

Differences explained: the collaborative model

Working from a collaborative model, Clark and Brennan (1991) account for differences in discourse patterns and content that occur across contexts in terms of constraints and costs associated with various communication situations. A full enumeration of these would be too lengthy to include here, but a brief summary should be helpful in establishing how Clark et al's work on grounding provides a theoretical framework for explaining cross-modal and other differences.

As mentioned earlier, Clark and Brennan argue that different media afford different possibilities and, hence, patterns of communication will vary across media to take advantage of these possibilities. The principle of least collaborative effort states that people should try to establish understanding with the minimum expenditure of energy. They do this by utilizing whatever techniques a particular medium makes available. For example, when two people are engaged in a face to face interaction, they have what Clark and Brennan refer to as "copresence", that is, they share the same physical environment. To minimize effort, a speaker may take advantage of this by simply pointing to something as a means of referring to it. This strategy bypasses the need for lengthy descriptions and establishes understanding economically.

However, were the same two people communicating by telephone, or some other non-face-to-face medium, this possibility would be not exist. Pointing would contribute

nothing to grounding, and would not be cost efficient. Thus, the speaker would have to find an alternative means of making a reference. Once again, the goal would be to do so as efficiently as possible based on the possibilities and limitations inherent in that particular medium.

Another of Clark and Brennan's constraints, which differentiates between oral and written modes, is "audibility". In oral communication, a speaker can use intonation and timing of words to convey meaning. In written communication, no such opportunity is available. Conversely, written communication affords possibilities unavailable to oral. One such is "revisability", that is, the ability to revise a message privately before sending it. We all remember instances where we have left telephone messages that we wish we could change or take back, but cannot. In written modes, the sender has a hard copy he or she can review before transmission, which makes revision more feasible.

Costs associated with different media account for differences in message construction. For example, face to face and telephone conversation are marked by what Clark and Brennan label as "delay costs", where hesitations or delays in speaking are interpreted as lack of knowledge, misunderstanding or the like. Thus, a higher premium is placed on communicating quickly, and less time can be spent formulating a message before transmitting it. A consequence of this is that spoken messages are generally "less perfect" than written ones, with less attention paid to grammatical correctness and word choice.

There are several other such costs and constraints, but the main point is clear. As we move from one communication context to another, whether that move is across modes

or people or purpose, the rules for efficient communication change. What works in one mode may fail in another. What can be assumed with one listener cannot be assumed with another. What is appropriate for one purpose may not be in another. Good communicators take these factors into account, and adjust the form and content of their message to reach understanding as efficiently as possible.

Grounding and figurative language

A review of the literature on figurative language suggests the possibility that a principal reason for using figures of speech in conversations, as opposed to literal descriptions, is to facilitate grounding. This possibility becomes clear upon the recognition of the fact that two of the roles ascribed to figurative usage are economy of words and making unfamiliar topics familiar. That is to say, metaphors and analogies, by associating a novel topic with something the listener is familiar with, provide a conduit for shared understanding. Further, they do so in an economical fashion allowing for more succinct descriptions and minimum expenditure of effort than alternative literal descriptions. A further explication of these roles, and empirical support of their importance, follows.

Economy

In his analysis of communication, Grice (1975) lays out a set of rules defining what makes for effective communication. One of these rules concerns quantity and claims that effective communication involves saying no more (or less) than is required to achieve

understanding. Figurative language often provides a way of satisfying this condition, particularly the latter portion, better than literal language. In other words, one role of figurative speech is to provide the most economical descriptions of objects, events, people or ideas. By economical, I mean getting one's meaning across using as few words and consequently expending as little energy as possible.

In some situations, figurative descriptions are more economical than parallel literal descriptions, by virtue of the fact that they can make the same point or accomplish the same goal by using fewer words to convey the same idea. References to this aspect of metaphor can be found in the work of several psycholinguistic researchers. Examples include the theoretical work of Ortony (1975) and the empirical work of researchers in communication such as Glucksberg, Clark and their collaborators.

In arguing for the importance of metaphor in communication and education, Ortony (1975) proposes a view of metaphor that may be described in terms of three theses; the compactness thesis, the inexpressibility thesis and the vividness thesis. The compactness thesis is directly relevant to the notion of economy to be put forth here. The thesis is related to what Ortony calls "particularization", a term that signifies the fact that language comprehension is largely synthetic. When we hear a particular word we pull into consciousness a number of facts associated with that word. Thus, a word might invoke in its perceiver a mental image or detailed representation based on the knowledge we have stored about the referent of the word. For example, if I were to hear a friend utter the words "my car", familiar details about his car would be called up in my mind

such as what it looks like, how well it drives, etc., without requiring him to laboriously catalog these details for my benefit. As Ortony says,

> The point and virtue of particularization is that it enables language comprehension to take place without the need for the message to explicitly spell out all the details. Even if this were possible it would be too boring and time consuming for either or both the speaker or hearer in the normal course of events (p. 47).

The compactness thesis claims that metaphor provides an extremely effective form of particularization. When using a figurative expression, one calls up a whole range of details associated with the vehicle that may then be transferred to the topic and thereby guides the sort of image that the perceiver constructs. Building on my previous example, let's suppose that when I ask my friend about his house, he tells me that it's "like his car". This may convey to me the fact that the house is old, run down and in need of paint. All of these facts, which I immediately associate with his car, are transferred to my understanding of his house. The main point here is that this was accomplished using only three words. Thus, as Ortony claims, a metaphoric description is "...quick, concise and effective and it invites and constrains the particularization of the comprehender" (p.48).

Glucksberg (1990) has made a similar point in his discussion of Krauss's studies of interpersonal communication (i.e., Glucksberg, et al., 1975; Krauss & Glucksberg, 1977; Krauss & Weinheimer, 1966). As noted earlier, these studies all involve variations on an experimental task in which two people, separated by a screen and consequently not

visible to each other, must communicate about a set of abstract, geometrical figures that do not have conventional names. This state of affairs challenges subjects to create their own descriptions for identification of the figures such that their partners can find them from among an array.

As Glucksberg notes, subjects in these tasks could employ two basic types of description, analytical (literal) descriptions or holistic (analogical) descriptions. Analytic descriptions are generally lengthier and more cumbersome, involving detailed collections of parts, whereas analogical descriptions compare the figure to a known object and refer to it as a whole. Glucksberg reports that in the Krauss studies, subjects overwhelmingly preferred analogical to literal descriptions which "enable speakers to be more efficient and more precise than they could be if they used literal language" (p.141).

Krauss and Fussell (1991), referring to the same studies, make a similar claim. As these authors state, "...figurative messages tended to be shorter than literal ones (it takes fewer words to say what something looks like than to list its geometrical elements and describe their spatial arrangement)" (p.179). In one such study (Fussell & Krauss, 1989), figurative and literal descriptions were compared on the measure of mean description length based on average number of words. Literal descriptions average about 20 words per description, compared to less than 10 words per description for figurative descriptions. Furthermore, these metaphoric descriptions became shorter with repeated use. For example, an initial description of a figure as "an hourglass shaped thing" would, over the course of conversation, be reduced to simply "the hourglass".

Clark and Wilkes-Gibbs (1986) found a similar pattern in a study that they conducted at Stanford employing a communication task modeled after Krauss's paradigmatic task. In this study, subjects showed a preference for analogical descriptions over literal ones. In attempting to account for this preference, the authors note that analogical, or holistic, descriptions involve but one concept. Literal (segmental) descriptions on the other hand, may involve many concepts and consequently require somewhat lengthier descriptions. Therefore, it requires fewer steps for the conversants to reach agreement when analogical descriptions are used.

Taken together, these studies all provide ample evidence in support of the compactness thesis and, in turn, support the notion of economy as role of figurative language. It seems to be the case that one reason figurative language is used is because it is often the most time and energy efficient way to say what one needs to say.

Making the unfamiliar familiar

Metaphors and analogies are often used by communicators who are trying to describe a person, object, event or concept that is not familiar to their audience. Their utility in these situations, and their main advantage over more literal descriptions, is that comparisons between a topic and vehicle are implicit in figurative descriptions. By drawing attention to similarities between the unfamiliar topic and something that is well known, metaphors and analogies provide a framework for understanding new concepts more easily.

This particular aspect of figurative language is perhaps the most widely noted and frequently discussed. It is often cited as a reason for the importance of metaphor in education, a context where the dissemination of new and unfamiliar knowledge is prevalent. In any situation where previously unencountered information needs to be conveyed, however, conversants may benefit from the use of a well chosen metaphor or analogy.

Figurative language and education

The primary function of education may be to increase the knowledge base of students by adding new material to that base. There is reason to believe that this is accomplished more easily when knowledge from previous experience can be accessed and applied to present experience thus creating a schema for comprehension (Schank,1986). For example, Vosniadou and Brewer (1987) accent the importance of prior knowledge for children's learning of new material. Several commentators have suggested that figurative language is an ideal tool for facilitating this process. Ortony (1975) makes this clear when he states that "The great pedagogic value of figurative uses of language is to be found in their potential to transfer learning and understanding from what is known to what is less well known" (p.53).

Empirical support of this claim can be found in the educational literature. For example, Vosniadu and Schommer (1988) used texts to teach five year old children about unfamiliar subjects (for example, how the body fights infections). Some of the children were given a text that included expository analogies which drew comparisons between

the new domain and a familiar domain (soldiers at war). Children who were provided with analogies performed significantly better on subsequent tests of recall and comprehension than children whose texts contained no analogies. In a related, earlier study, Vosniadou and Ortony (1983) reported similar findings; children who were given analogies acquired new information more readily. Given this evidence, it seems unfortunate that metaphors and analogies are used somewhat infrequently in school texts (Dixon, Ortony & Pearson, 1980).

Similar findings have appeared in studies with older children and adults (e.g., Rumelhart & Norman, 1981; Gentner & Gentner, 1983). Gick and Holyoak (1980) found that analogies based on previously learned material facilitated problem solving involving novel situations. Further, it seems that analogies may be particularly useful when the topic is of a rather abstract nature and the vehicle offers a concrete base for grounding the new material (Glucksberg, 1989). In particular, abstract concepts of the kind used in the physical sciences are easier understood when described by analogies that call up familiar experiential knowledge (e.g., Gentner,1982).

Other explanation contexts

Although the classroom may be one context in which this particular consequence of figurative usage is most salient, it is by no means the only one. Everyday conversations can also be fertile grounds for analogies that serve the purpose of making the unfamiliar more familiar (Glucksberg, 1989). One can easily recall situations, such as communicating about a person that your audience hasn't met, a place that your audience

hasn't been or an event that your audience wasn't present for, where an analogical comparison to someone or something familiar provided the listener with a sense of recognition of the topic of conversation.

Such references were common in a study done by Jordan (1973). Employing a referential communication task similar to the Krauss design, Jordan asked subjects to describe photographs of people such that another subject could find and select the correct photograph from among an array. In those subject pairs where the two subjects knew each other well, the subject giving directions often described the target analogically, by comparing the physical attributes of the person in the photograph to those of someone who was known to both parties. The degree to which these references actually facilitated recognition is unknown, but it can be assumed that they added some sense of familiarity.

Elsewhere, (Boerger & Henley, in review) I have suggested that figurative usage (specifically, analogical description) is common in the sorts of everyday conversations that involve someone who is to some degree an expert giving directions to a novice about something new and largely unfamiliar to the novice. For example, communication acts such as passing on a recipe, instructing someone how to go about repairing a household item, and/or directing someone how to find an unfamiliar location may be facilitated by the use of an analogical reference. By accessing some prior knowledge, analogies of this kind make the new information easier to digest. There is reason to believe that use of such analogies may be fairly common in these situations, but this is an empirical question.

An important issue to note is that in all such cases the assumption is made by the speaker that the vehicle used is something with which the recipient of the message is quite familiar (Glucksberg, 1989). This assumption of shared knowledge is of course critical, otherwise figurative expression will lose its usefulness. If the vehicle is unfamiliar, then the benefit of accessing prior schemas is lost. This issue becomes particularly important in the context of the literature on shared cognition (i.e., Resnick, Levine & Teasley, 1991), and in relation to "grounding" (see Clark & Brennan, 1991; Clark & Schaefer, 1987). If the assumption of shared familiarity with the vehicle is met, then the use of figurative expressions should greatly facilitate the description of unfamiliar topics.

Purpose of the present study

In light of current trends in communication, particularly the increased use of and dependence on media such as e-mail, it is important to address issues concerning the extent to which the mode through which people interact affects the content and structure of everyday interactions. The current study was designed to test experimentally how the medium of communication affects one aspect of language, the use of figurative descriptions. Given the assumption that figurative language plays an important role in efficacious communication, it is of interest to ascertain its prevalence in what is an emerging channel of intercourse, i.e., e-mail, relative to more traditional forms of intercourse such as oral and face to face conversation and to identify differences in the factors giving rise to the appearance of figures across modes. Such information could

prove useful to educators designing e-mail based instruction as well as to anyone collaborating through e-mail. Four media were used: Full copresence, face to face copresence, voice-only intercom, and interactive e-mail. Given the assumption that different media have different affordances and constraints associated with them and require different strategies and goals of people using them, it was hypothesized that the relative frequency of figurative descriptions would differ significantly across media. Previous studies have indicated that across a wide range of measures, people are far more verbose when communicating orally than when engaged in written communication. Thus, it was hypothesized that this same trend would apply to the frequency of figurative expressions of various kinds as well. Given issues of economy as they pertain to e-mail (see Clark and Brennan, 1991), it was further assumed that relative frequency rates, as opposed to raw frequency counts, may actually be greater in the e-mail mode.

It was also hypothesized that the frequency of a type of figurative description that I have referred to previously as interrogative analogies (Boerger & Henley, in review) would be affected by mode of communication. Such figures are ones that are used by people receiving instruction, and are framed as questions asked to clarify misunderstanding. Since some modes of communication provide more opportunities for asking questions than others (i.e., more opportunities of this kind in oral communication than in e-mail communication), it was assumed that frequencies of interrogative figures would be subject to modal effects, with greater frequencies appearing in the oral modes.

In addition to the frequency of their occurrence, it was further hypothesized that the ways figures are used by people, and the conversational context in which they appear,

would vary as a function of communication mode. For example, a figurative reference may represent the first attempt to describe a thing. In some cases, however, it may arise as an alternative description if the speaker decides spontaneously, or in response to some cue from the listener, that a previously offered description is inadequate (Boerger, in review). It was assumed that the dynamics of this process are subject to contextual influences. Thus, differences between modes regarding the context of metaphor use were expected.

In addition, some differences in the kinds of words used as the vehicle of the metaphoric expression were expected across modes. The vehicle of a metaphor is the familiar terms used, whose features are to be transferred to the unfamiliar thing, or topic. Thus, in the expression "John is a giraffe", giraffe is the vehicle, used to convey information about John, the topic. It seems likely that differences in context, as they give rise to differences in what is available to participants, will give rise to differences in what words will be chosen to serve as vehicles.

Finally, it was hypothesized that satisfaction with the communication would vary as a function of mode of communication. The constraints and affordances associated with varying media should serve to make some forms of communication easier and less frustrating than others. In particular, it was assumed that the lack of constraints occurring in full copresence would make it a more satisfying communication experience than that of any of the other media.

CHAPTER II

METHOD

Subjects

The subjects of this study were 160 undergraduate students from the University of Tennessee, Knoxville. Volunteers were recruited from upper level psychology courses. All participants received extra credit in these courses in exchange for taking part in the experiment. Subjects worked in pairs, with one assigned the role of expert (director) and the other that of novice (builder). This yielded a total of 80 pairs, with 20 pairs in each of four conditions representing four modes of communication.

Apparatus

Modes: The pairs communicated in one of four modes; full co-presence (both subjects were in the same room, in full view of one another), face to face co-presence (both subjects were in the same room but separated by an opaque screen, with only eye contact possible), voice only (subjects were housed in separate rooms and communicated using an intercom system), and written communication (subjects were housed in separate rooms and communicated using interactive e-mail). The intercom system used in the voice only condition was a two-way radio system. With this device, only one participant can speak at a time. This allowed for interactive exchanges, but not simultaneity of

speech. Subjects in this condition were housed in separate rooms, approximately 30 feet apart.

Subjects in the written communication condition used an interactive form of e-mail known as "talk", in which typed messages appear simultaneously on a split screen. Subjects in this condition occupied rooms approximately 30 feet apart, equipped with computer keyboards and monitors.

The voice only and face to face copresence conversations were recorded by placing a tape recorder in the room with the director, which allowed both conversants to be taped. Face to face interactions were videotaped. Printouts of the e-mail interactions provided hard copy transcripts of conversations in that condition.

Problem task: In choosing a task for the experiment, consideration was given to issues of ecological validity. It was important to choose a problem that simulates problems of a type typically encountered in real world experience, specifically those in which an expert gives instructions to a novice. Thus, the problem task should be one that has practical, everyday significance and consequently lacks the artificiality often found in the tasks used in studies of communication. Additionally, the problem should be one with clear, easily definable goals and a definite solution that can be reached in a reasonably short period of time (i.e., within one hour). Borrowing from Chapanis et al. (1972) and Cohen (1984), an equipment assembly task that meets all of these criteria was used.

The equipment assembly problem required the two partners to work together to build a hibachi grill, a common household item requiring some assembly. The hibachi

is complicated enough a design that it would be difficult to build without directions but can be successfully assembled in a reasonably short time with directions. The set of instructions given to each director is a set of step by step illustrations of parts and assembly, along with a list of contents, provided by the manufacturer. The only tool required to build the grill is a standard screwdriver.

Procedure

Experts were required to attend two sessions, scheduled on consecutive days. In the first session, the expert was given a brief training session on how to build the hibachi grill. Experts were provided with illustrated directions, the actual parts, and tools. They were allowed to assemble, disassemble and reassemble the device a suitable number of times until they felt they had mastered the procedure sufficiently and were confident that they could explain the procedure to another person. This session was monitored by the experimenter, who answered subjects' questions and checked their work for errors but did not otherwise verbally instruct them. When subjects felt confident in their mastery of the task, they told the experimenter how to assemble the grill in order to demonstrate expertise.

In the second session, each "expert" was paired with a "novice" partner. Experts and novices were recruited from different classes, and in the majority of cases were not known to each other. Each partner was briefed on the nature of their job role. Both partners were informed that they could talk freely, with no constraints placed on their conversation. Experts in the face to face condition were given only one restriction, that

they not physically handle the parts at any time. Participants were told to take as much time as they needed to work on the problem, and were asked to work the problem through to completion. They were given the following instructions:

For directors;

> You are to work with your partner to build a simple device. You have been provided with the directions for assembly, and been trained in the assembly of this device. You will now be asked to provide your partner with instruction while s/he builds it. Your partner has all the required parts and tools, but no directions. You may use the set of directions you have been given as a guideline, but do not simply read them verbatim in your instruction. You may say anything you want in order to get the job done. You may ask your partner questions, and answer your partner's questions freely. Take as much time as you need, but please work the problem through to completion.

For the builder;

> You are to work with your partner to build a simple device. Your partner has the directions for assembly, while you have all the required parts. All the tools you will need are here for you. You may ask your partner any question you want at any time. Take as much time as you need, but please complete the problem.

The directors had the required parts handy (except in the full copresence condition), as well as a copy of the instructions for reference, so they could work through the problem with the builder while instructing. The builder had only the parts and tools for assembly. In addition, both subjects were given instructions relating to the

use of the various media for communication (i.e., how to use the intercom or keyboards, etc.). Subjects using e-mail varied with respect to their typing ability, but all were sufficiently competent typists to perform the task with little or no difficulty.

Upon completion of the task, both subjects filled out a brief questionnaire which asked them to evaluate the effectiveness of the communication (both their own and their partner's), the ease of communication, and how satisfying or frustrating the communication was. The survey consisted of four questions, using a Likert scale format. This provided a measure for comparing ease of communication across media. Also, at this point the experimenter made note of any errors in the builder's finished product (i.e., pieces used in the wrong place or wrong orientation, wrong type of screws used to secure a piece, etc.).

Transcribing the data

All conversations from each of the oral modes, which were tape-recorded or videotaped, were transcribed from tapes into written form by student transcribers. This step facilitated the analysis of data. Protocols from the written (e-mail) mode, which were typed on computer keyboards, were printed, and these print-outs provided the transcripts for analysis.

As others have noted, the conversion of oral interactions to written form for use as data is not entirely free of problems (e.g., Ericsson & Simon, 1984). In converting oral conversation to written transcripts, some useful information is invariably lost. For example, voice inflections and other paralinguistic devices that are important contributing

factors in establishing the context and meaning of a particular utterance are, in Ericsson and Simon's words, "..usually ignored or imperfectly encoded in punctuation (p.275)" by transcribers. Chapanis et al. (1997) cite similar problems in their study and conclude that even fundamental issues, such as defining what constitutes a word or a sentence, and whether a particular sentence is interrogative or declarative, can present difficulty for the transcriber.

These issues are particularly problematic in protocols of the type developed in the present study where the coding of certain statements as questions was important. In conversation, this information is usually conveyed by the use of intonation. Thus, in transcribing the protocols, it was important that the transcribers be sensitive to such issues when performing their duty. Specifically, experienced transcribers (in one case, a woman who had been employed for some time as a transcriptionist, in others, undergraduate students who had done transcriptions previously) were used insuring better quality of transcription. In addition, as a further quality control, a subset of the tapes were reviewed by the principal investigator and checked against transcripts for accuracy. Consequently, while the resulting protocols cannot be considered completely veridical data they do constitute a fairly accurate representation of the actual conversations.

Dependent variables

The outcome measures of interest were the production of various types of figurative expressions. These are defined as references which attempt to draw attention

to similarity between the object of reference and some other thing. Technically, figurative language is comprised of numerous categories. Barlow, Kerlin and Pollio (1970), for example, identify fourteen different categories. For the purposes of this study, the majority of these types (i.e., categories like irony, onomatopoeia, etc.) are not considered to be particularly relevant. The decision to exclude these categories may appear somewhat arbitrary but the purpose of the study was to address the role of figurative language in a context involving explanation, and studies of this nature have generally focused on metaphor, analogy and simile as representative of figurative language. Thus, not all figures of speech were counted, but only those that fall within the categories of interest to this study; metaphors, analogies and similes. Guidelines for identifying these were those outlined by Barlow et al. (1970) in their training manual for identifying figurative language, developed for the University of Tennessee Metaphor Research Group. In describing metaphor and simile, Barlow et al. state that they "...function by making an explicit or implicit comparison or conjunction of two disparate ideas that share some common, though often highly imaginative feature (p.4)". In metaphors, the comparison is implied, as in the expression "John is an elephant". In similes, the comparison is made explicit through the use of words such as "like", "as" and "as if". For example, "John eats <u>like</u> an elephant". The authors do not specifically include the category of analogies in their manual, but other authors (i.e., Gentner, 1982) have suggested that analogies function as a type of metaphor. Thus the inclusion of analogies as data is not considered to be problematic.

In the tabulation of data, no distinctions among the above mentioned types were scored; all were collapsed into a single category. Within this general category of figures of speech, distinctions of a different nature were noted and a brief description of these categories follows.

Interrogative Figures

In a previous paper (Boerger & Henley, in review), I have made note of the fact that in conversations of the type of interest in this study, it is often the case that the person receiving instruction asks questions that are framed as analogies. For example, when the instructor refers to something unfamiliar to the instructee, that person may, in the course of attempting to establish mutual ground, inquire of the instructor, "Is it like ....?", or "Does it look like...?". These figures, (i.e., those used by the instructee and framed as questions), were labelled as interrogative analogies.

Unique Figures

Unique figures, in the present study, will be understood to mean figures that are unique only in terms of their use in the current context. That is to say, the first appearance of a particular figure will be scored as a unique figure. Subsequent uses of the same figure will not. Each new figure that appears in a particular protocol is scored as a unique figure (i.e., unique to that speaker). Thus, we may have two protocols that have the same or similar total number of figures used but different number of unique figures used (if, for instance, one of the protocols includes several uses of the same

figure to refer to the same object at different times, and the other includes different figures used to describe different objects, or different figurative descriptions of the same object). Unique figures, in this sense, are not intended to mean the same thing as novel figures, as defined by Barlow et al (1970).

Selection of Figures

Decisions concerning the identification and scoring of figurative descriptions were made by two independent raters. Their selections were made on the basis of a procedure originally developed by Barlow et al. (1977) for identifying figurative expressions in written transcripts. Each rater underwent a brief training session using Barlow et al's procedure for identifying figurative language of the type of interest in this study (as previously mentioned, several categories of figurative language identified by Barlow et al were excluded from the present study). Upon completing their training, raters independently reviewed copies of the transcripts, circling any expressions that they identified as being figurative, based on established criteria. The principal investigator compared the transcripts of the judges, and only those expressions selected by both judges were included in the final count. To assess inter-rater agreement, a Cohen's Kappa was performed on the judges' ratings, and a score of .70 was obtained. This score reflects a moderate level of agreement between raters, though ideally, a higher level of inter-rater agreement would have been obtained. Failure to do so is in large measure a reflection of the fact that one of the raters was more familiar than the other with the parts used in building the hibachi. Thus, some references that were identified

as figurative by one rater were recognized by the other as being the ordinary label used to name the parts provided by the manufacturer, and were not labelled as figurative. This points to the importance of context in determining whether a given expression should be considered figurative or not, a factor that can often be problematic in identifying figures of speech.

CHAPTER III

RESULTS

Word Counts

Previous studies (i.e., Chapanis et al., 1972; 1977) have found an effect for mode of communication on verbosity across a number of measures, including overall word counts. This trend held true in the current study. Results of an Analysis of Variance found a significant effect for mode of communication ($F\ 3, 156 = 18.45$; $p < .001$) on number of words used by subjects (see Table 1). Because of the large standard deviations obtained, which were a consequence of differences within groups between experts and novices, the data was subjected to a transformation and another analysis conducted (see Appendix A). The transformation involved deriving mean scores for experts and novices, and transforming individual scores into a percentage of those means. The resulting scores differed little from those derived in the original analysis, although the F score was somewhat higher. Between mode differences were not affected.

The previously cited studies reported that the oral modes were more verbose than written communication, with face to face communication (referred to as full copresence in this paper) being the most verbose. This pattern held in the current study, save for one exception. While subjects in two of the oral modes, voice only and face to face copresence, used more words than subjects in the written mode, (intercom, $\underline{M} = 734.7$; face to face copresence, $\underline{M} = 866.8$; written, $\underline{M} = 310.9$), the full copresence condition

Table 1. Number of words by mode

Mode	Means	Standard deviations
1. Intercom[a]	734.7	596.11
2. Face to face[a]	866.75	617.25
3. Written[b]	310.93	207.56
4. Full copresence[b]	237.2	234.97

[a] Differs significantly from modes 3 and 4 as determined by Tukey HSD at .05

[b] Differs significantly from modes 1 and 2 as determined by Tukey HSD at .05

produced the least verbose protocols of all four conditions (M = 237.2). The reasons behind the low number of words used in the full copresence mode will be discussed later.

Frequency of Figurative language

One of the goals of the current study was to ascertain if frequency of figurative speech in the study's experimental context compared with rates found in other communication contexts. Pollio, Smith, & Pollio (1990) report that speakers in a variety of contexts, such as political speeches and psychotherapy sessions produce an average of about 5 figures of speech per 100 words spoken. These authors cite these rates as evidence that figurative speech is a more commonly occurring phenomenon than classical theories of linguistics and cognitive psychology would suggest. The rates produced in the current study are somewhat less than those reported by Pollio et al. as speakers in the present context produced on average roughly three figurative expressions per 100 words. The reasons for this difference will be discussed at a later point. Since one of the primary purposes of this study was to determine if the frequency of figurative expressions (across all categories) varied as a function of mode of communication, mean values were computed for all conditions (intercom mode, M = 23.5,; face to face co-presence mode, M = 29.3; written mode, M = 11.5; full co-presence mode, M = 5.5). Although an Analysis of Variance found significant differences between modes for the frequency of figures used (F 3, 156 = 13.32; $p < .001$), simply looking at overall frequencies does not provide the most powerful assessment of differences, given the fact that oral modes are, as a rule, more verbose than other modes. A more meaningful

measure would be the relative frequency of figures used. If figures of speech account for a greater or approximately equal percentage of the overall word count in the written mode than in the other modes, this would say something interesting about the relative importance and utility of figures in this medium. For this reason, it was decided that rather than comparing raw frequencies, it would be more useful to look at differences in frequency rates. The rate chosen was number of figures per 100 words spoken.

An examination of Table 2 reveals that the mean rates (figures per 100 words) for the four modes were as follows: Intercom mode, $\underline{M}$=2.99, Face to face copresence mode, $\underline{M}$=3.171, full copresence mode, $\underline{M}$=1.535, written mode, $\underline{M}$= 3.198. An Analysis of Variance was used to test the hypothesis that relative frequency would differ significantly across modes, and the results of this test confirm the hypothesis that the various modes differ significantly from one another ($F, 3, 156 = 10.42, p < .001$). An examination of the means in the four conditions would seem to suggest that the difference is primarily accounted for by the low relative frequency of figures in the full copresence mode. A Tukey test found the only significant difference was between the full copresence mode and each of the other three modes; differences among all remaining three modes are slight. Once again, the data was subjected to the transformation described above, with little difference from the original analysis resulting.

Table 2. Rate of figurative expressions by mode

Mode	Means	Standard deviations
1. Intercom[a]	2.99	1.25
2. Face to face[a]	3.17	1.19
3. Written[a]	3.20	1.98
4. Full copresence[b]	1.54	1.7

a Differs significantly from mode 4 as determined by Tukey HSD at .05

b Differs significantly from modes 1, 2, and 3 as determined by Tukey HSD at .05

Interrogative Figures

As indicated earlier, interrogative figures refer to figures produced by the novice and posed as questions, used in an attempt to establish agreement or clarify misunderstanding. Some examples follow:

From face to face interaction:

Expert: Okay, then you take two things ....I don't know what they are called.

Novice: Look kinda like stars?

Expert: Yeah.

From Voice Only interaction:

Expert: " Ok. You want to attach...they're two large metal grates. They're silver, you know what I mean"?

Novice: "What do they look like"?

Expert: "They are approximately...oh, shucks, they're 7 inches by 10 inches in diameter".

Novice: "Like an oven rack"?

Expert: "Yeah, right".

From written interaction:

Expert: "O.K. find the wood handle plates...silver"

Novice: "Four L-shaped things"?

Expert: "yes"

Looking at raw frequency counts, the rates across all four modes were as follows: Intercom mode, $\underline{M}$ = 2.10, sd = 1.683; Face to face copresence mode, $\underline{M}$ = 4.250, sd

= 3.864; full copresence mode, M = .150, sd = .671; written mode, M = 1.150, sd = 1.309. An Analysis of Variance found significant differences between the four modes for frequency of interrogative analogies (F 3, 78= 12.293, p <.001). In addition, rates of interrogative frequency per 100 words were calculated and compared (see Table 3). These rates were as follows: Intercom mode, M = .71; face to face copresence mode, M = .83; full copresence mode, M = .03; written mode, M = .68. An ANOVA for frequency rates of interrogative analogies also found significant differences among conditions (F 3,78 =8.28; p < .001). Once again, Tukey tests established that the only truly significant inter-modal differences were those between the full copresence mode and the other three modes.

Unique figures

In looking at use of figures in individual transcripts, it was generally the case that once a given figure was introduced by either the builder or director, it was used repeatedly throughout the conversation to make subsequent reference to the same part. For example (from the intercom mode):

E: Okay, now you need to find , there should be a small little metal piece with kind of, it looks like a belt buckle. There should be a metal piece that looks like a belt buckle.

N: Right.

Table 3. Rate of interrogative analogies by mode

Mode	Means	Standard deviations
1. Intercom[a]	.7	.51
2. Face to face[a]	.8	.54
3. Written[a]	.6	.79
4. Full copresence[b]	.0	.12

[a] Differs significantly from mode 4 as determined by Tukey HSD at .05

[b] Differs significantly from modes 1, 2, and 3 as determined by Tukey HSD at .05

At a later point in the same conversation, the expert refers back to this expression.

E: Okay, so what you need to do is you need to put the little metal piece inside the belt buckle.

The fact that repeated uses of the same figure accounted for a great deal of the frequency of figures produced led to the introduction of another category for analysis, which I will refer to as unique figures. By unique, I mean unique to a specific protocol, not to all protocols. Thus, the first time a figure is used by either subject in a given protocol, it is labelled as a unique figure, with subsequent uses of the same figure in the same conversation not so labelled. In other words, unique figures refer to the number of different figures used by both subjects in a given protocol. This provides an index of the variety of figures used, as opposed to simply the number of figurative expressions produced. An ANOVA indicated that the number of unique figures generated by subjects varied as a function of mode of communication ($F_{3,156} = 4.29$, $p < .01$). The greatest variety of figures occurred in the intercom and face to face copresence modes (intercom, $\underline{M} = 3.58$, sd = 3.52; face to face copresence, $\underline{M} = 3.83$, sd = 3.55). The least variety of figures, as expected, was found among those communicating in the full copresence mode ($\underline{M} = 1.65$, sd = 2.14). While the mean number of unique figures in the written mode was slightly less than that for the intercom and face to face modes ($\underline{M} = 2.58$), it did not differ significantly from these modes (see Table 4). Again, with this variable, a transformation of the data was performed, which had little affect on the outcome (see Appendix A).

Table 4. Unique figures by mode

Mode	Means	Standard deviations
1. Intercom[a]	3.58	3.52
2. Face to face[a]	3.82	3.55
3. Written	2.58	2.73
4. Full copresence[b]	1.65	2.14

[a] Differs significantly from mode 4 as determined by Tukey HSD at .05

[b] Differs significantly from modes 1 and 2 as determined by Tukey HSD at .05

Noun based and verb based figures

Within the category of figurative references, a further distinction may be made between figures incorporating nouns (i.e., those used to describe objects or parts), and those incorporating verbs (i.e., used to describe actions or orientation of parts). An example of the former would be to describe a particular part as "a penguin", or to say that it "looks like a leaf". An example of the latter would be when a part is described as "standing", or two parts are described as "facing" each other. For the present section, these two categories will be treated separately.

Nouns as figures

All told, across all four modes, a total of 105 different nouns were used as figurative descriptors of the various parts used in the hibachi. Of these, only 11 descriptions were used by subjects in all four modes. Of the remaining descriptors, six were used in three of four modes and 17 were used in two of four modes, while the majority were unique to one of the four modes (used by one or more subjects but exclusively in a particular mode), (see Table 5).

The primarily oral modes had the most descriptors unique to subjects in a particular mode. The full copresence mode had nine descriptions unique to that mode, the E-mail mode had 15 such descriptions, the face to face copresence mode had 22, and the intercom mode had 25.

Table 5. Nouns used as figures

Appearing in 4 modes	Appearing in 2 modes	
door	bathtub	lip
head	bullets	prongs
"L"	"C"	rails
leg	clamp	screen
pan	ears	spatula
stands	feet	vent
star	frame	
vent	hinge	
windows	holder	

Appearing in 3 modes

body

dish

ladder

plate

Table 5 (continued)

Appearing in 1 mode

ankle	eyes	nail	towers
appendages	finger	pad	trap door
arms	flags	penguin	wagon whells
bars	flap	platform	
base	flower	props	
belt buckle	foundation	rafters	
bin	frying pan	rings	
bowl	gate	rods	
box	gear	ruts	
bubble	grates	skillet	
bucket	gymnastics thing	soccer goals	
bracket	headstone	spear	
cartridge	horseshoe	spokes	
clip	hurdles	spools	
dime	jump rope handles	stick	
disc	lawn chair legs	table leg	
dish washing rack	leaf	teeth	
drawers	ledges	tennis racket	
"E"	license plate	throwing star	

Of those descriptors that were universal, two in particular, "tray" to describe one piece and "legs" to describe another, were most prevalent. In other words, these were the two most commonly used descriptors in all four modes.

The intercom mode had 54 different figurative descriptors. The most commonly used,"tray", appeared in 15 of 20 transcripts. The next most commonly used was "legs", appearing in 10. Thirty six of 54, or 67%, appeared in only one of 20 transcripts.

The face to face copresence mode had 51 different descriptors. The most common were "legs" and "tray", appearing in 15 of 20. Thirty six of 51, or 71%, appeared in only one of 20 transcripts.

Subjects in the e-mail mode used a total of 38 different descriptors. The most common was "legs", appearing in 15 of 20 transcripts. Twenty two of 38, or 58%, appeared in only one of 20 transcripts.

Full copresence had 27 different descriptors. The most commonly used were "tray" and "legs", appearing in 11 of 20 transcripts. Sixteen of 27, or 60%, appeared in only one of 20 transcripts.

Verbs as figures

The figurative use of verbs showed much more stereotypy than did the nouns. A total of 37 different verbs were used to describe various actions (see Table 6). Of these, eight appeared in all four modes, seven appeared in three of four modes, six appeared in two modes, and sixteen were unique to one mode.

Table 6. Verbs used as figures

Appearing in 4 modes	Appearing in 2 modes
catch(ing)	fold(ing)
clip(ping)	match
face(ing)	rest(ing)
hold(ing)	snap(ping)
hook(ing)	stay(ing)
lay(ing)	want
line up	Appearing in 1 mode
sit(ting)	branch(ing)
stand(ing)	collect(ing)
stay(ing)	come(ing)
	fall(ing)
Appearing in 3 modes	flare(ing)
go(ing)	grip(ping)
hang(ing)	lock(ing)
point(ing)	look(ing)
run(ning)	push(ing)
touch(ing)	reach(ing)
	spread(ing)

Face to face copresence had the greatest number of different verb figures, with 26. The most commonly used were some variation on face or facing (i.e.,"facing each other", "facing out"), appearing in 19 of 20 protocols, and stand (or standing) appearing in 14 of 20. Ten of the 26, or 38 % appeared in only one of 20 transcripts.

Subjects in the intercom mode produced 20 different verb figures. "Facing" was again the most popular, used by 18 of 20 pairs of subjects, followed by standing used by 15. Ten of 20, or 50 %, appeared in only one of 20 transcripts.

Subjects in the e-mail mode used 18 verbal descriptors. Sixteen of twenty subject pairs used some form of "facing", making it the most commonly used in this mode as well. Seven of the 18 descriptors used, or 39%, appeared among only one of 20 subject pairs.

The full copresence mode produced 17 different verbal descriptors. Of these, "stand" was the most commonly used appearing in 12 of 20 transcripts, while "face" appeared in 11 of 20. Seven of the seventeen, or 41 %, were unique to one pair of subjects.

The use of body-based metaphors

In reviewing the variety of metaphors chosen by subjects to describe both parts and actions or orientations, it seems apparent that the human body serves as an important source of metaphorical relations. In looking at the collection of noun based figures, there was a slight trend for a greater number of body metaphors in the oral than in the written modes. In the face to face copresence mode, 10 of 51 figures used, or 20 %, concerned

figures involving reference to the body or some body part (i.e., "legs", "feet", "ankles", "head"). In the full copresence mode, six of 27, or 22 % were body references. In the intercom mode, six of 54 figures used, or 11 %, were body oriented. In the written mode, four of 38 figures, or 10 % were references to body parts.

In regard to verbal figures, body metaphors are those that allude to physical activity centered around the body (i.e., touching, facing, sitting). In each of the four modes, these metaphors accounted for a large percentage of the variety of metaphors used. In the intercom mode, they accounted for ten of 20 figures used, or 50 %. In the face to face copresence mode, they constituted 12 of 26 figures used, or 46 %. In the full copresence mode, seven of 17 figures used were body oriented, or 41 %. In the written mode, seven of 18 figures used, 39 %, were centered around bodily activity. Once again, a slight trend exists in which such metaphors are more prevalent in the oral modes than in the written mode.

Context of appearance

As reported in a previous paper (Boerger & Henley, in review), figurative descriptions can arise in a number of different ways. They may represent the first description offered of a thing, as in the following example from the face to face copresence mode:

E: ...OK, now you're going to put on your ladder looking things.

Alternatively, they may represent a supplemental description offered as an addendum to a more literal description (to be referred to here as supplemental figures), as in the following example from the intercom mode

E: Okay, take the adjustable draft control plate. It's a little silver thing that has two places for screws on the ends...it looks like a picture frame.

Finally, figurative descriptions may arise when the expert has tried a literal description that is not fully understood by the novice, and then offers an alternative, figurative description in response to that uncertainty (to be referred to here as response figures), as in the following example from the face to face copresence mode:

E: ...there's a little silver piece that fits into it.

N: There's a silver piece?

E: Yeah, silver piece that's a little door that slides.

N: OK. I got it.

It was assumed that the two latter types would appear more frequently in the oral modes than in the written and full copresence modes. An ANOVA did show an effect for mode on figurative descriptions of this type (supplemental figures, $F = 3, 156 = 5.85$, $p < .001$; response figures, $F\ 3, 156 = 4.174$, $p < .01$) consistent with the hypothesized relation.

Effects of mode on satisfaction with communication

As previously indicated, a four item, Likert scale survey was administered to subjects upon completion of the task to assess the degree to which they found the

exchange satisfying. The highest possible score on this survey (indicating the most satisfaction) was a 20. The four modes were compared to evaluate differences between communication settings in subjects' satisfaction. The mean scores were as follows: Intercom mode, $\underline{M}$ = 15.850; Face to face copresence mode, $\underline{M}$ = 15.375, full copresence mode, $\underline{M}$ = 17.225; written mode, $\underline{M}$ = 16.275. An ANOVA found significant differences between modes ($F\ 3, 156 = 2.746$, $p < .05$). However, a Tukey test found that the only significant difference between group means was that between the face to face copresence mode and the full copresence mode.

Relation of figurative usage to satisfaction

Analyses were carried out to determine if there was a relationship between the number of figures used and the degree of satisfaction with the communication. A Pearson correlation was employed to ascertain the degree of the relation between both rate of figurative language and satisfaction and number of interrogative figures and satisfaction. Both correlations were small and in a negative direction (For rate of figures used, $r = -.03$; for interrogative figures, $r = -.17$).

CHAPTER IV

DISCUSSION

The major goal of the current study was to demonstrate how different modes of communication affect the use of figurative language. Specifically, it was hypothesized that the mode of communication would affect the frequency of figurative language usage as well as the context of appearance of figures of speech, and the types of terms used as figures, as it has been found to affect various other linguistic measures in previous studies (i.e., Chapanis et al., 1972;1977; Cohen, 1984). These hypotheses were supported with some level of success.

The assumption of modal differences in figurative usage is driven by the model proposed by Clark and Brennan (1991), whereby it was assumed that modal effects would reflect the fact that different media afford different opportunities and impose different constraints on their users, and thus communicators working in the various modes would adapt their attempts to establish common ground in accordance to what the environment does or does not afford them, including their use of figurative language as a means of "grounding". Results will be discussed in reference to this model.

As stated earlier, the rates of figurative usage appearing in the current study, while not quite as great as in other realms of communication, were comparable to those reported by Pollio et al (1991). Had a less narrow definition of figurative language been used, including categories such as irony and personification for example, the rates may

have equalled or exceeded those found in previous studies. Thus, it can be argued that figurative language proves useful to experts instructing novices in a building task. However, this utility is contingent upon the mode of communication, for the reasons stated above.

Considerable evidence was presented demonstrating context effects on the frequency and context of figurative expression. Significant differences between modes on a number of measures were found. This is consistent with findings reported by other authors (i.e., Cohen, 1984; Chapanis et al., 1972; 1977) indicating that mode of communication effects various linguistic variables. In contrast to the aforementioned studies, however, the greatest source of variance seems to be the difference between the full co-presence mode and those providing lesser degrees of co-presence rather than between written and oral modes. This argues for a greater effect of the lack of a shared visual field on the eliciting of figurative descriptions, demonstrating that full co-presence affords communicators opportunities lacking in other modes, and further showing how figures of speech provide a tool for establishing common ground in the absence of these opportunities.

As hypothesized, frequency of figurative usage varied as a function of mode of communication. The results indicate that the primary differences between modes regarding the frequency of figurative descriptions are accounted for by the low rate of occurrence of these descriptions in the full co-presence mode. Direct observation of subjects communicating in this mode offers some insight into the reasons for this effect. The fact that subjects in this group were in full view of each other, and of each other's

visual field, made the use of descriptions of any kind largely unnecessary. That is to say, rather than describing objects, either figuratively or literally, subjects could simply point to, or nod at the object, which in fact they did the majority of the time. This strategy has the advantage of economy, and left little margin for error. Having a shared perceptual field also eliminated the need to use verbal feedback as a means of monitoring progress, and identifying and correcting mistakes. Such concerns were directly present to the expert. These factors were the most important reasons for the overall lack of verbosity in the full co-presence condition and for the low rate of figurative usage, across all categories of figures, in this mode. Since subjects working in this mode were afforded the opportunity to accomplish grounding with a minimal expenditure of energy, they chose to take advantage of this opportunity, foregoing verbal descriptions.

The difference between the full copresence mode and the other modes cited above points to one niche filled by figurative descriptions in the other modes. In conversations that do not afford the expert opportunities to guide the perceptions and actions of the novice with nonverbal behaviors, such as pointing to an object, metaphors and similes seemed to serve as a linguistic analog for these behaviors and help their user achieve the same goals. In other words, figurative descriptions allow a speaker to use language to guide the perceptual and motor activity of another when a shared visual field is lacking. Consistent with Clark and Brennan's model, when subject encounter a constraint imposed by the mode of communication, they adopt a strategy that is the most effective at promoting "grounding" given said constraints.

Verbrugge notes this role of metaphor in a 1985 paper addressing the relationship between language and direct perception. As Verbrugge states "The relations between metaphoric language and event perception can be considered in three contexts (which are admittedly only partially separable): the role of metaphor in guiding "virtual experience", its role in preparing a person for direct perception, and its role in preparing a person for coordinated movement (action)" (p. 167). The first of these contexts refers to dreams and related experiences and is not relevant here. The other contexts, however, directly relate to the experience of an expert attempting to instruct a novice in the performance of an activity or the acquisition of a new skill. According to Verbrugge, metaphors and similes facilitate this process by accessing an existing schema for the novice, elements of which may be transferred to the current context.

The role of metaphor as a means of preparing a person for direct perception was the role most often encountered in the present study. By describing a piece as looking like something that the novice was familiar with, experts by and large were directing the perceptual activity of the novice toward finding an unfamiliar part from among the array of available parts. The related role of directing the motor activity of novices, while less prevalent, was found as well. The following example is illustrative of this function.

Expert: "You should have it where its kind of like a tray, like a lunch tray like you get over in 'Rafter's '. You should have it sitting in your lap like that."

Yet another example, where two parts were referred to at an earlier point in the conversation as looking like soccer goals, and now the novice has made a query about what her orientation to these parts should be.

Expert: "If you're gonna kick a goal, like as if you're running to the goal". In both examples, the expert is accessing a sensorimotor schema to guide the novice's motor activity with the use of a metaphor or simile. In this way, the use of metaphor is directed toward establishing grounding.

Among the three modes other than full copresence, it is interesting to note that the highest rate of figures used occurred in the written, or e-mail mode. The reasons for this trend may be related to the previously cited issue of economy. Clark and Brennan (1990), in comparing e-mail communication and telephone conversation, make the following observation:

> Over the telephone, it doesn't cost much to produce an utterance or change speakers. On a keyboard, it costs much more. So to minimize these costs, tutors and students on a keyboard might seek and provide evidence after larger constituents; that is, they should try to do more within each turn than they would over the telephone (p. 146).

Essentially, what these authors are arguing is that e-mail communicators try to accomplish as much as telephone conversants while saying less. This argument is framed within their notion of costs associated with different media. In this case, it relates to what they term production costs. It takes more effort to produce words when typewriting than speaking. Consequently, according to these authors, "People are willing to use more words talking than in typewriting to accomplish a goal " (p.143).

E-mail communicators are able to be more selective in their use of words by virtue of the fact that they can deliberate more on the content of their message before

actually producing it than can telephone conversants. As Clark and Brennan note, the cost of delaying a message is greater in telephone conversation than in e-mail communication. In addition, those communicating by e-mail may revise their message before sending it, something that telephone conversants are less able to do. Taken together, these factors allow e-mail communicators to better economize while framing their message.

The need for greater economy endemic to e-mail communication translates into a greater reliance on figurative descriptions. As Ortony (1975) notes, figurative descriptions are more economical than corresponding literal descriptions because metaphor "...enables language comprehension to take place without the need for the message to explicitly spell out all the details " (p. 47). Less details translate into less wordy descriptions. Consequently, it makes sense that the medium in which the need to minimize word production is greatest would be the medium in which the highest rate of figurative usage occurs.

As predicted at the outset, frequency of interrogative figures also varied as a function of medium. The low frequency of interrogative figures in the full copresence mode was largely attributable to the factors mentioned previously. That is, the function they served was accomplished by pointing and other nonverbal means available to novices in that condition. In other words, grounding could be achieved most economically without the use of words in this condition, and subjects acted accordingly. Of the remaining modes, subjects in the e-mail condition used the fewest interrogative figures. This trend is probably due to the costs associated with interrupting and asking questions

in e-mail relative to oral conversation. Clark and Brennan (1991) suggest that the cost of changing speakers is greater in e-mail and other written modes than in oral conversation. Consequently, novices in this mode show greater conservatism about interrupting with a question of any kind, including those framed as figures, than novices in oral modes.

The lower frequency of interrogative figures in the e-mail mode is also consistent with a pattern discovered by Cohen (1984). In Cohen's study, experts instructing over the telephone were more likely than those communicating with keyboards to produce what he termed identification requests, where the novice is asked to identify if they see or have a certain part handy. For example, asking a subject, " Do you see a small tube? " as opposed to instructing her to " Pick up the small tube ". Identification requests seem more likely to elicit a response of some kind, including interrogative figures, thus favoring a higher frequency of such figures in the voice only and face to face copresence modes.

Evidence was accumulated to support the prediction that mode of communication would affect the context of appearance for figurative descriptions. The reasons behind these differences are what one might expect working from the model provided by Clark and Brennan (1991). Figurative expressions that arise as add-ons to a literal description, or as alternatives to a previously offered literal description, may in some sense be considered repairs or self-corrections by the expert. As such, their higher frequency of occurrence in the oral modes than in the written mode is consistent with Clark and Brennan's theoretical model. As these authors note, the cost of making repairs is higher

in written communication than in audible conversation. Also, as previously mentioned, written communication affords its users more opportunities to revise messages before sending them, thus minimizing the need to institute repairs.

The higher frequency of unique figures encountered in the oral modes is consistent with findings in previous studies such as those done by Chapanis et al. (1972; 1977). These authors found that subjects communicating in oral modes produced a greater number of unique words than did those in written modes. In addition to simply reflecting greater diversity in oral versus written speech, other factors may have contributed to the differences in unique figures. First, it is possible that they reflect the greater frequency of questions asked by novices in the oral conditions. More questions may have been interpreted by the experts as a request to provide alternative descriptions, such as another figurative description. Additionally, experts in the oral modes may not have remembered how they originally referred to a part, and consequently may call it something different at a subsequent point in the conversation. Experts in the written mode had the advantage of having a record of earlier communication displayed on the computer screen, which they could refer back to, thus contributing to less diversity in their descriptions. Ultimately, this lack of diversity may be yet another example of the impact of economy in the written mode.

As predicted, some differences between modes occurred in the kind of things used as vehicles in some of the metaphoric expressions. This is evidenced by the fact that metaphors using the body as a vehicle were more prevalent in some media than in others. The prevalence of body metaphors in the experimental interactions came as no great

surprise. As some authors have suggested (e.g., Lakoff & Johnson), the body serves as one of the preeminent sources of metaphorical mapping in human experience. In essence, what Lakoff (1987) has argued is that we understand new experiences in terms of our direct experience of our own bodies. Thus, when we use a metaphorical description like "legs" to describe parts of a table, or in our case an hibachi, this is more than just a convenient label based on perceptual similarities. Rather, it is a way of understanding the part that shapes and constrains our conception of the thing. Our direct experience of our own legs and the function that they serve maps onto our understanding of the "legs" of the hibachi and the function that they serve; i.e., to hold something up and provide support.

In our case, when a builder is told that she is to find the parts that will be used as "legs" for the hibachi, she is not only to assume that she is looking for parts that resemble human legs. More to the point, she is looking for parts that have the same functional relation to the hibachi that her legs have to her body, i.e., to provide support and enable the hibachi to "stand". Of course, this functional similarity does not apply to all body metaphorical references found in the protocols, for example those describing a part as "ears", where the reference is based solely on physical similarity. But in both types of cases (those based on functional similarity and those based on perceptual similarity) the metaphor plays a role in creating a model for the builder. Thus, the prevalence of body metaphors in our protocols provides empirical support that these metaphors play a fundamental role in guiding peoples' perceptual activity.

The differences between modes in the frequency and diversity of body metaphors may say something about the role of context in shaping discourse. Perhaps the experience of conversing through computer terminals is somehow more "disembodied" than that of communicating orally, and sharing one's physical environment with one's partner in communication. In other words, perhaps in the oral and copresent modes the body is more figural to the participants than it is to those engaging in e-mail communication, and thus enters into their speech more frequently. This is a point that would require more empirical research to flesh out, but may prove interesting for further study.

Finally, some evidence emerged indicating differences between modes in the degree of satisfaction with the interaction, a factor that had been ignored in previous studies of inter-modal communication. The scores derived from the satisfaction scale indicate that the subjects operating in the full co-presence mode encountered the least difficulty and found their exchanges the most satisfying of the four groups. As further evidence of this, it should be noted that errors in the final product were virtually absent among those working in this mode. This is, of course, to be expected, as experts in the full copresence mode had direct access to their partners' work and knew with a great degree of certainty what the state of that work was, as opposed to those in the other modes whose access was indirect.

In summary, some observations drawn from the present study are worth noting. People do use figurative language frequently in conversation, and they seem to do so because figurative language provides an efficient and effective tool for communicating

about unfamiliar topics. It affords its users the possibility of constructing a perceptual schema to guide its recipients when the context of communication does not afford a shared perceptual environment, consistent with the claim that figurative language serves to make the unfamiliar familiar. In such contexts, it helps communicators coordinate their understanding and their actions toward the accomplishment of a shared goal.

In addition, figurative language, like other aspects of language, is affected by the context in which it occurs. The rules for effective communication are dictated largely by the conditions in which they occur, and people, to a great extent, are sensitive to these factors and adjust their speech to adapt. Consequently, figurative expressions, be they framed as descriptions or interrogatives, are used differently in different situations, to maximize their utility. Perhaps the most important and noteworthy finding was that in contrast to other aspects of language usage (specifically, those cited by Chapanis et al., 1972; 1977; Cohen, 1984), the contextual factor that has the greatest effect on use of figures is not the medium of communication per se (i.e., oral vs. written), but the degree of co-presence shared by communicators. Thus, in addition to emphasizing the differences between media, it is also worth making note of the similarities in usage across media. Contexts such as communicating through intercom (or, for that matter, by telephone) and communicating by e-mail, differ in that one involves oral communication and one involves written communication, but share the common factor of a separation of the communicating parties. The fact that subjects in both conditions produce similar rates of figurative expressions, if not similar frequencies, speaks to the efficacy of figurative language across contexts in bridging the gap brought about by separation. In

essence this result would seem to support the claim made at an earlier point, that figurative language provides a useful tool for building a common ground among communicators. This common ground is more immediately present to communicators who share a perceptual field than to those who are denied access to each other's field of vision, and thus steps must be taken to build the common ground. Figures of speech facilitate this building process. This represents a valuable contribution to the collaborative discourse literature, and one that merits further study.

Limitations and Recommendations

As with many studies of its kind, a limitation of this study was that it relied exclusively on college students for its subject pool. While probably not particularly problematic, this sample may have affected the outcome to some degree. Future study might be improved by the inclusion of subjects from outside this domain. In particular, when looking at expertise in building things with one's hands, it might be of interest to look at people who do such work for a living. It may prove interesting to note differences in the figures they use and the descriptions they offer, as a consequence of their greater experience with problems of this kind, as well as a greater familiarity with the parts used.

Future research could be designed that would expand the current study, by extending it into related but somewhat different domains. For example, employing the same independent variable of mode of communication, it might be of interest to vary the task somewhat. Examples could include having experts direct novices in finding different

locations, or teaching them how to make some food item. These tasks share an ecological validity with the current experimental task, and could provide both additional insight into the use of figurative language in everyday contexts and further explicate the role of figures of speech in establishing a common ground for better understanding novel information. Insights gained from studies of this kind may prove useful for all who are interested in promoting better communication in an ever changing world of communication technologies and possibilities.

BIBLIOGRAPHY

Bibliography

Barlow, J.M., Kerlin, J.R., & Pollio, H.R. (1971). Training manual for identifying figurative language (Technical Report #1). Metaphor Research Group, University of Tennessee, Knoxville.

Boerger, M.A. & Henley, T.B. (In review). The use of analogical descriptions in giving directions: a consideration of the collaborative model.

Chapanis, A., Ochsman, R.B., Parrish, R.N., & Weeks, G.D. (1972). Studies in interactive communication: I. The effects of four communication modes on the behavior of teams during cooperative problem-solving. Human Factors, 14, 487-509.

Chapanis, A., Parrish, R.N., Ochsman, R.B., & Weeks, G.D. (1977). Studies in Interactive Communication: II. The effects of four communication modes on the linguistic performance of teams during cooperative problem-solving. Human Factors, 19, 101-126.

Clark, H. H., & Brennan, S.E. (1991). Grounding in Communication. In, L.B. Resnick, J.M. Levine, & S.D. Teasley (Eds.), Perspectives on socially shared cognition, (pp.127-149). Washington, D.C.: American Psychological Association.

Clark, H.H., & Carlson, T. (1982). Hearers and speech acts. Language, 58, 332-373.

Clark, H.H., & Marshall, C.R. (1981). Definite reference and mutual knowledge. In A.K. Joshi, B.L. Webber, & I.A. Sag (Eds.), Elements of discourse

understanding, (pp.10-63). Cambridge, England: Cambridge University Press.

Clark, H.H., & Wilkes-Gibbs, D. (1986). Referring as a collaborative process. Cognition, 22, 1-39.

Cohen, P.R. (1984). The pragmatics of referring and the modality of communication. Computational Linguistics, 10, 97-146.

Dixon, K., Ortony, A. & Pearson, D. (1980). Some reflections on the use of figurative language in children's books. Paper presented at the National Reading Conference, San Diego.

Freyd, J.F. (1983). Shareability: The social psychology of epistemology. Cognitive Science, 7, 191-210.

Fussell, S.R. & Krauss, R.M. (1989). The effects of intended audience on message production and comprehension: Reference in a common ground framework. Journal of Experimental Social Psychology, 25, 203-219.

Gick, M. & Holyoak, K. (1980). Analogical problem solving. Cognitive Psychology, 12,306-355.

Glucksberg, S. (1989). Metaphors in conversation: How are they understood? Why are 125-143

Grice, H.P. (1975). Logic and Conversation. In P. Cole & J. Morgan (Eds.), Syntax and Semantics (Vol.3, pp. 43-58. New York: Academic Press.

Isaacs, E.A., & Clark, H.H. (1987). References in conversation between experts and novices. Journal of Experimental Psychology: General, 116, 26-37.

Johnson, M.G. (1990). Language and cognition in products liability. In J. Levi, & A. Walker (eds.), Language in the judicial process. New York: Plenum

Jordan, I.K. (1973). The referential communication of facial characteristics by deaf and normal-hearing adolescents. Unpublished doctoral dissertation. University of Tennessee.

Joshi, A.K., Webber, B.L., & Sag, I.A. (1981). Elements of Discourse Understanding. Cambridge, England: Cambridge University Press.

Kingsbury, D. (1968). Manipulating the amount of information obtained from a person giving directions. Unpublished honors thesis, Harvard University, Cambridge, MA.

Krauss, R.M. & Fussell, S.R. (1991). Constructing shared communicative environments. In L.Resnick, J. Levine and S. Teasley, (Eds.), Perspectives on Socially Shared Cognition (pp.172-202).Washington, D.C.: The American Psychological Association

Krauss, R.M., & Glucksberg, S. (1977). Social and nonsocial speech. Scientific American, 236, 100-105.

Krauss, R.M., & Weinheimer, S. (1964). Changes in the length of reference phrases as a function of social interaction; A preliminary study. Psychonomic Science, 1, 113-114.

Krauss, R.M., & Weinheimer, S. (1966). Concurrent feedback, confirmation and the encoding of referents in verbal communication. Journal of Personality and Social Psychology, 4, 343-346.

Krauss, R.M., & Weinheimer, S. (1967). Effect of referent similarity and communication mode on verbal encoding. Journal of Verbal Learning and Verbal Behavior, 6, 359-363.

Lakoff, G. & Johnson, M. (1980). Metaphors we live by. Chicago:University of Chicago Press.

Lakoff, G. & Johnson, M. (1981). The metaphorical structure of the human conceptual system. In D. Norman (Ed.), Perspectives on Cognition. (pp. 193-208). Norwood, N.J.: Ablex

Ochsman, R.B., & Chapanis, A. (1974). The effects of 10 communication modes on the behavior of teams during cooperative problem-solving. International Journal of Man-Machine Studies, 6, 579-619.

Ortony, A. (1975). Why metaphors are necessary and not just nice. Educational Theory, 25, 45-53.

Petrunik, M. (1982). Telephone troubles: interactional breakdown and its management by stutterers and their listeners. Symbolic Interaction, 5, 299-310.

Pollio, H.R., Barlow, J.M., Fine, H.J., & Pollio, M.R. (1977). Psychology and the poetics of growth: Figurative language in psychology, psychotherapy and education. Hillsdale, N.J.: Lawrence Erlbaum Associates, Inc.

Pollio, H.R., Smith, M.K., & Pollio, M.R. (1990). Figurative language and cognitive psychology. Language and Cognitive Processes, 5, 141-167.

Potter, J., & Wetherell, M. (1987). Discourse and Social Psychology. London: Sage Publications.

Resnick, L.B. (1991). Shared cognition: Thinking as social practice. In, L.B. Resnick, J.M. Levine, & S.D. Teasley (eds.), Perspectives on socially shared cognition. (pp. 1-22). Washington, D.C.: American Psychological Association.

Resnick, L.B., Levine, J.M., & Teasley, S.D. (1991). Perspectives on Socially Shared Cognition. Washington, D.C.: American Psychological Association.

Schegloff, E.A. (1982). Discourse as an interactional achievement: Some uses of "uh huh" and other things that come between sentences. In D. Tannen (ed.), Analyzing Discourse, text and talk (pp. 71-93). Washington D.C.: Georgetown University roundtable on language and linguistics, Georgetown University Press.

Schober, M.F., & Clark, H.H. (1989). Understanding by addressees and overhearers. Cognitive Psychology, 21, 211-232.

Smith, M.K., Pollio, H.R., & Pitts, M.K. (1982). Metaphor as intellectual history: conceptual categories underlying figurative language usage in American English from 1675- 1975. Linguistics, 19, 911-935

Stoll, F.C., Hoecker, D.G., Krueger, G.P., & Chapanis, A. (1976). The effects of four communication modes on the structure of language used during cooperative problem solving. The Journal of Psychology, 94, 13-26.

Verbrugge, R.R. (1985). Language and event perception: Steps toward a synthesis. In W.H. Warren & R. Shaw (eds.),Persistence and Change (pp. 157-194). Hillsdale, N.J.: Lawrence Erlbaum Associates.

Vosniadou, S. & Ortony, A. (1989). Similarity and analogical reasoning: a synthesis. In S.Vosniadou & A. Ortony (Eds.), Similarity and Analogical Reasoning(pp.1-17). Cambridge:Cambridge Univ. Press.

Vosniadou, S. & Schommer, M. (1988). Exploratory analogies can help children acquire information from expository text. Journal of Educational Psychology,80, 524-536.

APPENDIX

Table A-1. Number of words by mode (transformed)

Mode	Means	Standard deviations
1. Intercom	507	132.7
2. Face to face	471	171.7
3. Written	59.6	32.9
4. Full copresence	38.3	37.7

ANOVA

Source	Sum of squares	df	Mean square	F	Probability
Between groups	465,852	3	155,284	28.8	.000
Within groups	839,898	156	5,383		

Table A-2. Rate of figurative expression by mode (transformed)

Mode	Means	Standard deviations
1. Intercom	97.9	42.3
2. Face to face	104.5	41.3
3. Written	103.4	62.7
4. Full copresence	46.8	51.5

ANOVA

Source	Sum of squares	df	Mean square	F	Probability
Between groups	92,099	3	30,699	12.2	.000
Within groups	392,846	156	2,518		

Table A-3. Unique figures by mode (transformed)

Mode	Means	Standard deviations
1. Intercom	156.9	138.7
2. Face to face	131.7	124.7
3. Written	74.1	92
4. Full copresence	35.8	47.3

ANOVA

Source	Sum of squares	df	Mean square	F	Probability
Between groups	360,839	3	120,279	10.6	.000
Within groups	1,774,228	156	11,373		

VITA

Michael Andrew Boerger was born in Columbus, Ohio in 1960. He graduated from Bishop Ready High School in Columbus in 1978. He attended Ohio State University after graduating from high school, and in 1983, received a Bachelor of Arts degree in Photography and Cinema. In 1985, he received a Bachelor of Arts degree in Psychology from Ohio State University. In the fall of 1987, he entered the doctoral program in Experimental Psychology at the University of Tennessee, Knoxville. In August of 1995, the doctoral degree was received. He is currently employed by Pellissippi State Technical Community College as an Instructor of Psychology.