HCI metaphors framed in a wide-ranging look at metaphoric discourse.

Metaphor in Theory and Practice: the Influence of Metaphors on Expectations

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Abstract

The use of metaphors is pervasive in all forms of discourse.

This paper is concerned with providing a brief review of the development of metaphor theory, illustrated with some examples of supportive empirical research. These include a canonical study of the way concepts of instruction and education are influenced, a study into the effects of human-computer interface metaphors on computer systems users, and a study designed to assess the impacts of metaphor use on attitudes to internet commerce, particularly on attitudes to the roles played by information technology (IT). The paper provides some contextual background to assist consideration of the effects of metaphors on attitudes and beliefs. In practice, metaphor use may be intentional, unconscious, or a mixture of both, but in any case metaphors can be shown to play powerful roles in the social construction of human reality.

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Introduction

Modern physics theory deals comfortably with a vast array of sub-microscopic entities, such as "atoms," which can never be seen by a human being. Yet vast numbers of school-children around the world, if asked, would claim that they knew what an atom "looked like." It looks like the solar system, they would say. The relationship, "an *atom* is a *solar system*," has been one of the most enduring, and most influential, scientific metaphors to emerge during the twentieth century, providing a continuing testimony to the power of metaphor to create new images and new meanings.

The use of metaphors is pervasive in all forms of discourse. Metaphors can be used *both* to influence and to persuade; yet they may also act to constrain and limit. Contemporary metaphor theory has developed as a means of explaining the hidden effects of metaphor, and in particular to reveal the variety of subtle ways in which metaphors contrive, or may be contrived, to shape and control the direction of discussion on conflicted issues. The contemporary interest in metaphor can be seen as simply one outcome of the "linguistic turn," or the view that the social world is essentially "socially constructed" (Berger and Luckman 1967). Metaphor studies do, however, have the additional virtue of looking beyond the surface of language to explore underlying structures of linguistic behavior thatenable new experiences and new concepts to be interpreted and expressed using existing language as a starting point.

This paper is concerned with providing a brief review of the development of metaphor theory, illustrated with some examples of supportive empirical research. These include a canonical study of the way concepts of instruction and education are influenced by a "conduit" metaphor, in which ideas are objects to be transferred from one person to another, as well as a more recent study into the effects of human-computer interface metaphors on computer systems users. The paper concludes with an account of a study currently being designed to assess the impacts of metaphor use on attitudes to internet commerce, particularly on attitudes to the roles played by information technology (IT). Though this study is at an embryonic stage, it has some contemporary relevance.

The broad aim of the paper is to provide some contextual background to assist consideration of the effects of metaphors on attitudes and beliefs. In practice, metaphor use may be intentional, unconscious, or a mixture of both, but in any case metaphors can be shown to play powerful roles in the social construction of human reality. An understanding of how metaphoric usages operate is, from this perspective, relevant to theorists and practitioners in all disciplines.

Layout of the paper is as follows:

- Part 1 presents an overview of the way modern theories of metaphor have evolved.
- Part 2 reviews published research into the effects of metaphors on beliefs and expectations about behavior.
- Part 3 discusses a proposed study into the roles played by metaphors in internet-commerce discourse.
- Part 4 summarizes and discusses the implications of the material presented in the body of the paper.

Theory of Metaphor

Figurative speech in all its variety has long been an issue of concern for philosophers and scientists deeply concerned with the nature of truth and reason. The idea that insights into one domain might best be conveyed through concepts borrowed from another has proved an anathema to "rational" theorists ranging from Plato to modern positivists (Popper, 1958). Strictures against metaphor include Plato's remark that those versed in its use will "corrupt the minds of all who hearken to them, save only those whose knowledge of reality provides an antidote" (Plato, 380BC/1955, p.437).

Equally vehement was Hobbes, who found absurdity in the use of metaphors and other rhetorical figures.

> For though it be lawful to say…in common speech, *the way goeth, or leadeth hither or thither, the proverb say this or that,* whereas ways cannot go, nor proverbs speak; yet in reckoning, and seeking of truth, such speeches are not to be admitted. (Hobbes, 1651/1914, p.189).

The classical view of metaphor as "just" a figure of speech, significant only as a rhetorical device, has been challenged by contemporary theorists (Black, 1962, 1979; Reddy, 1979; Schon, 1979; Lakoff and Johnson, 1980; Johnson, 1981, 1987; Lakoff, 1987, 1993, 1995; Turner, 1987; Kittay, 1987; Madison, 1990; Leary, 1995). Their most important line of argument has been that all language is metaphoric in origin and that all discourse is "shot through" with metaphor (Lakoff and Johnson, 1980). Metaphor is in this view inescapable, and several writers have analysed specific metaphors with a view to understanding their influence on people's everyday thinking (Reddy, 1979; Schon, 1979; Lakoff and Johnson, 1980; Lakoff and Turner, 1989; MacCormac, 1976; Morgan, 1986, 1997).

How Metaphors Work

Metaphor is generally regarded to be the fundamental "trope" or mode of figurative speech (see a dissenting view in Gibbs, 1993). In essence, a metaphor utilizes well-understood concepts or attributes from one domain to make points or provide insights about another. Indurkhya's definition is comprehensive.

> A metaphor is a description of an object or event, real or imagined, using concepts that cannot be applied to the object or event in a conventional way. The object or the event being described is called the target, and the concepts that cannot be applied conventionally are called the source…the metaphor is made meaningful by interpreting the source unconventionally in the target. The unconventional interpretation can be arrived at on the basis of some underlying similarity between the source concepts and the target. (Indurkhya, 1992, p.17).

Metaphors may be literary or practical, but the critical issue for theory has always been that they embed relationships, which are at best partial and sometimes even abstruse. There are therefore always mismatches between predicates in the source domain and predicates in the target domain. In concrete terms, this simply means that in a metaphor such as "it is the east and Juliet is the sun," the figure is usually taken to refer to predicates of the sun such that it is a source of light and a symbol of freshness and new beginnings, rather than to the fact that it is several million kilometers away and extremely hot.

As long as a metaphor remains "new" (Madison, 1990), it is the mismatch that alerts the hearer to look for parallels not immediately apparent from a direct comparison. Technically this is described as raising the salience of previously low-salience predicates of the target domain in comparison with more obvious characteristics. Thus "it is the east and Juliet is the sun" instantaneously conveys Romeo's idiosyncratic view of Juliet's personality and character in a way that bypasses slower forms of explanation. The power of this type of metaphor stems from the originality and impact of the relationship invoked, and in this respect the mismatch is the "point" of the metaphor. Highly insightful metaphors of this nature retain their freshness for long periods, so that, for example, Weber's famous metaphor of the bureaucratic organization as an "iron cage" is still used to frame debates on desirable organizational structures (Ray and Reed, 1994).

The Classical Perspective on Metaphor

Throughout the classical period, the concept of metaphor was generally treated as an interesting sidelight to issues concerning the "correct" use of language. This view became doctrine in logical positivism, where the belief that scientific

principles could be stated and discussed in context-free language was fundamental. Metaphors were therefore excluded from consideration by definition, offering "a merely heuristic value for science" (Kittay, 1987, p.7).

Plato considered figurative language to be dangerous, because it could stir up the emotions and blind people to the truth. The unfettered use of poetic language could ultimately produce a situation where "...pleasure and pain become your rulers instead of law and the rational principles commonly accepted as best" (Plato, 380BC/1955, p. 437). As the most powerful form of figurative language, poets, sophists and other orators used metaphor as a damaging weapon in the arsenal of rhetoric to coerce and control the populace.

Plato's pupil Aristotle was the first great theorist of metaphor, and, while sharing Plato's view that metaphoric language "had a terrible power to corrupt" (Plato, 380BC/1955, p. 436), was much more disposed to recognise its power and aesthetic appeal. Aristotle also noted the value of metaphor in conveying new and fresh ideas:

> … for the receiving [of] information with ease is naturally pleasing to all: and nouns are significant of something: so that all nouns whatsoever which produce knowledge in the mind are most pleasing...but the metaphor in the highest order produces this effect. (Aristotle, 328BC/1995, p. 234)

Aristotle's praise of metaphor's ability to evoke insight was not carried over into philosophical debate generally, and the belief that linguistic correctness required "literal" usages dominated scholarly thought for centuries. The language of science, objectivity, and truth was therefore meaningful independently of context. Metaphor and other forms of figurative speech were confined to an ornamental role in artistic expression and a persuasive role in the art of political debate.

There was, however, always some irony in the perpetuation of this view, inasmuch as philosophy itself was thoroughly infiltrated with metaphoric concepts. Thus, one of the most quoted and best remembered passages in *The Republic* (Plato, 380BC/1955) is based on the cave as a powerful metaphor for the limits of human knowledge; it is the imaginative use of this metaphor rather than the accompanying rational argument which provides Plato's argument with its persuasive force. The discrepancy between principle and practice was also invisible to critics on occasion, as in Locke's comment that "[metaphors] are for nothing else but to insinuate wrong ideas, move the passions and thereby mislead the judgement; and so indeed are perfect cheats ..." (Locke 1694, p. 146). The phrase "perfect cheats" is of course a fully-fledged metaphor (Lakoff and Johnson, 1980).

Modern Theory —the Origins of Language in Metaphor

Modern studies in linguistics have largely overturned the view of metaphor as a topic of study incidental to the main thrust of research into the use of language in practice. Instead, a growing number of leading theorists now accept metaphor as pervasive in language use, and fundamental to semantic analyses. It has been claimed that abstract thought is intrinsically metaphoric (Lakoff and Johnson, 1980), and powerful metaphoric structures underlying key theories in such disciplines as urban planning (Schon, 1979), communications (Reddy, 1979), politics (Lakoff, 1995) and religion (MacCormac, 1976) have been identified and elucidated. In Leary's terms, metaphors are the "bases upon which we continue to bootstrap our understanding of ourselves and the world around us, [and] the use of metaphorical or comparative thinking is endemic to the ways in which scientists and non-scientists alike come to comprehend themselves and their world" (Leary, 1995, p. 276).

A major influence on thinking in this area was Friedrich Nietzsche, who held that all human concepts were metaphoric in nature and that "the drive toward the formation of

metaphors is the fundamental human drive" (Nietzsche, 1979, p. 88). Nietzsche was perhaps too idiosyncratic a thinker to be viewed as the founder of a research tradition, and contemporary theorists generally acknowledge I.A. Richards as the primary source (Ricoeur, 1978, p. 76). Richards' view was summarized in the statement that metaphor was "the omnipresent principle of language [and that] we cannot get through three sentences of ordinary fluid discourse without it" (Richards, 1936, p. 92). Richards' view was not taken seriously during a period dominated by the logical positivists' drive for empirical certainty, but it garnered critical support with the publication of Max Black's "interaction" theory of metaphor (Black, 1962). Black's extension of Richards' work was itself adopted and extended by others (Ricoeur, 1978; Ortony, 1979/1993; Schon, 1979; Reddy, 1979), to the extent that the field has become a major subdiscipline within linguistics (Saeed, 1997).

Central to the modern view is the empirically well supported finding that metaphoric constructs are used naturally and unproblematically all the time in normal communication. Lakoff has summarised these findings as follows:

- Metaphor is the main mechanism through which we comprehend abstract concepts and perform abstract reasoning.
- Much subject matter, from the most mundane to the most abstruse scientific theories, can only be comprehended via metaphor.
- Metaphor is fundamentally conceptual, not linguistic, in nature.
- Metaphorical language is a surface manifestation of conceptual metaphor.
- Metaphorical understanding is grounded in non-metaphorical understanding.
- Metaphor allows us to understand a relatively abstract or inherently unstructured subject matter in terms of a more concrete subject matter. (Lakoff, 1993, p. 244).

Metaphor and Thought

The critical finding from this body of work is that metaphors play key roles in the shaping of everyday thought. The progressive incorporation of a specific metaphor into common language brings with it an array of attitudes and understandings with a powerful capacity to influence community norms and behaviors. This interpretation of metaphor reveals a range of positives and negatives associated with the practical uses of metaphors. Positives because metaphor can be used to convey insights and communicate new concepts rapidly and effectively; negatives because a metaphor is inherently limited in scope, and unable to convey the full scope of a new idea (Black, 1979; Lakoff, 1987; Way, 1991; Ortony, 1979,1993; Leary, 1995).

The modern theory explicates understandings previously available intuitively to some philosophers and scientists. More significant from the perspective of understanding metaphor's impact on fundamental patterns of thought, are findings showing the extent of metaphor use in normal discourse, and considerable research has been done in this area (Lakoff and Johnson, 1980,1999; Reddy, 1979). Lakoff and Johnson provide several case examples, in one instance showing how the metaphor ARGUMENT is WAR is used in Western culture to define argument as inherently contentious, involving winners and losers rather than simply participants. Phrases cited as deriving from the metaphor include:

- Your claims are *indefensible.*
- He *attacked every weak point* in my argument.
- His criticisms were *right on target.*
- I *demolished* his argument.
- I've *never won* an argument with him.
- You disagree? Okay, *shoot!*
- If you use that strategy he'll *wipe you out.*
- He *shot down* all my arguments. (Lakoff and Johnson, 1980, p. 4).

Metaphors in Science

Despite their poor press, key metaphors have dominated some aspects of scientific thought. A number of notable studies undertaken during the last fifty years have examined the roles played by metaphors in the elucidation of new scientific fields (Black, 1962; Hesse, 1966; Kuhn, 1993; Boyd, 1979; Leary, 1995). The findings indicate that metaphor has in fact been vital to the processes of scientific discovery, with broad movements often being grounded in general metaphors representing the *Zietgeist* of their respective times. Thus Koestler discusses the influence of the clock as a metaphor in the development of cosmogony and cosmology (Koestler, 1964), while Rose records an historical succession of 'universe' images including the potter's wheel, the chariot, the clock, and the engine (Rose, 1993). As discussed earlier, the "solar system" model developed by Rutherford as a way of explaining atomic structures illustrates the capacity of particular metaphors to capture the public imagination (Gentner and Jeziorski, 1993).

A powerful contemporary example of the "scientific" metaphor is that of the brain as computer, an image which has been instrumental in stimulating the development of new areas of inquiry including artificial intelligence and cognitive science. Boyd itemizes an extensive cluster of computer-based metaphors that together constitute much of the theory of cognitive psychology. They include:

- the brain as a computer,
- thought as information processing,
- cognitive processes as preprogrammed modules,
- information as encoded in memory-stores,
- remembering as an information retrieval procedure,
- learning as the adaptive response of a system, consciousness as feedback. (Boyd, 1979).

Boyd reiterates a point made by Black (1962), Hesse (1966), and Kuhn (1972, 1987, 1993) in other contexts. That is, for practical purposes, there is no alternative to the use of these metaphors because "their cognitive content cannot be made explicit" (Boyd, 1979). Thus while there is a broad consensus among cognitive psychologists that mental states and processes are somehow analogous to computer states and processes, there is as yet no such consensus on how to communicate this insight literally.

Metaphors in Organization Studies

Originally under the influence and guidance of Gareth Morgan (1986, 1996, 1997), metaphor has come to be an important theme in contemporary organization studies, and Morgan's *Images of Organization* (1986) has become a modern classic in the field. In this work, which shows the influence of ideas stemming particularly from Lakoff and Johnson (1980), Morgan identifies a number of metaphorical concepts that have grounded distinct bodies of organizational theory. These include concepts of organizations as machines, brains, cultures, political systems, psychic prisons, flux and transformation, and instruments of domination (Morgan, 1986). This is by no means an exhaustive list and Czarniawska-Joerges notes that organizational anthropologists have also conceived of organizations as being tribes, goal-seeking organisms, homeostatic systems and elephants (Czarniawska-Joerges, 1992). Hirschheim and Newman (1991) find an "organization as fiefdom" metaphor in university circles while Argyris (1985) comments that the dominant metaphor in one organization was that of the submarine as in the slogan "run silent, run deep."

Morgan's basic premise is the assumption that opposing schools of organization theory can be seen as relying on a range of different metaphors, each of which supports a distinctive yet incomplete understanding of organizational issues generally. Thus for instance the concept of an organization as a "psychic prison" captures some aspects of organizational life, particularly in highly bureaucratized structures, which are not likely to be seen as relevant or important from another perspective. Morgan stresses the current view that metaphors are far more

than rhetorical devices and that "the use of metaphor implies a *way of thinking* and *a way of seeing* that pervade how we understand our world generally" (Morgan, 1986, p. 12). It is fundamental to Morgan's analysis that a metaphor is intrinsically an incomplete description of the target concept, and that the interpretation of a metaphor will simultaneously highlight some aspects of organizational life while hiding others; "any way of seeing is also a way of not seeing" (Jackson, 1991, p. 27).

Though it is not the main focus of Morgan's interest, his analysis shows the consequences of one metaphor inappropriately coming to dominate a disciplinary area, resulting in the development of a one-sided and ultimately misleading set of theoretical constructs. Stemming from the early work of Taylor (1911) and Fayol (1949), the metaphor of "organizations as machines" came to dominate organizational studies for almost half a century. While the positive contribution of the metaphor is still recognized (for instance Cummings and Worley, 1993; Scott, 1992; Narayan and Nath, 1993), it was not until the emergence of theorists from the human relations school such as Mayo (1933), Herzberg (1966) and Maslow (1970), that some of the limitations of this concept of organization were first identified and explored.

An important element in Morgan's discussion is an illustration of how the machine metaphor highlights certain aspects of organization at the expense of others. Thus efficiency and utility are critical to a working machine. From this perspective it makes no sense to consider the autonomy of a part, or the possibility that the machine might ultimately be better served by the independent action of a component. Morgan comments that the machine metaphor has proven particularly robust even in the face of substantial reservations, mainly because of the extent to which it simplifies consideration of the issues involved. However, current thinking is that the metaphor is problematic, and Morgan himself has identified problems of inflexibility, apathy, mindless bureaucracy, and poor morale as consequent on its too literal adoption in organizational design (Morgan, 1986, p. 35).

Theorists have since extended Morgan's work in a variety of directions (for instance Alvesson, 1993; Czarniawska-Joerges, 1992; Narayan and Nath, 1993; Stacey, 1996), while confirming two key points. These are first that the adoption of a new metaphor can extend the horizons of a theoretical concept, and second that a slavish adherence to one perspective can blind theorists to other aspects of the concept. In Czarniawska-Joerges' view, the machine metaphor is a canonical illustration of the dangers inherent in endeavouring to explain a complex concept in terms of something more primitive. Although the static nature of the machine metaphor seemed to be a bonus for theorists trying to come to grips with organizational complexities, the problem ultimately revealed is that the "booming, buzzing world does not lend itself to neat, sharp-edged definitions" (Czarniawska-Joerges, 1992, p. 36).

How Metaphors Shape Attitudes

Although the value of metaphor use in the communication of new or unfamiliar concepts has been well canvassed, its drawbacks have emerged more slowly. These include both the extent to which the general adoption of an inappropriate metaphor can constrain thinking along undesirable lines, and the possibility that metaphors embedded in formal communications may in some circumstances mislead the message recipients or at least inhibit their learning.

A number of problematic metaphors have been investigated in recent years. Illustrative discussion in the following section is limited to two of these; a classic study which purports to reveal a problem deeply embedded in the conceptualization of communication, and a more recent study showing how a misleading metaphor can create feelings of dissonance when the message recipient's expectations are not fulfilled.

The "Conduit" Metaphor

The "conduit" metaphor (Reddy, 1979) is a concept encapsulating a pervasive pattern of

thought in which communication is represented as an instrumental process simply involving the transfer of knowledge from one person to another. In broad terms, Reddy's concerns are that "frame conflict" can arise when problems or requirements are expressed in fundamentally constraining ways and that, taken literally, these expressions may bias subsequent behavior in undesirable ways.

Reddy's argument is complex, but his basic proposition is that the misrepresentation of communication processes can influence communicators to think of the basic process as uni-directional:

> we have the mistaken, conduit-metaphor influenced view that the more signals we can create, and the more signals we can preserve, the more ideas we can 'preserve' and 'store'. We neglect the crucial human ability to reconstruct thought patterns on the basis of signals and this ability founders (Reddy, 1993, p. 188).

Reddy's argument is that there are vast arrays of expressions that people use in relation to communication, which derive from a conceptual structure comprising three key metaphors. These are "minds as containers," "ideas as entities," and "linguistic expressions as conduits." He states that the use of this structure leads to a number of implicit assumptions about the way communication works:

- Language can be used to transfer thoughts directly from one person to another.
- People "insert" their thoughts and feelings into words.
- The words act as a pipeline for conveying these thoughts from one mind to another.
- Recipients can then extract the thoughts and feelings from the words.

He also finds an extension to the metaphoric structure in which the conduits are not sealed pipelines but individual pipes that allow mental content to leak into ambient space. Further implicit assumptions can be found based on this extension:

- Thoughts and feelings are ejected by speaking or writing into an external "idea space."
- These thoughts and feelings then exist independently of any need for living humans to think or feel them.
- These reified thoughts may or may not find their way back into the heads of other people. (Reddy, 1993).

Some of this can seem surprising at first glance, and a few examples may help to convey the nature of this research (which has been supported with findings from Lakoff, 1993; Turner, 1987; Axley, 1984; and Johnson, 1981). In essence, rather than assuming discussions about communication were generally conducted in neutral terms, Reddy looked at thousands of linguistic expressions to see the forms people actually used, finding the majority to incorporate usages such as those italicised in the following:

- Try to *get your thoughts across* better.
- Whenever *you have a good idea* practice *capturing it in words.*
- Never *load a sentence* with more than it can hold.
- *Insert those ideas* elsewhere in the paragraph.
- That concept has been *floating around for decades.*
- You'll *find better ideas than that in the library.*
- They have *stuffed his head* with radical ideas.
- How many different concepts can you *get into your head* in one evening. (Reddy, 1993).

While the findings have been theoretically influential (Saeed, 1997), their full implications are still being explored. In Reddy's view, the conduit metaphor is implicated in a vast array of instructional and informative approaches wrongly predicated on the view that communication is just a matter of getting

the message "out there." In his view, the metaphor is leading us (metaphorically!) down a "technological and social blind alley……[which is] mass communications coupled with mass neglect of the internal, human systems responsible for nine-tenths of the work in communicating" (Reddy. 1993, p. 188).

Human-Computer Interfaces

Reddy makes a strong claim, but to date there has been relatively little research to show that metaphors can have direct effects on recipient attitudes. One exception was a study conducted recently in the context of human-computer interface (in future, simply "interface" for convenience) research, where the idea that the use of metaphor should be a guiding design principle has been widely canvassed (Apple, 1985, 1987, 1992; Cooper, 1995).

An historical review showed that the design of graphical interfaces was a radically new activity for most of the computer scientists initially involved in the activity, and that they were driven to base much of their thinking on metaphors and analogies. Alan Kay's initial conception of a personal computer was the Dynabook, "a self-contained knowledge manipulator in a portable package the size and shape of an ordinary notebook" (Goldberg, 1988). In discussing the features the Dynabook should have, he comments that

> there should be no discernible pause between cause and effect. *One of the metaphors we used* when designing such a system was that of a musical instrument, such as a flute, which is owned by its user and responds instantly and consistently to its owner's wishes (Goldberg, 1988, p. 255).

This early research was highly influential, and the use of metaphor became a common theme in interface design to the extent that Apple adopted it as a basic "design principle" (Apple, 1985, 1987, 1992). The idea was to enable users to quickly acquire new knowledge on the basis of association with other domains, or to "use concrete metaphors and make them plain, so that users have a set of expectations to apply to computer environments" (Apple, 1987, p. 3). Swigart comments that in fact "the Macintosh was born of metaphor: the screen was no longer flat vertical phosphor; it became a desktop. Here my files hide in folders. I have access to tools: a file clerk …, a calculator, a phone book" (Swigart, 1990, p. 135).

Some metaphors proved to be particularly robust as conceptual aids and were quickly adopted as part of the fabric of graphical interfaces. The most notable examples included the "desktop" metaphor as the basis for screen presentation and the "typewriter" metaphor (complete with "ribbon" and "ruler") as the presentation mode for word-processing packages. At the other end of a value continuum came esoteric metaphors such as the presentation of a menu in the form of a car dashboard (Mandel, 1994). Fortunately, these have had little effect on design practice.

Designers have attested to the fact that metaphors have assisted them to conceptualize interface presentation requirements (Kay, 1988, 1990; Goldberg, 1988), but there has been relatively little field research into the effects of such metaphors on users' beliefs and behaviors. A small-scale study was therefore designed to explore some of these issues, specifically the question of whether the effects of interface metaphors in practice appeared to have been correctly predicted by the designers. In the event, most of the findings tended to confirm theoretical predictions that the "standard" metaphors had significantly facilitated understanding during the early days of computing, but had faded into the background as computing became more widely understood.

The most interesting outcome from this study (Hamilton, 1996, 2000) concerned the issue of attribute mismatch. Attribute mismatches are potentially significant to the effect of any metaphor. Because metaphors depend for their effect on insights based on shared background knowledge, their audience must be capable first of identifying the connection being posited, and second of making the correct attribute linkages between the different domains.

In the interface context, making the

right connections means making those the designer intends. Interface metaphors are specific in their intents and outcomes, and it was postulated during the research design process that the impacts from any attribute mismatches detected by users would be immediate if they occurred at all. This proved not to be the case. While findings as to the instructional or explanatory value of interface metaphors varied considerably from person to person, two consistent findings were that people were quite seriously bothered by mismatches that contradicted their expectations, and that the effects tended to linger.

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The most frequent examples of this effect occurred in relation to a minor design issue concerning the "trashcan" metaphor, which has been a standard feature of the Macintosh interface for many years. The metaphor is an accessible one, with users dragging icons representing discarded files to the trashcan icon and thereby disposing of them. The functional similarities are extensive, with users being able to retrieve dumped files as long as the trashcan itself has not been "emptied." The issue of concern arose because the trashcan has the additional functionality of allowing floppy disks to be ejected, also by dragging the appropriate file icon to the trashcan. The difference is that in this process, the files concerned are not in any sense being "trashed" but are simply being taken out of use for the moment.

Because the study population comprised experienced Macintosh users, fully cognizant of trashcan functionality, it was expected that any cognitive or behavioral effects from this would have disappeared over time. Instead, the issue evoked responses quite unexpected in their strength if not direction. All those interviewed felt that disk ejection "worked against" or "broke" the metaphor in a troubling way, and emotive responses were quite common. Interview transcripts showed a variety of responses such as

- First of all it terrified me—[it was] throwing away my work.
- Disk ejection is something I'm used to but its annoying to put it in the rubbish to get it out.
- It shocked me. (Hamilton, 1996)

Cognitive Dissonance

The most promising explanation for the strength of the effects found was that a form of "cognitive dissonance" was created by the mismatch. Cognitive dissonance theory (Festinger, 1957) has been widely adopted to explain various types of cognitive clash, and has evolved into a theory capable of explaining a variety of behaviors and outcomes in which people strive to maintain a consistent concept of self (Aronson, 1995). The aspect of interest for the interface study was that cognitive dissonance effects could arise in circumstances where an individual's reasonable expectations of behavior, based on prior beliefs, are not met. In Festinger's terms:

> dissonance is almost unavoidably created between the cognition of an action taken and those opinions or knowledges which tend to point to a different action (Festinger 1957, p. 5).

Dissonance theory predicts that cognitive clashes will evoke responses designed to ease feelings of psychological discomfort. These responses can vary from avoidance techniques, in which the individual refrains from the activities generating dissonance, to the progressive restructuring of prior beliefs in way that will eventually eliminate the dissonance. Thus Aronson (1997) recalls an early experiment in which two groups of people who had completed a singularly dull task were paid to tell others that they had completed the task (true), and that they had enjoyed it very much (false). The individuals in one group were each paid $1, those in the other $20. The key finding

was that those paid only $1 experienced some dissonance, in the sense that $1 was paltry payment for lying, and were shown to gradually come to the conclusion that the original task **had**, in fact, been quite enjoyable. In contrast, those paid $20 felt that the reward was sufficient to justify lying and continued in their belief that the task was boring (Aronson, 1997).

The explanation favoured for the "trashcan" findings was therefore that strongly profiled interface metaphors, which incorporate salient attribute mismatches, could generate some degree of cognitive dissonance in users. An interface metaphor encourages users to act according to a set of strong expectations on how the interface will respond to different actions. Any serious unpredictability in the behavior of the interface will therefore tend to generate some degree of cognitive conflict; more specifically, a user who has "trusted" the metaphor will be forced to consciously rethink actions performed automatically in the source domain, with some corresponding degradation in performance.

More than half the participants indicated that the power of the metaphor was sufficient for them to have recurring doubts that using the disk ejection facility might affect their data. Responses included:

- I hope it remembers that this is not rubbish.
- You do it [disk ejection] at your own peril.
- I always felt uncomfortable with disk ejection—it seemed to be throwing away the disk.
- Thoughts that have occurred to me include 'is my disk going to come out wiped clean? Am I going to lose everything on the disk?' (Hamilton, 2000).

While the majority of users had become accustomed to the functionality provided, perhaps the most surprising finding from the entire study was that three people (from a total population of fifteen) were sufficiently bothered by the discrepancy to have decided not to use the trashcan ejection facility at all despite its obvious convenience.

Why "Solutions" are Everywhere in Information Technology Practice

The interface study was a small one conducted on the basis of an ongoing interest in the formation of attitudes to information technology (IT) in general, and was designed with the idea of a subsequent larger-scale study in mind. The findings were both sufficiently strong and sufficiently interesting to make the next study a viable possibility. While still at an embryonic stage, some preliminary work has been done. This is discussed briefly in the following.

The focus of the study is on the role of metaphor as one of the linguistic mechanisms that combine to create and then perpetuate an IT trend or fashion. In this regard, the speed of IT change itself poses a major linguistic challenge for IT researchers, who are confronted with the problem of presenting research findings and theoretical insights in language which ideally will not "date" too quickly. The difficulty is that the IT industry as a whole is generating neologisms and new metaphors at an accelerating rate as new technical and organizational possibilities continue to emerge. The outcome is that the source language for the expression of theory lags as a restricted and somewhat old-fashioned subset of the "street" language being used for contemporary business and technical communications.

The idea that this could be a fruitful field of study was strengthened by a high-level review of communications dealing with the application of information technology in emerging forms of electronic commerce (e-business). As a new and exciting field for research, e-business is an area where traditional business concepts are proving inadequate to the burden of communication, and where metaphor-based modes of explanation offer powerful alternative modes of explanation. The most salient example is that of "the world-wide-web," where the metaphor "*set of interlacing connections* is *web*" has proved to be a remarkably effective way of conceptualising the applications which make up the information transfer structure enabled by the internet. Extensions of the web metaphor

can be found in the use of the term "spider" to refer to pieces of software which "crawl around the web" in search of browser links.

Theoretical Framework

A list of major IT-driven trends during the last two decades must include (roughly in temporal order) such things as "information engineering," "strategic information systems," "IT for competitive advantage," "IT outsourcing," "business reengineering," "enterprise resource planning (ERP) software," "data warehousing," and "e-commerce." All have had something to offer both technically and from a business perspective, yet all (apart from e-commerce, where the cycle has yet to run its course) have been oversold and over-hyped, to the extent that failed business initiatives have resulted almost as a matter of course.

A generalised trajectory for each of these trends can be defined, and comprises the following four-stage sequence:

1. a period during which articles discussing and promoting the new ideas start to emerge.
2. a period during which the relevant concepts become the height of fashion, and the trickle of articles becomes a torrent.
3. a period during which doubts begin to emerge and interest to wane somewhat, and
4. finally a period during which some level of ongoing interest sediments out, and the concepts become a more stable part of IT theory.

Broadly speaking, this is a standard fashion cycle (Abrahamson, 1996). The difference is that the level of interest remaining at the end of the cycle is not characteristic of fashions in all areas, and reflects the fact that IT trends always have some technological and business substance.

Initial research has suggested a theoretical framework that will incorporate elements from areas other than that of metaphor theory. These include both management fashion theory and cognitive dissonance theory. Management fashion theory is the source of concepts relating to the origins of fashions driven by business community expectations rather than fashion setters alone. It provides a theoretical base for understanding how managers and organizations can be coerced by the market and by their shareholders to commit to following a general trend. In Abrahamson's terms, a management fashion is "largely a cultural phenomenon, shaped by norms of rationality and progress" (Abrahamson, 1996, p.261).

The conjunction of metaphor theory with cognitive dissonance theory arose in the context of the interface study discussed earlier, but early investigations indicate it will also have relevance to this new study. Thus one of the issues of interest is to explain how IT trends can emerge so strongly and then disappear within a business climate characterised by quite high levels of management resistance to, or dislike of, information technology and its effects. Dissonance theory suggests that managers committing to a new IT trend may well experience some degree of discomfort at doing so. Extrapolating from this leads to the theoretical proposition that dissonance will tend to cause managers to commit only half-heartedly to new IT initiatives, or to do so without attempting to understand the issues in any depth.

The aim of the study is to understand, within a broad theoretical framework, how metaphors are used in the processes that generate and maintain an IT trend. That metaphors are used in this way is relatively easy to demonstrate; establishing the actual mechanisms involved is expected to be a much more complex undertaking.

An Illustrative Aside

Metaphor theory and the study of metaphors in action can be extremely illuminating. It must also be acknowledged that, for anybody who enjoys language at any level, metaphor research can also be interesting simply in its own right. This is particularly so with respect to the search for metaphorical usages, and especially where the trail leads through the hyperbole-laden verbal thickets conjured up by marketing and

management gurus. With this in mind, I round off the paper with a few examples of the usages in question.

The example comes from a search through the IT supplements published as part of the Tuesday, June 27, 2000, edition of a national daily newspaper. The source of the material, *The Australian*, is a newspaper that has established a high IT profile by means of its weekly (Tuesday) publication of an extensive IT supplement. On the day in question, the supplement incorporated an insert titled "eXec," which was concerned with the ways in which "CEOs and CIOs are tackling the e-commerce revolution." While it might be expected that the material for a technology supplement would generally be couched in literal terms, even a superficial analysis revealed the widespread use of figurative language.

Grounding Metaphors

My research has indicated IT discourse generally is deeply influenced by two closely related metaphors. While the phrase "root metaphors" has been used in a number of contexts to refer to fundamental and highly influential metaphors (Ortony, 1993), I am avoiding this usage in the absence of formal data analysis. Anecdotal and circumstantial evidence does nevertheless suggest that the term will eventually be warranted.

The first of these two metaphors is "the organization as *problem*, the specific application of IT as *solution."* The second is "the organization as an entity which is *ailing, bloated,* or *ill*, and the application of IT as a *form of surgery."* Both metaphors are pervasive, and both share the key characteristic that IT becomes simply a value-neutral tool or prescription able to be "applied" to the relevant issue. From the theoretical standpoint, these metaphors can be seen as an expression of means-end reasoning, or the technocratic attitude usually invoked at more abstract levels in dystopian theory (Fischer, 1990).

The proposition underpinning the research is that the two metaphors tend to be used in similar circumstances, but that the first is invoked more or less as a matter of course, and the second when a rhetorical element is involved. Thus "IT as solution to organizational problem" is routinely cited in areas such as:

- ERP software as a solution to the legacy systems problem (Davenport, 1998).
- Radical business reengineering as a solution to the problem of an outmoded organizational structure (Hammer and Champy, 1993).
- IT as operating in a "solution space" (Checkland and Howells, 1998).
- In a tangential example, the IT unit itself becomes the problem for which outsourcing is the solution (Pinnington and Woolcock, 1997).
- E-commerce, where numerous organizations are representing themselves as custodians of IT solutions to the problem of establishing an e-commerce presence (McBride, 1997).

Examples in this category from "The Australian" supplement were numerous and included references to "ERP solutions," "ASP (application services provider) solutions," and "network solutions." In a more detailed example, WAP (wireless access protocol) technology provided a powerful "wireless internet application solution" for "road warriors" (businessmen using laptop computers). Advertisements suggested that Unisys could provide "e-@ction solutions" for customers with e-business problems, that company I2's "intelligent eBusiness solutions" were of value because I2 realised that the "real meat of eBusiness [was] just below the surface," and that Telstra was able to "tailor a business solution for you." Unusually, the more emotive message of the "surgery" metaphor was absent apart from one instance in which it was suggested that the internet offered a way of "taking a knife to whole layers of costs."

In general, the "solutions" and "surgery" metaphors operate to suggest that businessmen and organizations interested or worried by e-commerce should not be constrained by "unwarranted" technology concerns. There is, at a slightly deeper level of analysis, a

clear implication of writers and advertisers portraying technology concerns as phobic rather than justified, given the inherent reliability of the technology. This is, of course, radically inconsistent with published research findings which suggest that e-commerce successes have to date been extremely rare (Kotha, 1998).

Other Examples

Additional metaphors, as well as other forms of figurative speech, were also in evidence. Many expressions were concerned with creating or augmenting a sense of urgency. Thus companies were informed that an immediate e-commerce venture would result in "picking the low-hanging fruit," that "slow" organizations needed to "get the fire lit" to survive, that Australian companies were "dragging their feet," and that internet involvements "grease the wheels" of capitalism.

Many of these metaphors are routine. More arresting, though ultimately more obscure, was the suggestion that traditional companies were under threat from the people "with pink hair and no processes." Similarly impressive was a Gartner Group representative who managed to combine the creation of a neologism (" mind-share") with two metaphors, when suggesting that new "players" in the internet device market would need to win enough "mind-share" to create "critical mass."

This small exercise also showed some figurative terms steadily becoming part of the general e-commerce vocabulary. Metonymy is a trope in which a reference from a contiguous domain is used to describe a related entity (a standard example is the expression "the *ham sandwich* has asked for his bill" (Gibbs, 1993)). Metonymic expressions can be both pithy and highly effective as in "clicks and mortar," which uses two metonyms to refer to a traditional organization which is also operating as an internet-based company. In one example of this, a frequently used metaphor was also invoked to suggest that "clicks and mortar" companies needed to be careful not to "cannibalise" their existing markets.

Summary and Conclusion

The use of metaphors for rhetorical purposes remains a feature of modern business, advertising, and technology communications, and the types of expressions in popular currency can provide valuable insights into the issues seen as significant at any given time. But the grounding metaphors that shape core patterns of thought have been shown to be of even greater significance for understanding how some possible directions become viable while others fade and eventually disappear.

It is generally accepted that the contemporary IT industry is continuing the processes of societal transformation initiated with the computing revolution. The internet and the world-wide-web are among a group of technologies with compelling power to change lives. There are however some critical differences in the ways various interest groups see the role and the value of information technology. In particular, should it be understood as a value-neutral set of tools to be applied as required, or as the representation of a technical ideology with all the cultural and societal questions that entails.

The way language is used will continue to be a key factor in the way this and other debates unfold. This paper has sought to show how metaphor can provide a perspective from which to analyse many of the key issues. The IT case provides one example of areas where pervasive metaphors such as that of the "solution" and the "surgical instrument" can be used to impose a form of tunnel vision on discussion.

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