

Only the tip of the iceberg: Who understands what about metaphor?

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Abstract

In recent years there has been an upsurge of interest in figurative language. Much of this work has focussed on tests of the ‘standard pragmatic model of metaphor’ in which metaphor is seen as a special process which can only occur after a defect is found in the default literal processing. This view has been largely refuted, and current thinking sees metaphor as much more central to language and cognition. This paper explores how the characteristics of metaphor may interact with the characteristics of the comprehender in metaphor understanding. © 1999 Elsevier Science B.V. All rights reserved.

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1. Introduction

By way of introduction, come with me for a brief trip. First, imagine that you are a student in general psychology. Freud’s concept of personality is being described in terms of an iceberg. Your mind plays with the implications. The part of the iceberg that can be seen above the water is the tiny part of personality available to consciousness; below the water is the vast domain of the Id – unconscious, unseen, and powerful. Now, imagine that you are in a labor and industrial relations course. A successful African-American businesswoman describes herself as a bigamist. She feels as though she has one family in mainstream American culture and another in African-American culture. How can she come to terms with her conflicting loyalties? Finally, you sit in a movie theater. A dying man powerfully communicates the idea of the cycle of life to two young children by the simple act of biting into an apple.

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Metaphor, as the interaction of two dissimilar concepts, is ubiquitous in our environment. It comes in a number of guises – visual, auditory, and linguistic. It is used as a tool in teaching, as a powerful tool in literature and art, as a persuasive technique in communication and marketing, and even as a foundation for theorizing about human behavior (Sternberg, 1990). In some ways metaphor unites us. Universal metaphors based on common human experiences may help us to empathize with others with whom we seem to share so little. Anger may be expressed as heat, and our sexual passions as a sumptuous feast. But let's go back for a moment to our opening examples. How did we understand the implications of the iceberg metaphor? Did we first attempt a literal meaning, or did we directly extract the metaphorical? Did every reader's mind make the same associations and extract the same meaning? In this paper I will discuss these issues. Beginning first with issues of processing, we will then move to the issue of individual differences. My basic thesis is that the meaning of metaphor exists neither 'in' the metaphor nor 'in' the comprehender, but rather it involves a complex interaction involving messenger, message, and receiver all existing within a shared cultural context (Trick and Katz, 1986).

2. How do we understand metaphor?

Metaphor has a long and controversial history, going back at least to the views of Aristotle, who spoke both of metaphor's brilliance and dangers. However, discussions of metaphor continued to be the realm of philosophers and poets until the birth of the disciplines of linguistics and verbal learning. From both of these perspectives metaphor was much like a child born out of wedlock – difficult to deny, but embarrassing to claim. Within the standard view that language was fundamentally literal and compositional, the noncompositional and ambiguous nature of metaphor defied attempts at simple explanations. Many students of language simply ignored the problem, happy to relegate metaphor to the realm of a literary embellishment, nice but not necessary. Others, realizing that metaphor could not be easily ignored, began to see it as a matter not of language meaning, but rather of language use and, therefore, belonging to the field of pragmatics. This was a notable step forward, in that it acknowledged metaphor as a vital part of human communication.

The standard pragmatic model (e.g., Searle, 1979) saw metaphor comprehension as an indirect process. Each utterance was first subjected to an obligatory literal compositional analysis. If this analysis could not be completed because of a violation of pragmatic principles, then a special figurative process would be activated and, using whatever contextual information was at hand, the speaker's meaning would be extracted. The greatest benefit of this model is that it made several clear and testable predictions.

One prediction of the standard model was that literal processing should be obligatory, whereas metaphor processing should be optional. That is, metaphor processing should occur only if triggered by a defective literal meaning. Glucksberg and colleagues (Glucksberg et al., 1982) cast doubt on this with a series of studies in which

judgments of literal truth were interfered with by the automatic processing of figurative meaning.

A second suggestion of the standard model was the existence of a special metaphor processor which might be primed to facilitate additional metaphor comprehension. Inhoff et al. (1984, Experiment 2) found evidence for this process priming hypothesis in that related metaphorical contexts provided more facilitation to target metaphors than related literal contexts. However, the process priming hypothesis predicted that the reading of one metaphor should prime the processor even when context and target metaphors were completely unrelated. A test of this stronger prediction found no evidence of facilitation by an unrelated metaphorical context and, therefore, no evidence for a special metaphor process (Blasko and Brihl, in press).

The prediction that has received the most attention is that a metaphorical statement should take longer to process than a literal statement with the same meaning. This is because figurative meaning should be processed only after a literal meaning has been attempted and rejected. A number of studies have found that this is not necessarily the case. When metaphors are presented in a sufficiently supportive context, they may be read as quickly as literal statements (Ortony et al., 1978; Inhoff et al., 1984; for a different view, see Janus and Bever, 1985). In fact, we now have direct evidence that the figurative meaning of a highly apt and familiar metaphor is rapidly available in parallel with the literal meaning of the vehicle (Blasko and Connine, 1993).

3. Metaphor as cognitive process

Taken as a whole, these results spelled the demise of the standard model, but the findings also contributed to a fundamental shift in the way that we view metaphor and its relationship to literal language. In fact, the very distinction between literal and figurative language has been questioned (e.g., Gibbs, 1994; Rumelhart, 1979). Rather than thinking of metaphor as an all-or-nothing phenomenon, it may be more useful to see it on a continuum of conventionality. Just as the standard assumptions about metaphor have been challenged, so have the standard views of literal language. The fixed structures of knowledge underlying the standard view of literal language have been shown to be much more dynamic than was once thought. For example, research has shown that we flexibly create ad hoc categories ('things to take on a camping trip') as the need arises (Barsalou, 1987).

According to current views, therefore, metaphor is more than a linguistic device; rather it is seen as a reasoning and inferential process (Cacciari and Glucksberg, 1994). For example, Lakoff's contemporary model of metaphor (Lakoff, 1987, 1993; Lakoff and Johnson, 1980) views metaphor as fundamental to the structuring of our conceptual knowledge. According to this view, metaphor involves the mapping of complex conceptual domains. For example, one of the root metaphors in Western industrialized cultures is TIME IS MONEY, leading to the easily understood, almost literal, metaphorical expressions: *Don't waste my time. Spend your time wisely. It cost me a whole hour.* Much effort has gone into exploring these complex

metaphorical mappings. However, the degree to which metaphorical systems of thought contribute directly to the comprehension of figurative expressions remains an open question. Some evidence supports a direct role in the processing of metaphor (Kemper, 1989) and idioms (Gibbs, 1994), whereas other evidence does not (e.g., Glucksberg et al., 1993). Lakoff (1993) argues that additional models of metaphor comprehension are unnecessary because metaphorical expressions are understood by direct contact with a conceptual metaphor. One problem is that the contemporary theory provides few details to help us understand the way in which different types of metaphors are understood by different people. It does not tell us which conceptual metaphor should be used under what conditions, or which metaphoric expression will be considered most apt, comprehensible, and familiar to the reader or listener.

These are all important questions which any model of metaphor (and language) must address. Research has shown that several characteristics of the metaphor influence how the metaphor is rated and the speed with which it is comprehended. Metaphors which evoke vivid mental imagery may be understood and remembered better (for a discussion see Paivio and Walsh, 1993). These findings have led many to comment on the relationship between metaphoric and perceptual processes (e.g., Lakoff and Johnson, 1980; MacCormac, 1985). Aptness or metaphor goodness is another important factor. Trick and Katz (1986) found higher aptness ratings when the metaphor terms were taken from relatively dissimilar semantic domains but held similar positions within those domains. For example, the metaphor, *Saddam Hussein is a cobra*, may be considered relatively apt because the domains of world leaders and snakes are quite dissimilar, while within their respective domains both are very high on the dimension of aggressiveness.

According to the categorization approach (Glucksberg and Keysar, 1990), an apt metaphor is one which is prototypical to the ad hoc category created by the interaction of vehicle and topic. For example, in the metaphor *The ideas were gold*, the vehicle 'gold' is being used as the name of an ad hoc category of 'things which are rare and valuable'. Therefore, although there are many things that are rare and valuable, including silver and platinum, metaphors like *The ideas were platinum* is not quite as apt because platinum is not a prototypical member of the ad hoc category.

Another variable with demonstrated importance is familiarity. Many words such as the 'leg' of a table begin as a metaphorical extension and later became lexicalized. We know that familiarity breeds liking. Individual ratings of familiarity are at least moderately correlated with goodness (Katz et al., 1988). Familiarity also influences on-line processing. Using a cross-modal priming technique, Blasko and Connine (1993) found that high familiar metaphors showed immediate activation of the figurative meaning of the metaphor. Low familiar metaphors showed activation only if they were also fairly apt. In another study (Blasko and Briehl, in press) which tracked readers' eye-movements, high familiar metaphors were read more quickly even when aptness and imagery were held constant. However, this same study also found that familiarity may not necessarily confer a memory advantage. Perhaps less familiar metaphors are somewhat more memorable because of their novelty, therefore canceling out any advantage added by familiarity.

Although by no means an all inclusive list, we can now point to several characteristics of metaphor that may be theoretically important: aptness, imagery and familiarity. However, all of the results that we have discussed thus far have made the highly questionable assumption that metaphors are understood in the same way by everyone. The next section takes up the important issue of individual differences.

4. Individual differences in metaphor processing

People differ widely on any number of cognitive and linguistic processes, and these differences often have serious theoretical and practical implications. Go back to our earlier example: 'For Freud, personality was like an iceberg'. Metaphors such as this can be very useful teaching tools in that they provide a conceptual hook for new ideas in terms of well-known concepts. Whenever we present a metaphor, however, we take a risk that the inferences drawn may not be the ones that were intended. For example, in an essay exam a student of mine once interpreted the iceberg metaphor as, 'Freud thought people's personalities were cold and hard as ice'. Although 'cold and hard' may be characteristics of icebergs, they are obviously not the ones intended. Of course, this same argument – that metaphor is ambiguous and serves only to cloud the truth – has often been used to argue that metaphor should be avoided in teaching, writing, and especially in the realm of science, where we are most concerned with verifiable 'truth'. But as has been pointed out, metaphor exists everywhere, including in science, and its very indeterminacy is also its creative power. The answer, therefore, lies not in rejecting metaphor, but rather in understanding more about this powerful conceptual process and how it varies among individuals.

There have been fewer studies on the characteristics of the comprehender than on the characteristics of the metaphor despite the fact that the understanding of at least one form of structural metaphor (analogy) is often used in intelligence and placement testing (e.g., the Miller Analogy Test). In one of the few studies that have been conducted, Trick and Katz (1986) found that students with high analogic reasoning scores rated metaphors with dissimilar domains more highly. It was as though they were more sensitive to the structural correspondence between domains.

Individual difference measures thought to be important to the underlying cognitive processes of metaphor should also be explored. If metaphor involves creating a bridge between dissimilar semantic domains and filtering out or suppressing unimportant characteristics while selecting relevant ones, then it should require considerable working memory capacity for both the access and mapping processes. In the past few years evidence has been accumulating that individual differences may predict performance on a variety of linguistic tasks (Gernsbacher, 1990; Just and Carpenter, 1992). For example, the capacity theory of language (Just and Carpenter, 1992) suggests that individual differences in working memory capacity constrain the processor in such a way as to provide functional limitations on the speed and efficiency of comprehension. To my knowledge, there has been little research to date on

working memory and metaphor, so I will begin by describing related studies and then review some ongoing work in my lab.

In a series of studies, Johnson and Pascual-Leone (1989) used the Figural Intersection Test (FIT) to get a measure of modality free general capacity or m-space. Children with higher FIT scores gave more in-depth interpretations of simple ambiguous metaphors such as *My sister is a rock*. Research with bilingual adults (Johnson and Rosano, 1993) also found that a metaphor interpretation task tapped general cognitive processes that were relatively independent of an individual's abilities in a specific language.

Recently I began to investigate the influence of working memory capacity on the rating and interpretation of metaphors (Blasko and Trich, 1997). In one study 32 metaphors were selected from the norms of Katz et al. (1988). Forty subjects were pretested for working memory capacity using the reading span task developed by Daneman and Carpenter (1980). In the reading span task, participants read sentences aloud while trying to remember the final word of each sentence. The set size gradually increased from two sentences per set to six. Based on the pretest, 27 participants (nine each in the low, medium, and high working memory span groups) completed a rating and interpretation task. Each participant was given a packet containing the metaphors and was asked to read and interpret each metaphor in his or her own words. If the participants felt that the metaphor had more than one meaning, then they were asked to list additional meanings on each successive line. They were then asked to rate the metaphor using a scale of 1 (very low) to 7 (very high) for ease of interpretation, aptness or goodness of the metaphor, and familiarity. If working memory capacity constrains metaphor processing, then low span subjects may have more difficulty understanding and interpreting the metaphors, thereby leading to lower aptness and comprehension ratings as well as poorer interpretations.

Although there were no stated time limits, on average low span subjects took the longest (36 minutes), followed by medium span (34 minutes) and finally high span subjects (29 minutes). Contrary to predictions, there were no significant differences between the span groups on the three rating scales. Low span subjects were just as likely to say that the metaphors were apt, familiar, and easy to interpret as high span subjects. However, the subjective feeling of understanding tells us little about exactly *what* one understood. Therefore, it was important to analyze the interpretations provided by each subject. First, we counted the number of interpretations for each metaphor. Then we counted the number of words in each interpretation as a rough estimate of a participant's depth of interpretation. While a larger number of words may mean a richer interpretation, this is not necessarily the case. For example, one subject described the metaphor *the mosquito is a vampire* as, "The mosquito, like the vampire that it is being compared to, likes to suck blood". This interpretation, at 12 words, doesn't really say any more than another subject's two word interpretation, "Sucks blood". Therefore, four undergraduate research assistants, blind to the writers' span score, coded each interpretation on a scale of 1 (low quality) to 7 (high quality). A high quality interpretation fully explored the depth of the metaphorical meaning, whereas a low quality interpretation might focus on a single surface feature. During training, the possible interpretations of each metaphor were

discussed and practice was given using the scales. Correlations between raters were high, averaging .72, so the four ratings were averaged to produce the final score.

The results of these analyses showed a clear effect of working memory capacity. As reading span increased so did the number of words in the interpretation. Importantly, span also predicted the quality of those interpretations. The most detailed and complete interpretations were given by high span subjects. Take for example the low familiar metaphor *Thought is a snake sliding and coiling on warming stones*. One low span subject gave this metaphor a 5 on ease of interpretation but then merely restated the metaphor, 'Thought is like a snake coiling around'. Another low span subject rated it a 4 and provided somewhat more, 'Thought are [sic] constantly moving'. In contrast, a high span subject, who also gave the metaphor a 4 for ease of interpretation, provided the much richer interpretation, 'The snakes moves [sic] like the neural messages in the cortex during the thought process. The thought process warms and activates the brain like the stones warm the snake'.

We can see the differences between groups in more detail when we compare the correlations for high and low span groups. Consistent with previous rating studies (e.g., Katz et al., 1988), familiarity was related to aptness and ease of comprehension for all subjects. But for low span subjects, ease of comprehension also correlated with the quality of the interpretation ($r=.53$, $p<.01$) whereas this relationship was much weaker for high span subjects ($r=.30$, $p=.09$). Similarly, quality of interpretation was significantly correlated with the number of words in the interpretation for high span subjects ($r=.45$, $p<.05$) but not for low ($r=.02$, $p=.90$). In cases where low span subjects did use many words, they often repeated themselves or used empty filler words. One other interesting difference was that for high span subjects the number of interpretations was positively correlated with the aptness of the metaphor ($r=.33$, $p<.05$) whereas for low span subjects just the opposite was the case. Metaphors with more interpretations were seen as less apt ($r=-.54$, $p<.001$). In general, then, greater working memory capacity predicted the extraction of richer interpretations, and the enjoyment of more challenging metaphors with more possible interpretations.

5. Implications for future studies

Although limited by the small number of subjects and stimuli, these results suggest that individual differences play a role in metaphor comprehension and interpretation. In addition, they point out some important methodological issues for future work. First, it is important to study which characteristics would be theoretically likely to influence comprehension, but we may draw incorrect conclusions if we neglect to factor in individual difference variables. Second, results must be confirmed with divergence tasks measuring different aspects of metaphor understanding. Psycholinguists have tended to favor on-line measures which identify the initial 'click' of comprehension (Gibbs, 1994). This has been important to define the outer limit of comprehension and to compare different types of stimuli. However, it is also important to study later stages of interpretation in which the full depth and richness

of a metaphor's meaning are grasped. In the previously described study, if we had only looked at group differences in ratings, we might have been misled into thinking that working memory plays no role, even though the groups were clearly interpreting and/or expressing those interpretations quite differently.

The final point is probably the most important. As we have tried to make the study of metaphor seem more legitimate, we have focused on the ways that metaphor and literal language are similar, but in the process we should not lose sight of the ways in which they are different, if not in kind, certainly in degree. The vast difference that teachers of English notice in their students' grasp of figurative language is no doubt a result of many complex processes, including general cognitive factors such as capacity and imagery ability, motivational factors we have not even mentioned, as well as domain specific factors such as vocabulary and historical knowledge. Metaphor asks us to stretch our imagination, draw our own links, and in so doing often brings us to new insights. In this way, it is very much a creative process.

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