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Constraints on Word Meaning in Novel Metaphorical Phrases

by

© Jeremiah Michael Faries

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Constraints on Word Meaning in Novel Metaphorical Phrases submitted by Jeremiah Michael Faries in partial fulfilment of the requirements for the degree of Master of Science.

Alinda Friedman
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Date Aug 6, 1986

Abstract

Two experiments examined the relative influence of the salience of the attributes in the predicate term versus the expectancy factors of the subject term in the comprehension of simple sentences. Previous research on metaphor comprehension has been concerned primarily with the salience of the attributes for the component terms of the sentence and how priming of those attributes facilitates comprehension. An argument is presented in which the restrictions on word meaning provided by immediate context (syntactic and semantic) and surrounding context (semantic) may also influence the ease with which metaphorical sentences are understood. It is further argued that the restriction/expectancy effect may be the most natural source of contextual facilitation. A set of general principles are outlined which may guide development of theories of comprehension. Specifically, mechanisms are suggested which could account for the comprehension of both literal and metaphorical statements with the same set of processes.

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I. Introduction

Figurative language can be defined as language that expresses one thing in terms that usually denote another (Ortony, 1980). If interpreted literally, a figurative statement is often false. For example, hyperbole is literally untrue overstatement, synecdoche does not contain the whole truth, and some metaphors are categorically false. Superficially, it may appear that figures of speech are deviant forms of language.

Historically, explanations of language comprehension have treated figurative language separately from literal language (see Black, 1962; Searle, 1977). Recently, though, there has been considerable interest in determining whether separate processes are required to account for the comprehension of metaphors versus the comprehension of literal language or whether instead all forms of comprehension should be accounted for in terms of a single set of processes (Gildea & Glucksberg, 1983; Glucksberg, Gildea, & Bookin, 1982; Ortony, Schallert, Reynolds, & Antos, 1978).

Much of the research on comprehending figurative forms of language has used metaphor as the prime exemplar of figuration. In this thesis I will do likewise and will concentrate on sentences of the general form *X is Y*. The terminology used to describe metaphor reflects the tendency to view it as separate from literal language. Traditionally, in a metaphor like *Her voice is a trumpet*, the first term *voice* has been variously referred to as the subject (conventional grammar), the topic (Black, 1962), or the target (Gentner, 1982). The second term *trumpet* has been referred to as predicate (conventional grammar), the vehicle (Black, 1962) or the base (Gentner, 1982). The basis for the intended meaning of the statement (e.g., *very loud*) has been called the *ground* of the metaphor (Black, 1962; Richards, 1937). Hereafter the X and Y terms will be referred to as the subject and the predicate respectively, whether we are referring to figurative or literal statements.

What are the contributions of the subject and the predicate terms in the formation of the ground? Previous research has emphasized the salience of the ground attribute in each of the two terms of the metaphor (Inhoff, Lima, & Carroll, 1984; Ortony et. al., 1978). For

example, in the metaphor *That billboard is a wart*, the influence of the two terms *billboard* and *wart* has been said to arise from the salience of the attribute *ugliness* for each of the two terms.

Any particular word may have many components of meaning or attributes which are associated to that word. The salience, or strength of association, varies from attribute to attribute. Salience is typically measured by frequency norms. Subjects who are asked to generate features for a particular word will generate the features or attributes that are most strongly associated, or most salient, for that word. Any relatively salient aspect of the meaning of a word can be used to convey information, but the attributes for any particular word vary in their salience. The higher the salience of the attributes the more likely they will be the aspect of meaning used in the interpretation of a sentence.

In this thesis I propose and test an alternative explanation for the influence of the subject term. I will examine the influence of the subject term as one of expectation. In other words, the phrase *That billboard is* leads us to expect predication of particular characteristics and restricts predication of other characteristics. This view of the influence of the subject term essentially treats the subject term as an element of context.

Contextual influence must also be defined in a discussion of sentence comprehension. There are two broad ways in which we can partition context. Long term context would be a lifetime of experience which has influenced the level of salience of the attributes for any term. Short term or immediate context would be the surrounding linguistic or non-linguistic influences occurring at or close to the time of comprehension. Short term context can be further partitioned into immediate sentential context or textual context. Sentential context is context provided by the immediate phrase constituents within which a given word is situated. Textual context refers to the context provided by an entire discourse or conversation. For the purposes of this thesis the linguistic short-term sentential influences will be the focus of the discussion and empirical manipulations. In particular, the subject phrase of the sentence will be treated as context that influences the meaning of the predicate term.

Sentential influences can also be partitioned into syntactic versus semantic constraints. For example, the phrase *The boy ___ to the door* restricts the acceptable meaning for any word inserted into the blank. Syntactically, the sentence restricts the acceptable meaning to an intransitive verb or verb phrase. Thus, in understanding such a phrase, the word substituted for the blank will have an interpretation bias as a verb.

In addition to the syntactic constraints, minimal sentential context may also provide semantic constraints. In the above example the acceptable meanings may be restricted to actions that involve moving to the door. Moreover, the semantic constraints provided by *boy* restrict the meaning to the actions which boys can do. Thus, the word substituted into the example sentence will be interpreted, in part, according to syntactic and semantic restrictions. If some of the highly salient components of meaning of the predicate do not fit the constraints, then they likely will not form part of the interpretation. For example, the interpretation of *The boy flew to the door* would not likely include motion through the air unless we had already established this boy to be Peter Pan. Only the components of meaning of the word *flew* that fit the semantic constraints of the sentence, such as fast movement, would be the comprehended meaning.

One of the major issues in metaphor comprehension has been whether or not two sets of comprehension processes are required to account for literal and metaphor comprehension. One side of the dispute suggests that, in comprehending a sentence, a literal interpretation of a statement is always attempted first and extra inferencing occurs if the literal meaning is not contextually appropriate (Searle, 1977). This view makes much of the distinction between what is said and what is intended. The opposing view (e.g., Gildea and Glucksberg, 1983; Glucksberg et. al., 1982; Ortony, 1980) holds that given adequate contextual information the comprehension of literal and metaphorical statements can be accomplished with equal ease using a single set of processes. Most empirical evidence appears to support the latter view (Ortony et. al., 1978; Glucksberg et. al., 1982). If we should account for literal and figurative comprehension with a single set of processes, then it is necessary to refine current

theories of language comprehension so that they could do so. This paper examines the issues reconsidering the role of the subject term of the phrase in the derivation of meaning.

A. Background Research

If the processes used to comprehend metaphor are different than those used to comprehend literal language, then it is necessary to specify the conditions which trigger the use of the metaphoric comprehension process instead of the usual literal comprehension process. Searle (1977) suggested that the necessary condition is one of literal falsity or anomaly. He claims that the comprehension of metaphors involves three stages. First, an individual attempts a literal interpretation of the text. Second, this interpretation is then compared with the current context. If it is found to be false or anomalous with respect to that context then a figurative meaning is inferred. If Searle's stage model is correct then the comprehension of figurative statements should always take longer than the comprehension of a literal counterpart because an extra inferential step is required.

Clark and Lucy (1975) tested such a prediction using indirect requests as stimuli. Indirect requests are phrases such as *Do you mind opening the window?*. The literal response to that question would be a simple yes or no, whereas the intended request is that the listener actually open the window. Clark and Lucy (1975) had participants verify whether an intended request had been complied to and found that indirect requests took longer to verify than did direct requests. Moreover, they also demonstrated that responses were affected by aspects of the literal meaning of a phrase. Two phrases that had the same intended meaning would be more or less difficult to comprehend depending on whether the literal interpretation involved a negative or positive interpretation. For example, the two phrases *shouldn't you open the door* and *should you open the door* are both indirect but the former requires a negative interpretation in the literal meaning of the phrase. Clark and Lucy argued that these effects would only be manifest if the literal meaning of the statement was interpreted. These findings were consistent with the hypothesis that a literal interpretation must be rejected before a figurative

meaning can be inferred.

Gibbs (1979) argued that the stimuli presented in Clark and Lucy's (1975) study lacked a natural amount of context. He therefore employed a procedure similar to theirs but embedded the indirect speech acts in paragraphs. He argued that a paragraph setting provides enough contextual support to make comprehension of indirect speech acts as easy as the comprehension of direct ones.

Gibbs (1979) found no time differences between the comprehension of direct and indirect speech acts, which suggests that if a stage model is appropriate at all it may be so only in cases where there is insufficient contextual support. Since most communication takes place in an appropriate contextual environment, the stage model may be suitable only for unusual language experiences.

If the comprehension of metaphors requires a stage in which a literal truth judgment is made regarding the statement, then the time it takes to make a literal truth judgment should not be affected if the statement has a metaphorical meaning. Glucksberg, Gildea, and Bookin (1982) tested whether the comprehension of metaphors was automatic by implementing an experimental design analogous to the color-word interference technique introduced by Stroop (1935). Automatic in this sense meant only that it was non-optional. A stage model suggests that the figurative sense of a phrase would be optional if it made no literal sense. Participants were shown sentences like *Some jobs are jails* and were required to respond whether they were literally true or literally false. The experimenters reasoned that if the processes used to comprehend a metaphoric meaning are optional, then there should be no interference from metaphoric statements in a task that required a literal truth judgment. If, on the other hand, metaphor comprehension processes are automatic, then having comprehended a metaphoric meaning should interfere with judgments in a literal sentence verification task. Glucksberg et. al. (1982) found that good metaphors - metaphors that had an easily accessible alternate meaning - did slow down reaction times for a literal sentence verification task, thus lending support to the hypothesis that metaphor comprehension

processes are automatic.

In defense of the stage model, one could argue that a literal meaning is sought first but that the search for alternate meanings is automatic if a literal interpretation of the phrase is either categorically false, anomalous, or inconsistent with prior context. If this search were automatic, frome would expect interference on any anomalous phrase. Glucksberg et. al. (1982) did not find this. It was only for good metaphors that the interference effect was found.

Ortony (1980) pointed out that, because of contextual support, there are many metaphors that are not literally false. For example, there are entire sentences that can be used metaphorically: *Regardless of the danger the troops marched on.* Depending on the context, this sentence could be literally true, metaphorically true, or anomalous. Likewise, the idiom *She's no spring chicken*, as most often used, is literally true as well as metaphorically sensible. Although literally true, it is not literally very informative. To interpret figurative statements that are also literally true the extended meanings must be arrived at in ways other than a rejection of literality based on truth value.

It may be better to consider the comprehension process as one based on informativeness rather than literal truth. If, for whatever reason, a statement is not informative, then extra inferencing may be required. I suggest that it may be more fruitful to examine the factors that render many metaphors presented without context uninformative. In other words, the problem to solve is what the deficiencies are in an isolated metaphor that lead to anomaly such that context can alleviate the deficiency.

To the extent that many metaphors without context are uninformative, this suggestion appears very similar to Searle's. The extra stage proposed by Searle (1977), however, would be seen, by my view, as an extension of the usual comprehension process. Grice (1975) suggests that the *cooperation principle* applies in normal conversation. This is an implicit agreement between the speaker and the listener that the speaker is communicating some information. I suggest that this so-called implicit agreement is more than just an agreement,

but is a principle upon which our comprehension processes are based. Theories of comprehension should reflect such a principle: if information is readily accessible it will be processed.

The mechanisms through which context has its effect are still relatively unspecified. Gibbs (1979) simply presented the indirect request stimulus in a natural paragraph but did not specify which aspects of the natural setting could lead to a decrease in comprehension time. By examining the effects of various contextual influences on the comprehension of phrases we can gather clues to the important variables that influence comprehension.

Gildea and Glucksberg (1983) followed up on the Glucksberg et. al. (1982) study by examining the effects of context on the difficult to understand metaphors of the previous study. A relatively difficult to understand metaphor like *some marriages are iceboxes* was preceded by a statement that suggested something about the ground of the metaphor. For example, the ground of the above metaphor may be something to do with emotional coldness. Gildea and Glucksberg found that when the prime sentences were relevant to the ground concept (e.g., *some people are cold*) the time to make a literal truth judgment was increased. Thus, by priming the ground of the metaphor, the comprehension of the metaphorical meaning became more automatic and interfered with a literal truth judgment.

Gildea and Glucksberg (1983) argued that this kind of contextual facilitation of metaphor comprehension may be very similar to the processes that disambiguate ambiguous words. They claim that one major reason that some metaphors are difficult to understand is that a single meaning is not clearly indicated. Likewise, an ambiguous word may have two or more highly salient attributes so that without sufficient context it is unclear which of these salient attributes is appropriate. The difference between metaphors and ambiguous word phrases may be that the meaning component used in a novel metaphor may have a lower frequency of usage than the alternate ambiguous word meaning. If, however, a novel use of a word becomes frequent the result may be polysemy.

Inhoff et. al. (1984) counter Gildea and Glucksberg's (1983) claim that metaphor comprehension is much like disambiguation of ambiguous words by asserting that the contextually incorrect interpretation of a polysemous word is rarely noticed whereas "reading a metaphor does sometimes invoke awareness of the literal as well as the metaphoric meaning". Inappropriate meanings are also activated, however, when understanding an ambiguous word as well. For example, Greenspan (1984) presented individuals with sentences in which either a central attribute or a peripheral attribute was emphasized. For example, *The man lifted the piano*, emphasizes the heaviness of pianos. Heaviness is considered to be a peripheral attribute of piano, whereas musicality would be a more central attribute of piano.

Greenspan (1984) was interested in the differential recall value of central and peripheral attributes of words. He found that when peripheral attributes had been emphasized central attributes still served as good recall cues, whereas the converse did not hold. It appears, then, that the general case is that the central or more frequently encountered attributes are noticed even if they are not part of the intended meaning of the sentence. This is the case for literal as well as metaphorical sentences.

Reder (1983) examined the effects of priming alternate meanings of an ambiguous word on comprehension times for a phrase containing that word. Subjects were presented with phrases that contained ambiguous words (e.g., pipe) and were required to generate a conclusion to the sentence. Time to generate the conclusion was taken to be a measure of comprehension time and accuracy of the completion phrase determined whether the comprehended meaning was consistent with the prime. She found that the primes that were consistent with the appropriate meanings facilitated comprehension of the sentence. Interestingly, extra priming to the wrong concept node did not inhibit priming.

Reder (1983) suggested that a spreading activation model of comprehension can account for these findings. If the meaning of any word is represented in terms of links to concept nodes then, to comprehend the meaning, the activation of nodes must reach some threshold value. Primes that raise the activation level of relevant concept nodes should

facilitate comprehension, whether the sentence is metaphorical or literal and ambiguous.

Although the literal meanings are usually those that are the highly salient ones, Gibbs (1980) has demonstrated that with adequate conversational context participants take longer to comprehend literal uses of conventional idioms than they do to comprehend the idiomatic uses. This reverses the stage model of comprehension, and suggests that the categorization of language use as literal and figurative may be more accurately described along a continuum of conventionality. Context, both long term and immediate, can alter the factors that determine which of the many attributes of a word will be used in the interpretation of a particular sentence.

Another way to examine contextual effects is to measure the effects of particular contextual influences on the time to comprehend a statement. A number of researchers have found that with adequate context the time needed to comprehend literal or figurative statements is about the same (End, 1984; Gibbs, 1979; Inhoff et. al., 1984; Ortony et. al., 1978).

Ortony et. al. (1978) presented participants with target sentences that were either metaphorical or literal and preceded them by either short or long context paragraphs. Subjects pressed a button when they had comprehended the target sentence. With a short, one sentence context segment, the subjects took longer to comprehend the metaphorical target than the literal target, whereas when the targets were preceded by long context, the subjective comprehension times of both literal and metaphorical sentences were about the same. They concluded that since participants took no longer to comprehend metaphors than they took to comprehend literal phrases with long prior context, the same strategy could be used to comprehend both types of sentence. Interpretation is facilitated when the prior information upon which the comprehension processes rely is adequate and appropriate.

Inhoff et. al. (1984) replicated Ortony et. al. (1978), but questioned the conclusion that similar processing times indicate similar processes. To test this they implemented a process priming manipulation. They reasoned that if the processes used to comprehend literal and metaphorical sentences differed then, when a metaphor was to be understood, related

context that was metaphorical should produce faster comprehension times than related literal context. In other words, a switch from literal to metaphorical processes should require some time.

Inhoff et. al. (1984) provided participants with prime conditions that were either literal or metaphorical and related. To control for a priming effect of the metaphoric word they also included a control condition in which the word used in the metaphorical context was used, but the prime was both unrelated and literal. For example, for the target sentence *The road became a waltzing line,* the following sentences are the control, literal prime, and metaphorical prime respectively: *He used to dance. Heat waves made the highway flicker.* and *Heat waves made the highway dance.* They found that, for metaphorical targets, the metaphorical context sentences facilated comprehension more than the literal context sentences or the control sentences, and concluded that this was evidence for a distinct metaphor comprehension process.

It is not clear, however, which cues are used to switch to metaphoric comprehension processes when the context is adequate, related, and literal, such as in Ortony et. al.'s (1978) study. In other words, the realization that metaphoric processes need to be used should take time, and it should still take longer to comprehend metaphors with long literal context than it does to comprehend literal phrases with long literal context. Such a time difference is manifest in neither Inhoff et. al.'s first two studies nor in Ortony et. al.'s (1978) study.

One alternate source for the process priming effect found by Inhoff et. al. could be that the metaphoric related context primed the metaphor target sentence more than the literal prime. For their process priming claims to be satisfactory, it would have to be argued that the interpreted meaning of the primary concept (dancing or flickering) was identical in all three context sentences. Each sentence, however, emphasizes different elements of meaning. As such they would have differential effects on the comprehension of a target sentence like *The road became a waltzing line.* There would, then, be no reason to appeal to a process priming explanation. The elements of meaning activated by the metaphorical context could have

provided a more appropriate set of constructs with which to understand the target sentence.

Other analyses of metaphor comprehension have viewed the ground of the metaphor as separable from the subject and predicate terms. End (1984) found that comprehension time is reduced when a metaphor is followed by a related metaphor. End's claim is that the consecutive presentation of related metaphors (e.g., some fogs are coats, some mists are veils) in effect primes the ground of the second metaphor. She claims that this is evidence that two metaphors can share a common ground insofar as both the prime and the target metaphors share a significant set of attributes. However, an explanation on the basis of semantic priming of the particular attributes of the meaning of the phrases may be simpler than an explanation based on End's claim that the different metaphors have a common abstract ground.

It is not surprising that the context in which a phrase appears partially constrains how it is interpreted. Any theory of the comprehension of novel metaphors, however, must explain why certain contexts make metaphorical phrases as easy to understand as literal phrases. One interpretation of the recent evidence is that a single set of processes should be used to account for both literal and metaphorical comprehension. But if this interpretation is accurate then it is necessary to explain why literal phrases are usually easy to understand even without context. Moreover, we may also want to know what aspects of the context actually are responsible for the observed facilitation effects. Most of the evidence for contextual facilitation of metaphor comprehension has come from studies that prime the ground of the metaphor. The literal counterpart to the metaphorical ground would simply be the set of attributes predicated to the subject term.

B. Models of Metaphor Comprehension

There have traditionally been three major views of metaphor comprehension (c.f. Black, 1977; Verbrugge, 1980). The Substitution view asserts that the metaphorical word or phrase is supplanted with a word that conveys the literal meaning of the ground. For

example, to comprehend the phrase *my shoes are a battlefield* the predicate term, *battlefield*, would be replace by a term such as *tattered*. The primary criticism of this view is that the replacement term cannot readily be chosen unless the phrase is already understood. Verbrugge (1980) states that the substitution view requires that the comprehender already knows that the subject has the relevant property, thus metaphor is reduced to an implied similarity statement. The substitution view could, therefore, not explain the comprehension of a metaphor intended to impute new information about the subject term.

The second view of metaphor comprehension is the Comparison view. On this view the subject and the predicate are compared and their overlapping properties are taken to be the ground of the metaphorical statement. Black (1962) suggests that the comparison view is really only a special case of the substitution view, since the requirment still holds that the comprehender know that the subject has the relevant property. Thus, the comparison view would also be unable to adequately account for metaphors that impart new information about the subject.

Ortony (1979) argues that the overlap in the properties of the subject and the predicate serve as the ground of the metaphor. This notion is consistent with the comparison view. He argues that the ground concept of the metaphor generally has a different salience level in the subject term than it does in the predicate term so that the metaphoricity of a statement would be determined by the salience imbalance of the overlapping attributes of the two terms. A metaphor would be a statement in which the ground concept was more salient to the predicate term than to the subject term. For example, the statement *my shoes are a battlefield* could be understood if the comprehender knew that my shoes were in pretty rough shape. The intersection of the properties of *my shoes* and *battlefields* would have something to do with a decimated state of appearance. By Ortony's view, this statement is a metaphor because the characteristic of decimation is more salient for *battlefields* than it is for *my shoes*. In other words, when the overlapping properties are highly important to the predicate but not so important to the subject, the statement is said to be perceived as a metaphor. When the

overlapping properties are very important to both terms, it is said to be a literal similarity statement. Anomalous phrases result when the overlapping properties are not very salient in the predicate term.

There are two significant shortcomings with Ortony's explanation of metaphoricity. The first has already been mentioned in reference to the substitution view: metaphors may also be used to impart new information about the subject. The second problem with Ortony's formulation has to do with the inability of the model to adequately account for the differentiation between literal and figurative statements. For example, the attribute of "great height" is highly salient to both skyscrapers and giraffes, yet the statement *Giraffes are the skyscrapers of the jungle* is still interpreted metaphorically. Moreover, the literal sentence *Don is a juggler* presumably imparts highly salient attributes about jugglers to Don. If the hearer of this phrase knew Don but had no idea that he was capable of tossing objects around skillfully, then the ground of this statement would contain characteristics which were highly salient to the predicate term but not very salient or non-existent for the subject term. The statement would still be a literal statement, however. Thus, although Ortony's theory goes beyond literal similarity, it does not go beyond similarity statements, and therefore may be inadequate as a theory of metaphor comprehension.

There is, however, some validity to the notion that a meaningful phrase would be one in which the attributes that comprise the meaning of the phrase are highly salient to the predicate. This would hold true for both literal and metaphorical statements, and as such would be a characteristic of predication in general. If an *X is Y* statement is intended to ascribe some aspect of meaning of the Y term to the X term it is reasonable that that aspect be salient to the Y term.

The third major view of metaphor comprehension is the Interaction view. The general assertion of proponents of this view is that the two terms interact to somehow produce a unique ground. One way to view this interaction is consider that some of the properties or attributes associated with the predicate are applied to the topic. This involves an "asymmetric

filtering or transformation of the topic by the vehicle" (Verbrugge, 1980). That is, our knowledge of the vehicle or predicate modifies what we know about the topic or subject term.

Verbrugge and McCarrell (1977) examined some of the properties of the interaction between subject and predicate. They used various features of the subject, predicate, and ground as recall cues, reasoning that the closer the recall cue was to the comprehended meaning of the metaphor, the better recall value it should have. They found that features that were highly salient to the subject only did not serve as good recall cues, whereas features that were highly salient only to the predicate did. Even when individuals were only required to recall the subject of the phrase, highly salient predicate features served as a better cue than features that were highly salient to the subject only. This suggests that after comprehension of a metaphor a restructuring of the meaning representation for the subject occurs, and that new information that is highly salient to the predicate is transferred to the memory representation of the subject term.

If, however, the highly salient properties of the predicate were always transferred to the subject, then one would expect that the same highly salient predicate properties should serve as good recall cues no matter what the subject was. Verbrugge and McCarrell found that this was not so. It appears as if different subjects also influence the interpretation of the ground of the metaphor. This indicates that there is something about the information known about the subject that constrains the features that are transferred to it from the predicate.

As can be seen, the two major questions addressed by research on metaphor comprehension have been (1) whether the processes are the same as those used for literal comprehension, and (2) how each of the components of a metaphor contribute to its meaning. There is fairly good evidence to suggest that, given adequate context, time differences between the comprehension of metaphors and literals are negated (e.g., Ortony et. al., 1978). It is consistent with the evidence, therefore, to view metaphor comprehension as a special case of general comprehension and to examine possible comprehension systems that could account for both literal and figurative sources of meaning. Attempts to answer the question of the

influence of the components of a metaphor have largely been concerned with the salience of the ground attributes in both the subject and the predicate term. I have suggested that Ortony's view along these lines lacks generality. Verbrugge and McCarrell's (1978) study has shown that high salience of a feature in the predicate term will likely be a strong influence in the formation of the ground. The source of the influence of the subject term has yet to be convincingly demonstrated.

C. Rationale

Verbrugge (1980) states that one of the greatest challenges facing a theory of metaphor is to explain the reciprocal constraints between the two terms of a metaphor. In particular, a theory of metaphor must explain what it is about the interaction between the subject and predicate terms that could account for (1) the unique formation of the meaning, (2)the asymmetric recall value of salient features, and (3) the differences between recall times of isolated metaphors versus isolated literal sentences.

The experiments presented here were designed to assess the efficacy of the view that the subject term of a simple *X is Y* phrase has its influence as an element of context that restricts or leads to expectations about the acceptable meaning of the predicate term. This was done using the two major paradigms employed in research on metaphor comprehension, namely, sentence comprehension and true-false sentence verification. The indices of comprehensibility were time for comprehension in the former paradigm and interference from metaphorical meaning in the latter paradigm.

The predicate term has already been shown to have its greatest influence as a result of its highly salient attributes (Verbrugge and McCarrell, 1977). In addition, Ortony's (1979) argument suggests that in either a metaphor or a literal statement the intended ground attribute must be highly salient to the predicate term. If not, Ortony suggests that the sentences will be essentially anomalous. The factor that I varied concerning the predicate term was, therefore, the salience of the intended ground feature to that predicate term.

High salience of the ground attribute in the subject term, on the other hand, has been shown to have little influence on the comprehension of a metaphor (Verbrugge and McCarrell, 1977). For example, highly salient features of the subject term proved to be poor recall cues for metaphorical phrases, suggesting that the highly salient features of the subject term have little direct influence on the formation of meaning. Ortony (1979) suggests that high salience of the intended ground attribute in the subject term renders a literal statement. However, an argument has been made in this thesis that suggests that Ortony's view lacks generality. I have suggested that a sentence in which the intended meaning attributes were already highly salient in the subject term of the sentence would not impart much new information, and as such would not be a very informative way of communicating. Although sentences which reaffirm what is already known may have some value (e.g., emphasis) they do not likely exemplify the general comprehension processes nor do they reflect the communicative purpose of language. I have, therefore, chosen to determine an alternate source for the influence of the subject term.

I examined the subject term's influence based on the expectations or restrictions it provides on the acceptable meaning of the predicate term. Information that is expected should be comprehended faster and more accurately. As mentioned, my view of the influence of the subject term is in contrast to Ortony's (1979) theory of salience imbalance in which the primary influence of the subject term is said to arise from the salience of its attributes. Ortony's view would suggest a Comparison approach to the derivation of metaphorical meaning, whereas my view suggests filtering process (Verbrugge, 1980) in which the highly salient attributes of the predicate term are filtered through the set of expectations and restrictions provided by the subject term. In addition to the expectations and restrictions a subject term may have in an isolated sentence, the expectations or restrictions are also susceptible to the influence from the general context as is the salience of the attribute in the predicate term. The potential contextual influence will be discussed later.

There are two arguments that can justify a search for the effect of expectation. First, the purpose of an *X is Y* statement is to predicate some of the attributes associated with the Y term to the X term. It seems reasonable, therefore, to look to the expectations and restrictions imposed by the X term to provide a filter (Verbrugge, 1980) through which the highly salient predicate attributes are selected. Thus the expectations of the subject term would form the basis for the interaction between the subject and predicate terms. Gildea and Glucksberg (1983) make reference to a similar process in which the informative properties of Y are applied to X to form a meaning. They suggest that if the highly salient Y properties are also applicable to X then the statement will have a ready interpretation. In other words, they suggest that the highly salient feature of the predicate term must also be applicable to the subject term.

The second reason for examining the role of expectation/restriction is that the implied filtering process is one which can be used in comprehending literal predication as well. In particular, the general process would be one of transferring highly salient attributes of the predicate term to the subject term, and is applicable to literal predication as well as metaphorical predication. This would be consistent with the empirical evidence that a single set of processes would best explain both sets of data. On the other hand, a theory in which overlapping feature sets give rise to meaning would, as previously suggested, be an awkward way to discuss literal predication.

Clark and Gerrig (1983) have demonstrated that contextual expectation of an eponymous verb phrase (e.g., *Do a Napoleon for the camera*) constrains the interpretation sufficiently so that novel eponymous verb phrases can be readily understood. In this example, the sentential context likely leads the comprehender to expect that a specific kind of action is being requested. This is even further specified with the phrase *for the camera* which suggests a pose of some sort. Even though the word Napoleon may never have been previously used as a verb denoting his characteristic stance, this statement is interpretable.

Clark and Gerrig (1983) make it clear that two very important conditions must be met to render novel usages of of words comprehensible. First, the context, sentential or otherwise, must set up a sufficient set of expectations or restrictions on the kind of meaning required. In this way the novel sense of the word can be selected for use. Second, the component of meaning intended by the use of the word must be fairly highly salient if the word is to be used in a novel way.

In creating the new sense of meaning when interpreting a novel metaphor the same conditions can be said to apply. In the *X is Y* form of metaphor, comprehension should be facilitated if the type of predicate attribute is expected. I suggest that, without surrounding context, the major source of these expectations is from the X or subject term. In addition, the intended meaning should be highly salient for the Y term for easy comprehension.

To test whether the expectations/restrictions provided by the subject term are adequate to account for the interaction between subject and predicate, I assessed the comprehensibility of *X is Y* sentences that varied along the dimensions of salience of the intended ground attributes in the predicate term and the level of expectation provided by the subject term of the phrase. I tested the comprehensibility as measured by a) comprehension time and b) interference with decisions in a true-false sentence verification task.

Sentences constructed so that the expected endings are appropriate for the highly salient attributes of the predicate term should be the easiest to comprehend. This should be reflected in both faster comprehension times and more interference with a true-false sentence verification task. The level of expectancy was determined by collecting normative data for endings generated to complete the subject phrases used in this study.

On the other hand, if expectancy in the subject term is not crucial for interpreting a sentence then high salience should overshadow any effect of expectancy. If both the highly expected and unexpected ground attributes are reasonable (i.e., not so unexpected so as to be ridiculous), then high salience should be enough to make the sentence comprehensible, unless the level of expectancy is an important factor in the formation of meaning.

II. Normative Data

Normative data were collected to get an index of the type of expectations or restrictions the subject phrases eventually used would give. In addition, an index of salience of particular features in words used as predicate terms was also collected.

Normative study 1: Sentence Endings

The first normative study was conducted to collect a measure of the frequency with which particular endings were generated for a set of sentence beginnings. The reasoning used was that the generated endings should reflect the expectations arising from the sentential context.

Stimuli. The stimuli for the sentence ending normative data were generated by the experimenter. There were 180 phrases of the form "This X is a ____" were constructed. Five lists of 36 phrases were randomly constructed from the total 180 phrases. The order of the sentences within each of these five separate lists was then also randomized five times per list. There were, therefore, five unique lists, each randomized five times, for a total of 25 forms with 36 sentences each. The lists were presented in a two page format, with brief instructions on top of the first page.

Subjects. Eighty-five undergraduates from the University of Alberta participated to fulfill course requirements. This yielded 17 participants for each of the five unique lists. In other words, 17 participants generated an ending to each of the 180 phrases. The sessions were run with groups of about 25 participants at a time.

Procedure. The participants were seated at desks. The forms were distributed such that no two adjacent individuals had the same words on their lists. Participants were instructed to complete each sentence on the form in a reasonable way. They were explicitly asked to not think of wierd or witty methods of completing these phrases. It generally took from 20 to 30 minutes to complete this task.

Results. The results were tabulated by counting the number of occurrences of a particular kind of ending per subject term. The responses were considered to belong to the same kind of ending if they referred to different aspects of the same class of description. For example, participants completed the phrase *Her writing is*___ with the endings *neat* as well as *messy*. The general class in this case would be the degree of neatness. The most frequently generated endings were considered to be highly expected for the purposes of creating the stimuli for the main experiments. Unexpected endings were chosen as endings which were rarely generated. Table 1 shows the normative data for the subject phrases used in the two experiments in this thesis.

Table 1

Normative Data for Sentence Completion: Phrases Used in Experiments 1 and 2

Subject Phrase	High	%	Low	%
His arteries are	hardness	24	strength	0
This ballet is	grace	29	loudness	0
Those children are	pestiness	58	grace	0
That coffee is	strength	29	cost	0
That brick is	weight	41	dirtiness	0
That desk is	messiness	65	cost	0
That drug is	harmfulness	41	strength	0
His ears are	size	58	softness	0
That fish is	size	29	pestiness	0
These floors are	shininess	29	size	0
Her gossip is	harmfulness	35	loudness	0
That house is	size	35	whiteness	0
That jacket is	warmth	47	neatness	6
Her jewels are	cost	53	size	6
That lake is	temperature	29	wetness	0
That letter is	length	29	messiness	0
That music is	loudness	47	speed	0
That park is	ugliness	47	temperature	0
That paycheck is	size	88	precision	0
That restaurant is	cost	29	interest	0
His shirt is	dirtiness	29	confinement	0
His shoes are	size	29	hardness	0
These seatbelts are	confinement	41	weight	0
His speech is	speed	23	fun	0
This sponge is	wetness	53	size	0
His stomach is	size	35	emptiness	23
That surgeon is	precision	35	harmfulness	0
Her teeth are	whiteness	53	shininess	0
That train is	speed	58	warmth	0
Her voice is	volume	58	ugliness	6
His wallet is	emptiness	41	size	12
This weekend is	interest	58	speed	12
This vacation is	fun	47	length	6
Her writing is	neatness	94	size	0
This sofa is	softness	58	size	0
That wind is	strength	29	harmfulness	0

Normative Study 2: Feature Lists

The second normative study was conducted to obtain a measure of the salience of attributes for particular words. The frequency with which features are listed for various words reflects the salience of the feature for that word.

Stimuli. The stimuli for the second normative study were generated by the experimenter after consideration of the data from the first normative study. Words for which an attribute was highly expected from the data of the first normative study were chosen in addition to words which fit the unexpected endings as chosen by the experimenter. For example, the phrase *Her hair is.....* was most often completed with reference to color. Words, like *fire engine*, which the experimenter considered to have highly salient features that fit the expected color ending were thus included in the list of word stimuli.

In total, 450 words were compiled to form the stimuli for the second normative study. Then 15 unique lists of 30 words each were randomly selected, without replacement, from the total list. Each of these unique lists were randomized for presentation giving a total of 75 forms. The lists were printed in a 5 page format, six words per page, and provided space in which the participants could list the features of each word.

Subjects. The subjects were 225 undergraduates from the University of Alberta who participated for course credit. Fifteen participants, therefore, generated features for each of the 15 unique lists so that, for each of the 450 words, there were fifteen people who generated a set of features.

Procedure. The participants were run about 30 at a time in a large classroom. Each participant was given a pencil and a five page form. They were instructed to generate a list of the features belonging to each of the words on the lists in front of them. It took from 30 to 45 minutes for the participants to complete the task.

Results. For each of the 450 words the features generated were tabulated across subjects. For purposes of the construction of stimuli for the main experiments, high salient features were considered to be features that occurred often, whereas low salience features were

considered to be features that are true of the term but were rarely generated if at all. The data for the predicate words used in the experiments in which the intended meaning attributes are highly salient are shown in Table 2. The data for predicate words used in the low salience conditions are shown in Table 3. It is interesting to note that, for words which appeared in both studies, there was some overlap between the two sets of norms. For example, a phrase like *That brick is*___ was most often ended with reference to weight. Being heavy was also highly salient to bricks, as indicated by high frequency as a listed feature in the second set of norms. There were usually differences, however, justifying the collection of both sets of normative data. For a word like *smorgasbord* the most generated feature was *varied*, whereas the phrase *This smorgasbord is* was most frequently completed with *delicious*. Another example is the data for the word *tree*: the sentence endings were most often to do with age (old), whereas the features listed had to do with color and size.

Table 2

Normative Data for Feature Lists:
Predicate Words Used in High Salience Conditions

Word used	Feature used	%
metal	hard	47
swan	graceful	67
houseflies	bothersome	67
moonshine	strong	40
anchor	heavy	60
junkyard	messy	60
dagger	dangerous	53
elephants	large	87
dinosaur	large	67
aluminum	shiny	53
poison	harmful	87
atom	small	87
sauna	warm	80
caviar	expensive	60
antarctic	cold	73
telescope	long	47
jackhammer	loud	47
lizard	ugly	47
ant	small	73
platinum	expensive	53
slum	dirty	73
mountain	large	47
cage	confining	67
turtle	slow	80
melba toast	dry	73
tank	large	60
swiss watch	precise	67
cocaine	white	87
cheetah	fast	87
trumpet	loud	47
ghost town	empty	47
sermon	boring	47
party	fun	60
slaughterhouse	messy	47
fur	soft	67
ammonia	strong	80

Table 3

Normative Data for Feature Lists:
Predicate Words Used in Low Salience Conditions

Word used	Feature used	%
nails	hard	20
stallion	graceful	20
dandilions	bothersome	13
hammer	strong	13
piano	heavy	0
roadmap	messy	13
tuberculosis	dangerous	20
earth	large	20
bathtowel	large	27
crystal	shiny	20
pollution	harmful	27
ion	small	6
lamp	warm	20
medicine	expensive	6
asteroid	cold	6
submarine	long	13
gun	loud	6
bruise	ugly	13
thorn	small	20
tuxedo	expensive	6
badger	dirty	6
vault	large	13
closet	confining	13
hippotamus	slow	6
nest	dry	6
hospital	large	6
architect	precise	6
cocoon	white	6
hurricane	fast	6
hair dryer	loud	6
desert	empty	6
professor	boring	13
sport	fun	20
war	messy	6
haystack	soft	13
moose	strong	13

III. Experiment 1: Reading time

The first experiment was designed to examine the relative effects of salience versus expectation/restriction for sentence comprehension. Comprehension times for the sentences are taken to be indications of the ease of comprehension, with fast times reflecting greater comprehensibility than the slow times. Sentences constructed according to the factors of salience versus expectation should yield different comprehension times that vary according to their comprehensibility.

A. Method

Stimuli.

The stimuli for the reading time experiment were constructed solely from the stimuli used in the two previous normative studies. Thirty-six subject phrases were selected from the original 180. For each subject phrase a meaning which was highly expected and a meaning which was unexpected were selected. High expectancy endings were those that fit the most often generated endings, whereas low expectancy endings were those that were reasonable but not often generated. Predicate terms to complete both the low and high expectancy endings were chosen from the normative list of 450 words. The metaphorical stimuli were constructed by orthogonally varying the expectancy level factors (low versus high) of the subject phrases with the salience factors (low versus high) of the predicate phrases. Thus the following four metaphoric sentence types were produced:

(1) High expectation in subject + High salience in predicate

(2) High expectation in subject + Low salience in predicate

(3) Low expectation in subject + High salience in predicate

(4) Low expectation in subject + Low salience in predicate

For example, the phrase *Her voice is* ... was most often completed with some reference to loudness. In addition the feature *loud* was most often listed for the word trumpet. The

phrase *Her voice is a trumpet* is, therefore, an example of the first condition. To create an example of the second condition, the ending to the subject phrase would be one in which the highly expected feature was not very salient to the word used as a predicate. For example, the feature *loud* was rarely listed as a feature of the word *gun*, although it is a true characteristic of guns. The phrase *Her voice is a gun* is an example of the second condition.

To form the two low expectancy conditions, an attribute that could reasonably be predicated to the subject, but rarely occurred in the normative study, was selected. For example, it is reasonable to talk about someone's voice as pleasant, beautiful, or unpleasant and ugly. The word *lizard* was often listed as having the feature *ugliness*. The phrase *Her voice is a lizard* is, therefore, an example of the third condition. Finally, the phrase *Her voice is a bruise* is an example of the fourth metaphorical condition because the feature *ugly* was rarely listed for *bruise*, even though bruises can be said to be ugly. In summary, all the predicates could be true of the subjects but differed in rated salience. Similarly, all the endings were plausible as true sentences but were either often or rarely generated as sentence endings.

In addition to the above sentence types, two literal conditions were created. The salience of the features for the predicate term are always high in a literal statement of the form used in this study. We can, therefore, only have the following literal conditions:

(5) High expectation in subject + Literal predicate (High salience)

(6) Low expectation in subject + Literal predicate (High salience)

An example of the 5th condition would be *Her voice is loud*. An example of the sixth condition would be *Her voice is ugly*.

As mentioned previously, 36 subject phrases were used and each subject phrase appeared in each of the six conditions. Subject phrases were, therefore, equivalent across all six conditions. Instead of using the same set of predicate terms in each of the six conditions the same set of predicate terms were used in both high salience conditions and the same set of predicate terms were used in both low salience conditions. This gave a total of 216 unique

stimuli. In other words, each of the predicate terms was paired with both a high and low expected subject phrase. For example, the term *trumpet* was paired with a subject phrase for which *loud* was an expected ending, as well as with a subject phrase for which *loud* was not an expected ending. In this way the predicate terms were balanced across Expectancy conditions, but not across Salience conditions. In addition, length of the predicate terms was balanced across Salience conditions: a mean of 6.94 letters per word for high salience words, and a mean length of 6.83 letters per word for low salience words. The expected endings were generated by an average of 44% of the participants (range = 23% to 94%) whereas the unexpected endings were generated by an average of 2% of the participants (range = 1% to 23%). For high salience words, the feature used was generated by an average of 64 percent of the participants (range = 47% to 87%), whereas an average of 12 percent generated the features for the words designated as low salience (range = 0 to 27). The average frequency (Francis & Kucera, 1967) for the predicate words used in the high salience condition was 13. The average frequencey for the words used in the low salience condition was 33. Note that the bias owing to frequency goes against the predicted salience effect.

Filler sentences were constructed from subject and predicate terms not used in the experimental items. Each of the 48 filler items was presented to each participant. Two-thirds of the filler items were literal and one-third were non-literal. Thus, the total number of literal versus non-literal items were balanced over the entire experiment even though only one-third of the experimental items were literal.

Subjects and design.

Twenty-four undergraduates from the University of Alberta participated for course credit. There were 18 practice trials that consisted of a broad range of sentences of the same form and variety as those which were later presented in the experimental set. None of the practice trials contained any words or concepts in common with the experimental set. The experimental set consisted of 36 experimental trials plus 48 filler trials. The first 12 trials in

this set consisted of practice trials that were randomly selected from the total set of filler trials without replacement and were thus treated as practice trials. Thereafter, filler and experimental trials were randomly ordered with the constraint that no more than four of either type could appear one after another.

Following the 12 practice trials, the remaining 72 items of the experimental set were run in six blocks of 12 trials. Each block consisted of six randomly selected filler items and six experimental items. There was one experimental item from each condition in each block, and these were selected randomly with the constraints that neither the same subject phrase nor the same predicate phrase could occur more than once per participant. This meant that with 36 experimental trials and 36 subject phrases, each subject phrase appeared once and only once for every participant.

To ensure that each participant was reading and comprehending each phrase to some degree, seven trials throughout the experiment were designated as catch trials. These trials were randomly selected with the constraint that each block had one catch trial. The first catch trial was selected from the practice block. The remaining six catch trials were distributed randomly once per block and once per condition.

Procedure and apparatus.

The stimuli were displayed on a DEC VT100 video monitor which was modified to show no cursor and to allow for blanking and unblanking of the stimuli within the monitor itself to enable precise timing of the video signal. A DEC Minc/11 computer, which was outside the experimental room, controlled the presentation of the stimuli, and timed and collected responses. The participants sat about 53 cm from the screen and were free to move their heads. At that distance the visual angle of each letter was .4 vertical and .2 horizontal degrees.

In front of the participants and between them and the video monitor was a response pad. The response pad was a piece of wood with two metal plates across it. The participants

rested their palms on the larger of the two plates and rested their index fingers on a small wooden resting strip. A response was made by bringing their index finger off the resting strip and contacting the other metal plate. Participants used their preferred hand to make these responses. There were two different response plates: one for the right and one for the left hand, although any one participant only used one for the preferred hand.

Each trial began with a message instructing the participants to press the response pad to continue. All messages and stimuli were presented in the vertical centre of the screen and began 2 cm from the left edge of the screen. When the response pad was pressed the screen was blanked for 750 msec, and the stimulus sentence was displayed. The timing of the response commenced at the time the stimulus was displayed. The sentences remained on the screen until the participant had responded. After a 1 second pause the intertrial message instructing the participants to press the pad to continue was displayed.

For the trials designated as catch trials a beep was sounded immediately after the response was made and the stimuli were blanked from the screen. A message appeared on the screen instructing the participants to paraphrase the immediately preceding sentence. This message remained on the screen while the participants recorded their interpretation of the sentence on a form provided for this purpose. The paraphrase message also included a sentence number which was to be recorded on the form as well. When the participants had recorded their paraphrase they pressed the response pad and the next trial was inititiated with the presentation of the intertrial message.

As previously mentioned, each participant was given a practice set of 18 items. During the presentation of these items the experimenter remained in the experimental room to spot and clarify any misunderstanding arising from the verbal instructions. During this practice set one item was designated as a catch trial. This was always the sentence *The sky is a mirror*, and was always the eighth trial. This sentence was sufficiently unusual and difficult to interpret so that any uncertainty on the participants part about the nature of the task could be readily noticed and cleared up. On three occasions the participants wrote the sentence

down verbatim and were then instructed to write the sentence in their own words, in the words of the interpretation they had just claimed to have made.

Upon completion of the practice trials the participants were given a short break and encouraged to ask any questions about the procedure to be sure they understood it. They were then given the 84 item experimental set consisting of one block of 12 practice trials and six experimental blocks of 12 trials each. The experimental trials followed the practice trials without break.

Upon completion of the experimental set of trials the participants were then asked to recall as many of the items presented as they could. They were asked to record these sentences on the back of the paraphrase record form. They were given five minutes to perform this task, unless they were still recalling after five minutes. Most participants had finished prior to that time.

B. Results

The comprehension times for each participant were collapsed across trials within each of the six sentence conditions. One subject inadvertently proceded to the next trial while recording the paraphrase which resulted in a response time for one trial which was over half a minute. This one trial was excluded from the analysis and the cell for the low expectancy - high salience literal condition for that particular subject was an average over five trials.

A Gender X Expectancy (high, low) X Salience (high, low, literal) analysis of variance (ANOVA) was conducted in which both expectancy and salience were repeated measures. There were two reliable main effects of expectancy, $\underline{F}(1,22) = 17.34$, $\underline{p} < .001$ for participants and $\underline{F}(1,210) = 16.94$, $\underline{p} < .001$ for items, and salience, $\underline{F}(2,44) = 40.53$, $\underline{p} < .001$ for participants and $\underline{F}(1,210) = 63.94$, $\underline{p} < .001$ for items. The Expectancy X Salience interaction approached significance, $\underline{F}(2,44) = 2.33$, $\underline{p} < .11$. Participants took 778 ms longer to comprehend the sentences in which the predicate meaning was unexpected (4,112) than for sentences in which the predicate was highly expected (3,334). They took 838 ms

longer to comprehend low salience metaphors (4883) than it took to comprehend high salience metaphors (4045). In addition, it took 1802 ms longer to comprehend high salience metaphors than it took to comprehend the literal statements (2243). The means of these effects are shown in Figure 1.

An ANOVA was also conducted which excluded the literal condition from the analysis to determine whether the effects would be reliable between the metaphorical conditions alone. The factors were Gender X Expectancy (high, low) X Salience (high, low). There were again main effects of expectancy, $F(1,22) = 15.69$, $p < .001$ for participants, and $F(1,140) = 14.122$, $p < .001$ for items, and salience, $F(1,22) = 10.313$, $p < .004$ for participants, and $F(1,140) = 8.413$, $p < .004$ for items. Participants took 1,036 ms longer to comprehend the metaphorical sentences in which the predicate meaning was unexpected (4982) than for the metaphorical sentences in which the predicate meaning was highly expected (3946). In this ANOVA the interaction is far from reliable, $F(1,22) = .239$, $p < .630$. The lack of interaction in this second analysis suggests that the potential interaction seen in the first ANOVA was due to the effect of the literal phrases.

A Newman Keuls analysis showed that all differences between the means were reliable except the differences between the low expectancy - high salience metaphors and the high expectancy - low salience metaphors and the difference between the two literal conditions.

Amount of variance accounted for by the main effects was also computed using ω^2. The F values and mean square values used in the statistic were from the subject ANOVA which excluded the literal statements from the analysis. This was done to examine the variance accounted for without the additional variance introduced from the literal conditions. Twenty-eight percent of the total variance in the metaphor conditions can be attributed to the expectancy factors. Sixteen percent of the variance can be accounted for by the salience factors.

The recall data were analysed in terms of the percentage of items from each condition which were recalled. Each participant recalled an average of 7 percent of the total number of

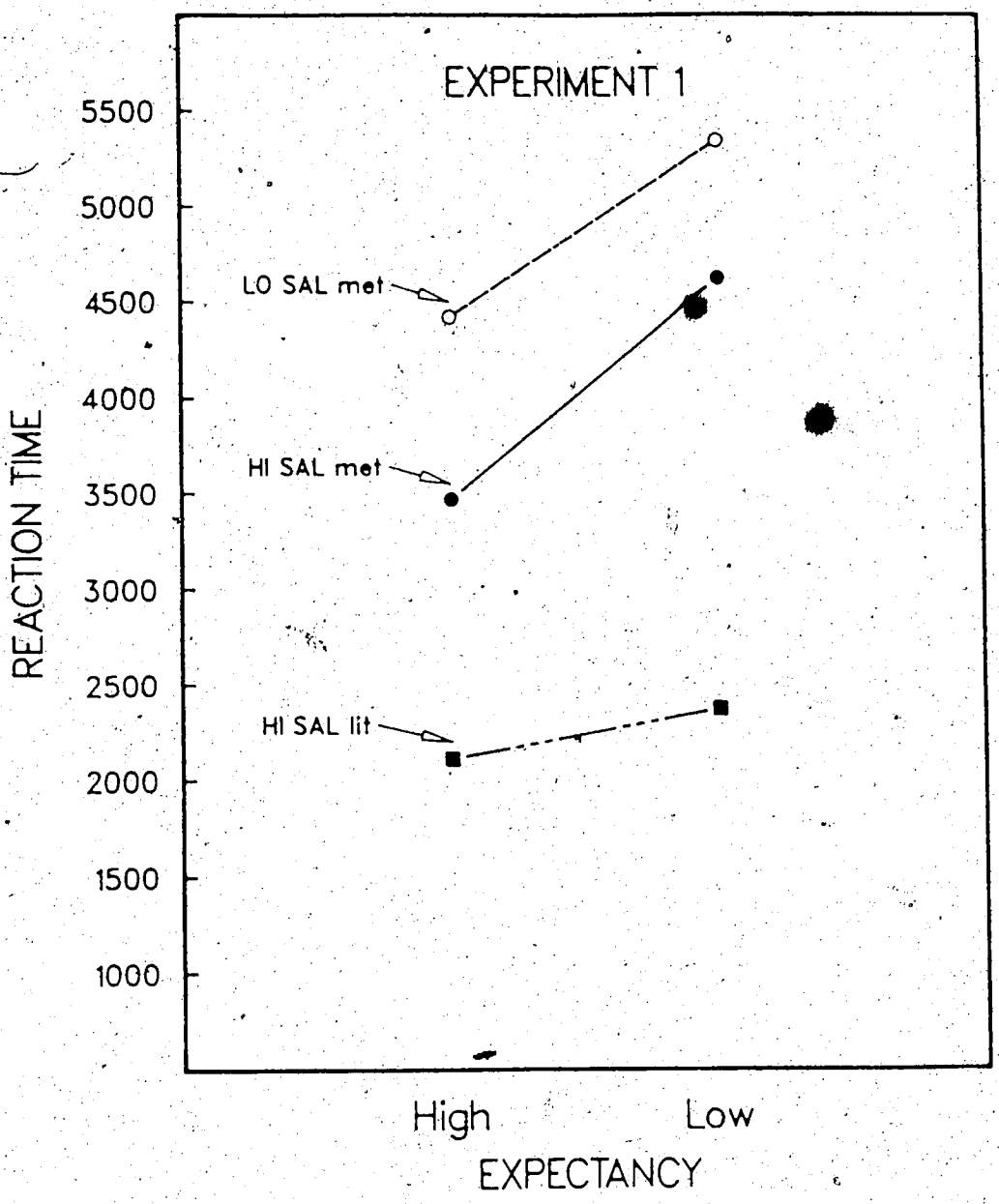

Figure 1: Comprehension Times (in Milliseconds) for Experiment 1: Sentence Comprehension

items, including filler and practice items, presented to them. The percentage of items recalled over all the participants from each category are shown in Table 4. A Gender X Expectancy X Salience ANOVA was conducted on the recall data. The gender by expectancy interaction was the only reliable effect, $F(1,22) = 5.85$, $p < .025$. Males recalled an average of 11% of the high expectancy items and 7% of the low expectancy items, whereas females recalled an average of 11% of the high expectancy items and 14% of the low expectancy items. It is interesting to note that 4.3% of the metaphorical items were recalled as similies. That is about 16% of the metaphorical items recalled. This involved inserting the word *like* prior to the predicate term.

An analysis of the paraphrased items is by no means comprehensive in this study because only 144 paraphrases were recorded and these were randomly selected. Many items were, therefore, left out of the analysis and some appear more than once. Out of interest, however, they were tallyed as percentage correct for each of the six conditions. It is important to note that percent correct refers to the percentage of times the paraphrase matched the intended meaning. As such it is not a measure of correctness as much as one of effectiveness of communication.

The paraphrase data per condition are summarized in Table 5. The low expectancy - low salience condition appears to produce the least effective communication as well as taking the longest to understand. In this condition there was a fairly even split between errors owing to intrusions by the highly expected factor in the subject term and by the highly salient attribute in the predicate term. For example, the low expectancy - low salience phrase *That sofa is a vault* is "intended" to mean the sofa is large. An example of the highly expected intrusion is the misinterpretation of the phrase to mean *That sofa is hard*. Hardness or softness is a feature which is highly expected for the phrase *That sofa is* __.

An example of a high salience intrusion is the interpretation of the same phrase to mean *That sofa is a safe place*. In this case, the high salience of the particular attribute in the predicate term forced a strange interpretation. Interestingly, one participant interpreted the phrase to mean *That sofa is hard and encloses you*, which appears to be a combination of both

Table 4

Percentage Recalled per Condition for Experiment 1

		Salience		
		High Metaphor	Low Metaphor	High Literal
Expectancy	High	9%	13.3%	10.5%
	Low	10.5%	8.5%	9.8%

Table 5

Percent Correctly Paraphrased for Experiment 1

		Salience		
		High Metaphor	Low Metaphor	High Literal
Expectancy	High	75%	58%	100%
	Low	54%	21%	100%

kinds of intrusions.

IV. Experiment 2: Sentence Verification

Experiment 1 demonstrated clear effects of expectancy and salience, with the high expectancy - high salience metaphors being easier to understand that the other three metaphorical conditions. This is consistent with the idea that the interaction of subject and predicate term arises from a combination of the expectations from the subject term and the salience level of that concept in the predicate term.

The second study is designed to examine the effects of salience and expectancy in a sentence verification task based on the studies by Glucksberg et. al. (1982). If the comprehension of an X is a Y phrase involves a process in which highly expected features that are highly salient in the Y term are transferred from Y to X then we may expect that the sentence in which high expectancy is matched with high salience would be the easiest to understand. If this comprehension were automatic and non-optional as Glucksberg et. al. (1982) suggest, then the highly expected - high salience metaphors may cause interference in a literal verification task. It is also interesting to examine the effect of high salience or high expectancy alone. To this end, I took the same basic stimuli as were used in Experiment 1 and had subjects verify whether they were true or false.

A. Method

Stimuli.

The stimuli for the second experiment were based entirely on the stimuli for the first experiment. The same basic sentences were used (i.e., the same subject and predicate terms) but the form of all sentences was changed to *some X are Y*. In some cases pluralization changes were required for syntactic consistency.

In all other respects the stimuli remained the same. There were 216 total stimuli, 36 in each of the 6 conditions. The same subject terms were used in all conditions and the predicate terms were the same for both expectancy conditions. Because the same predicate terms were

used, word length remained balanced across salience conditions. Table 6 shows an example sentence from both experiments 1 and 2 in each of the six conditions.

Subjects and design.

Twenty-four undergraduates from the University of Alberta participated for course credit. The data from one other participant was not included in the analysis owing to error rates of 50% or higher in three conditions.

As in Experiment 1, each participant was given 12 practice trials followed by six blocks of 12 experimental trials each. For the experimental trials each block consisted of six experimental trials plus six filler items. The filler items were two-thirds literally true and one-third literally false statements. This balanced out the overall number of true and false statements seen by each participant, even though 2/3 of the analysed items were false. As in Experiment 1 each participant saw each experimental subject phrase once and only once throughout the experiment.

The false items were the metaphorical items. The experimental conditions, therefore, had 48 literally false items per subject. The literal conditions were, of course, literally true and constituted one-third of the experimental condition items. Half of the participants responded true with their preferred hand and half of the participants responded true with their non-preferred hand. Participants were randomly assigned to the hand conditions.

Procedure and apparatus.

The same equipment was used for Experiment 2 as was used for Experiment 1. The only difference was in the response plates. In Experiment 2 there were two response plates in front of the participant; one for each hand. One plate was designated as the true response plate and the other as the plate for false responses. Otherwise, response procedures were identical to those in Experiment 1. In addition, half the participants were required to respond true with their preferred hand and half were required to respond true with their non-preferred

Table 6

Examples of Sentences From Each Condition for Experiment 1 and Experiment 2

Condition	Experiment 1 example	Experiment 2 example
Hi-Hi met	Her voice is a trumpet	Some voices are trumpets
Hi-Lo met	Her voice is a gun	Some voices are guns
Lo-Hi met	Her voice is a lizard	Some voices are lizards
Lo-Lo met	Her voice is a bruise	Some voices are bruises
Hi-Hi lit	Her voice is loud	Some voices are loud
Lo-Hi lit	Her voice is ugly	Some voices are ugly

hand.

Each trial began with an asterisk in the left hand side of the screen vertically centered. A beep was sounded, the asterisk was blanked from the screen and 750 msec later the stimulus sentence appeared on the screen beginning where the asterisk had been. The stimulus remained on the screen until the participant responded. Timing began when the stimulus was first unblanked and stopped when the participant made the response. Immediately after the response the asterisk reappeared for 1200 msec.

The participants were instructed to read each sentence, decide whether the sentence was literally true or literally false, and to respond as quickly and as accurately as they could. They were given the examples *Some cars are monkeys* and *Some cars can fly* as examples of false sentences. The examples of true sentences given were *Some cars have wheels* and *Some cars are moving*.

To get the participants used to the mode of responding a pre-practice series was presented in which the words *True* or *False* were presented in place of the stimulus sentences. In addition, cards with the words *True* and *False* were placed behind the appropriate response plate.

After the pre-practice trials participants were given a short break and encouraged to ask any questions to ensure that they understood the task. They were then given the 12 practice trials that were followed without break by the 72 trial experimental set.

After completion of the experimental trials participants were asked to recall as many items as they could using a pencil and paper provided for this purpose. they were given five minutes to perform the recall task, but were allowed to continue if they were still writing after five minutes.

B. Results

The verification times for all participants were again collapsed across correct trials within each of the six sentence conditions. A Gender X Preferred Hand X Expectancy X Salience ANOVA was conducted. Expectancy and salience factors were repeated measures. There was a reliable main effect of salience, $\underline{F}(2,40) = 5.76$, $\underline{p} < .006$ for participants, and $\underline{F}(2,210) = 2.549$, $\underline{p} < .08$ for items. There was also a reliable Expectancy X Salience interaction, $\underline{F}(2,40)$, $\underline{p} < .04$ for participants, and $\underline{F}(2,210) = 4.576$, $\underline{p} < .011$ for items. Participants took 176 ms longer to determine that the metaphorical sentences were false when the intended ground attributes were highly salient in the predicate term (2,052) than when they were not very salient in the predicate term (1,876). The high and low salience metaphor conditions took 316 ms and 140 ms longer, respectively, than it took to verify the literal conditions (1,737). As can be seen from Figure 2, the salience by expectancy interaction was largely due to a slowed response for the high expectancy - high salience metaphor versus high expectancy - literal responses. In fact all other times are nearly identical.

A Newman Keuls analysis showed that the only reliable difference in this analysis is the difference between the high expectancy - high salience metaphors and the high expectancy literals.

An ANOVA was conducted which excluded the literal condition from the analysis. This gave an analysis for the false responses (i.e., the metaphors) only. The factors were Gender X Preferred Hand X Expectancy X Salience with expectancy and salience as repeated measures. In this ANOVA the only clearly reliable effect was the main effect of salience, $\underline{F}(1,20) = 5.05$, $\underline{p} < .04$.

The amount of variance accounted for the main effects was computed from the metaphor only ANOVA. The expectancy factor accounted for 6.7% of the variance. The salience factor accounted for 14.4% of the variance.

The recall data were analysed in terms of the percentage of items recalled from each condition. Each participant recalled an average of 9% of the total number of items presented

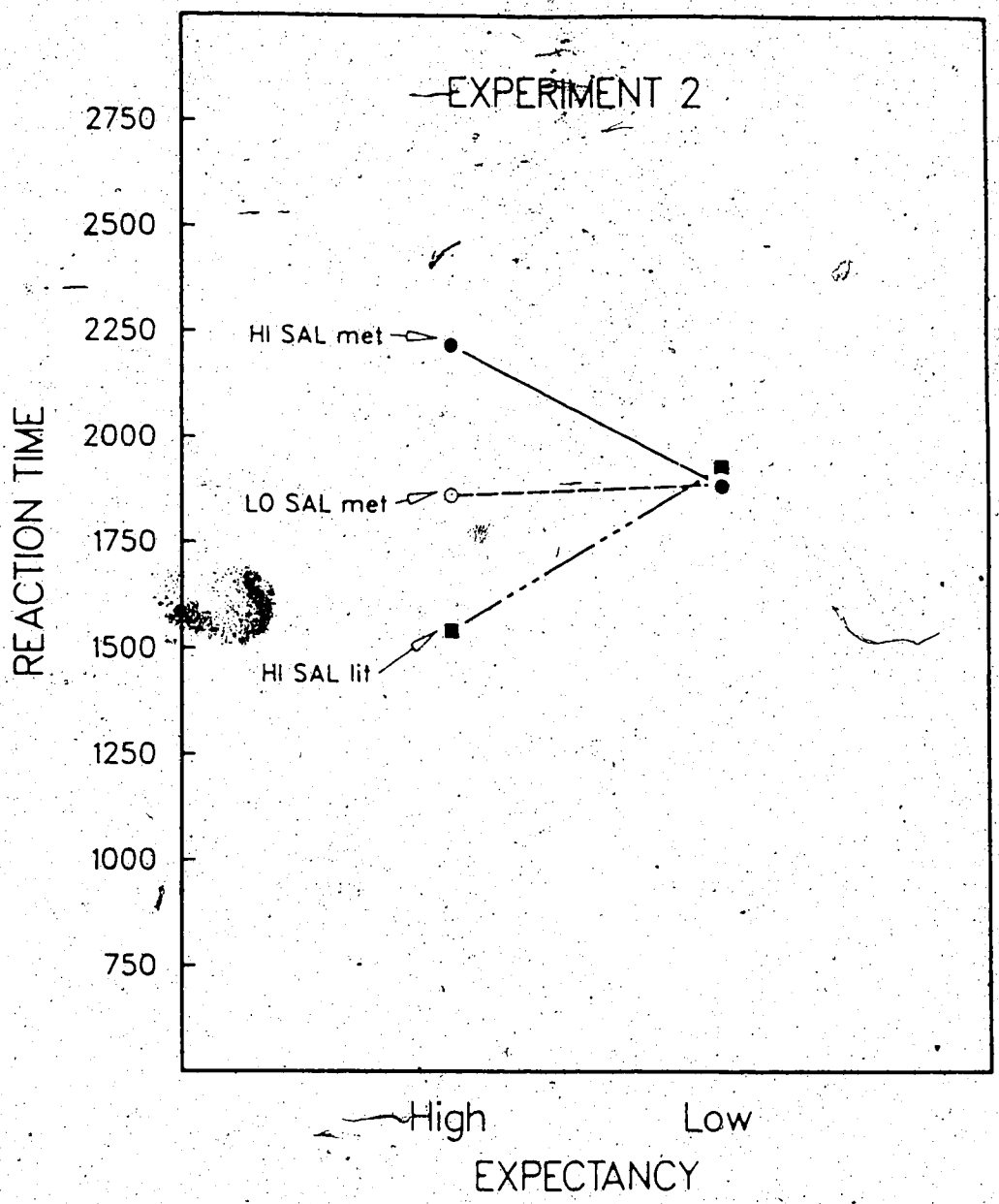

Figure 2: True-False Verification Times (in, Milliseconds) for Experiment 2: Sentence Verification

to them. The percentage of items recalled over all participants per condition are shown in Table 7. A Gender X Preferred hand X Expectancy X Salience ANOVA was conducted. The main effect of salience was reliable, $F(2,40) = 4.74$, $p < .015$. An average of 12% of the literal items, 8% of the high salience metaphors, and 5% of the low salience metaphors were recalled.

The error data averaged across subjects are shown as percent incorrect per condition in Table 8. A Gender X Preferred Hand X Expectancy X Salience ANOVA was conducted on the error data. There were no reliable main effects, but the Gender X Preferred hand interaction was reliable, $F(1,20) = 6.81$ $p < .017$, as was the Expectancy X Salience interaction, $F(2,40) = 14.63$, $p < .001$. An ANOVA which excluded the literal conditions also had a reliable Expectancy X Salience interaction, $F(1,20) = 8.28$, $p < .009$. In general, the metaphors which interfered with the true-false decision the most also had the most errors associated with them. Conversely, the items that interfered with the true-false decision the least had the least number of errors.

Table 7

Percent Recalled per Condition for Experiment 2

		Salience		
		High Metaphor	Low Metaphor	High Literal
Expectancy	High	8.3%	4.2%	14.7%
	Low	8.5%	6.4%	9.3%

Table 8

Error Data as Percent Incorrect per Condition in Experiment 2

		Salience		
		High Metaphor	Low Metaphor	High Literal
Expectancy	High	13%	9%	1%
	Low	4%	10%	12%

V. General Discussion

In the first study participants were asked to read a series of sentences presented one sentence at a time and to press a button when they had interpreted each sentence. The sentences they viewed varied according to whether the subject term expected the intended ground attribute and whether the intended ground attribute was either literally expressed, highly salient to a metaphorical predicate, or not very salient to a metaphorical predicate.

For metaphorical sentences, the expectations of the subject term of the sentences reliably influenced comprehension times as did the salience of the intended predicate features. These two factors did not interact so that, for example, the influence of expectancy was just as large for low salience predicates as it was for highly salient predicates. This finding lends support to the claim that the source of what Verbrugge (1980) refers to as reciprocal constraints between the two terms of a metaphor comes from the joint influence of the expectations generated by the subject term and of the salience of the intended feature in the predicate term. The metaphorical sentences that are easiest to understand are those in which the expectancy and salience factors are high. Conversely, the most difficult to understand metaphors are the sentences in which the expectancy is low in the subject term and salience is low in the predicate term.

The two metaphorical conditions in which only one of the two factors was high (i.e., the high expectancy - low salience and the low expectancy - high salience conditions) were not reliably different. They did, however, produce faster reading times than the condition in which both factors were low. It appears as though expectancy and salience might be additive insofar as a lack of one factor may be compensated partially by a strength in the other factor. This is in distinct contrast to Ortony's (1979) view because the sentences in which the intended ground feature is not very salient can be as comprehensible as those in which the intended ground feature is highly salient merely by pairing the low salience predicate term with a high expectation subject term.

My results are neutral with respect to representation, but they do suggest the kinds of information that must be represented to account for these findings. To talk about the possible sources of the effects demonstrated in these experiments I would like to discuss the meaning of any predicate term as links of varying strength among a set of concept nodes (Anderson, 1983; Reder, 1983). The meaning of any predicate term in a given context, therefore, would be represented as those attribute or concept nodes which exceed a threshold level of activation. The comprehension of the phrases used in this study would involve a transfer of the meaning of the predicate term to the subject term. Ignoring the subject term's effect, the influence of each attribute would be in relation to its salience to the predicate term. The subject term would modify that influence by suppressing the influence of non-expected attributes and enhancing the influence of expected attributes. This would constitute a true interaction, would be applicable to both literal and metaphorical sentences, and would explain the asymmetry of the recall value of highly salient features of the subject and predicate terms observed by Verbrugge and McCarrell (1977).

The comprehension of meaning would, therefore, be an analysis of the concept nodes (representing attributes) that exceed threshold. Activation strength, discussed here as salience, and contextual priming or suppression, discussed here as expectation or restriction, are both influences that may affect the activation level of the nodes representing the attributes of the intended ground, and may cause these nodes to reach threshold faster.

The expectancy effect was at least as strong as the effect of salience as indicated by the ω^2 statistic. This would be a reasonable characteristic of a system like the one just mentioned. The effect of high expectancy when paired with low salience appears to be about the same as the effect of high salience when the attribute is unexpected. If there is a strong expectancy for a weak attribute, the time for that node to reach threshold will be decreased compared to when it is not expected.

The strength of influence of the expectation factor can perhaps help explain the finding that different subject terms paired with the same predicate term lead to different meanings

(Verbrugge and McCarrell, 1977). Each subject term would have a different set of expectations and restrictions and would thus accept or restrict a unique set of concepts.

The so-called incorrect interpretation of the sentences selected for paraphrase in the low expectancy - low salience condition is also consistent with the view presented here. As mentioned previously, there was an even split between intrusions arising from expectancy factors as from intrusions arising from salience factors. The expectancy factors appear to enhance not very salient attributes of the predicate term as often as highly salient features overcome a lack of enhancement due to high expectation. Note that in the example previously given *That sofa is* ___ the expectancy variable of softness can be readily satisfied with the attribute hardness, thus allowing for the misinterpretation *That sofa is hard*. On the other hand an analysis based on comparison of overlapping features would have difficulty explaining it because *hard* is not likely a salient feature of sofas. Framing the influence of the subject term as one of expectations or restrictions of a class of attributes (e.g., degree of softness) allows enhancement of any attribute that can satisfy that expectancy. On the other hand, framing the subject term's influence in terms of salience imbalance and overlapping features (Ortony, 1979) restricts the influence to specific attributes and not the whole class.

The effect of literal sentences cannot be overlooked. The literal sentences were much easier to understand than any of the metaphorical sentences. One explanation for this may be that the attributes of intended predication are very highly salient for the literal predicate terms, and that the intended meaning would get through much more easily. For example, the attribute of *makes high volume noise* would be extremely salient to the word *loud*, whereas it would be only one of several highly salient features of the word *trumpet*. Reder (1983) suggests that activation strength diminishes as the number of links to concept nodes increase for any given word. The highly salient attributes of a word like *loud* should, therefore, be more highly activated than similar highly salient attributes for a word like *trumpet*. This is reflected in the faster comprehension times for literal over metaphorical phrases as well as in the muting of the expectancy effect in the literal condition. Comprehension times for the high

and low expectancy literal conditions are not reliably different, whereas between the metaphorical sentences they are. It may be that the activation level of the ground attribute in the literal predicate is so high that any effect of expectancy is relatively minor in comparison.

The observed difference between literal and metaphorical sentences can be accounted for using a single set of processes. The suggested difference that renders literal predication without context easier to understand than metaphorical predication without context is the difference in the level of salience of the intended ground attribute between literal and metaphorical terms. In the absence of context that either raises the salience of the intended ground feature in the predicate term or enhances the expectancies and restrictions provided by the subject term, the filtering process is slower for metaphors. There is no need, therefore, to suggest a separate set of process to account for the observed differences.

The above explanation for the advantage of literal comprehension can nicely fit with the previous research on contextual influence of metaphorical sentences. The context could facilitate comprehension by priming attributes or by generating or reinforcing expectations. Either kind of prime may overcome the deficit for metaphor comprehension demonstrated in this study.

Experiment 1 furthers our understanding of metaphor comprehension in that it tests factors along which isolated metaphors (i.e., without surrounding context) can be made more or less easy to understand. Previously, the only real determination of ease of comprehension has been Glucksberg et. al.'s (1982) study where *All* metaphors were considered poorer than *some* metaphors. In their study, metaphors that were stated *All X are Y* were considered to be poorer than *Some X are Y* because the *All* versions are more blatantly false than the *some* versions of the metaphor. In addition, Gildea and Glucksberg (1983) procedurally defined poor metaphors as those that did not interfere with a true-false verification decision. The method of creating stimuli in this thesis suggests that there is an apriori way to define comprehensible metaphors, namely those in which the highly salient predicate properties are also highly expected.

The second experiment was, in part, a replication of Glucksberg et. al.'s (1982) study. The stimuli consisted of the same subject and predicate pairings as those in the first study, although the form of the sentence was *Some X are Y*. The participants of Experiment 2 saw a series of sentences and they were instructed to respond as quickly and as accurately as they could as to whether the sentences were true or false.

Whereas Glucksberg et. al's (1982) false stimuli consisted of "only a few... metaphors", in this study it is not necessary that the sentences even be viewed as metaphors. All the false stimuli were categorically untrue statements that varied according to expectancy and salience factors. In one sense this experiment tested a hypothetical definition of a good metaphor. A good metaphor in this sense means comprehensible. I have defined good metaphors as those which pair a subject term which expects a particular class of attributes to be predicated with a predicate term in which a highly salient attribute belongs to the expected class. In practice, however, most of the low expectancy - low salience metaphors were anomalous (but still categorically untrue).

The results of the second experiment show that the metaphors which were the most comprehensible in Experiment 1 (the high expectancy - high salience metaphors) interfered with a true-false decision more than less comprehensible metaphors. This replicates Glucksberg et. al.'s (1982) finding that the meaning of some metaphors is automatically activated and they are thus non-optionally interpreted. These findings produce major difficulties for a stage model (Searle, 1977) in which a literal interpretation precedes a figurative one. The most reasonable explanation of the results of Experiment 2 is that high expectation and high salience made the metaphors more comprehensible that the non-optionally interpreted meaning interfered with a false decision. As argued in the introduction, a stage theory would not predict this kind of interference. Experiment 2 extends previous work using this paradigm by specifying the factors associated with the subject term that render the metaphor automatically comprehensible. It is only in the conditions in which the expectancy factor was high that any interference effect was found.

An examination of priming effects that cause poor metaphors to interfere with a true-false task should consider the effect of priming both expectancy and salience factors. Gildea and Glucksberg's (1983) study used three kinds of primes: Specific-figurative, Specific-literal, and General-literal. They found that both literal and figurative primes produced interference from metaphorical meaning in a literal verification task. They also found that the figurative primes produced more of an interference than did the literal primes. They had no ready explanation for the advantage of figurative over literal primes. It may be, however, that figurative primes are more likely to prime or create relevant expectancies in the subject term as well as prime relevant attributes. In other words, the expectation factor may be heightened with a figurative prime in addition to the salience of the ground attributes. For example, the prime *Some people are cold* may prime appropriate expectancies in the term *Some marriages* such that the phrase *Some marriages are iceboxes* would be more readily comprehensible. Contrast the above prime with the literal prime *Some winters are cold*. The subject phrase *Some people* would have more expectations in common with the phrase *Some marriages* than would the phrase *Some winters*. In the literal prime few appropriate expectancies would be primed and the effect would be only due to the semantic priming of the predicate concept *cold*. One fruitful line of research may be to examine the effect of explicitly priming variables in the subject term versus features in the predicate term.

The surprising finding in Experiment 2 is that when either or both the expectancy or salience factors were low, it took about 1800 ms to make the decision whether it was true or false. One way to look at the results is that when both expectancy and salience factors are high metaphors interfere with a false decision, and literals are decided faster. In other words, the meaning becomes apparent faster under these conditions, interfering when the response is false and facilitating a true response. When either or both of the manipulated factors (expectancy or salience) were low, the decision time was about the same.

One of the major differences between the results of Experiment 1 and Experment 2 is that the factors interact in Experiment 2 whereas they are additive in Experiment 1. As

mentioned previously, the verification task seemed to be affected only if both salience and expectancy factors were high, whereas the comprehension task was affected by degrees when either the expectancy or salience factors were high. This difference may be largely due to the different levels of comprehension required in the two tasks. Comprehension would be different in a task which explicitly requires that you press a button when you understand a sentence than it would in a task in which you are required to decide if the sentence is true.

The additive results of the first experiment suggest that comprehension is affected by a combination of high expectation and high salience. When both factors are high comprehension is faster than when only one is high. Comprehension is also faster when one is high than when none are high. The second experiment suggests that, when an individual is instructed to make a true-false judgment, the meaning of some metaphors automatically interferes with the decision. The only metaphors which do so are the high expectancy - high salience metaphors suggesting that because comprehension is easiest for these metaphors, they interfere with the decision. The poorer metaphors do not seem to interfere even though, among the poorer metaphors, some are easier to understand than others. In other words, to interfere with a true-false decision a metaphor must have a particular level of comprehensibility and the high expectancy - high salience metaphors were the only ones that did.

If the basis of the true-false decision is a post-comprehension assessment of conflicting characteristics, then it is consistent that the false statements which had the least amount of conflict would be sometimes judged as true sentences. This would explain the higher error rates in the high expectancy - high salience condition compared to the other conditions. In other words, if few highly expected categories of the subject term conflicted with highly salient attributes of the predicate term, there would be a tendency to respond true, thus yielding high error rates along with interference. The false conditions in which some strong components of meaning do not conflict may, therefore, be prone to error. Likewise, the low expectancy literal condition may have been more difficult than the high expectancy literal condition because the highly salient predicate attributes may have conflicted in some way with the

expectancies of the subject term.

The predicate term of some metaphors may be standard words that are used often to convey a particular meaning. For example, the word *giant* is often used to figuratively convey largeness. Glucksberg et. al. (1982) referred to this sort of predicate as a *stock vehicle*. Frequent use of a *stock vehicle* may render the metaphorically used attributes very highly salient such that they may be very similar to literal predicates. This may make metaphors that include a stock vehicle very difficult to classify as literally false. For this reason the use of *stock vehicles* was avoided in this study.

In this study, there was no surrounding context, although I suggest that the expectations and restrictions provided by the subject term act along with the general context to create more precise expectations and restrictions. It may be that the most natural form of contextual influence is one in which the expectations of the subject term are specified by the context rather than priming specific attributes. For example, the meaning of the phrase *his wife is an icebox* could be interpreted in two ways. One could be that she feels cold and the other that she is emotionally unresponsive. The first interpretation could be arrived at with the following context:

> The window is usually left open throughout the nights. He feels comfortable upon awakening whereas his wife is an icebox.

The second interpretation could be arrived at with another context:

> He began to feel very depressed and unable to concentrate owing to his inability to find suitable employment. He had tried many times to discuss these feelings with his wife, but she is an icebox.

The expectations differ in these two examples so that the same metaphor means two different things. Note that to arrive at these interpretations it was not necessary to explicitly prime specific characteristics in the predicate term.

In addition, overtly priming specific attributes would be a rather awkward way to explain contextual facilitation in a natural setting. It would be difficult to explain how new

information could be introduced and readily understood.

Both experiments reported here support an interaction view (Black, 1962) of metaphor comprehension and, in particular, suggest that the filtering mechanism proposed by Verbrugge (1980) is one of expectation or restriction from the subject term on word meaning in the predicate term. The view that I would like to put forward in this thesis is similar in principle to the interaction view but is more general so as to be applicable to literal comprehension as well. In addition, it implies a general set of processes with which word meanings arise. First, the form of the sentence will influence the interpretation in a number of ways. It will restrict the kinds of meaning important for a particular sentence by introducing syntactic structure. For example, a sentence like *He threw his* ___ would lead one to expect the blank to be filled with a noun, whereas a sentence like *He* ___ *his ball* would likely lead us to expect a verb. In addition, the form of the sentence will also determine things like which term modifies which. For example, in the *X is Y* form of sentence, it is the second term, the predicate, which modifies the subject or first term.

To illustrate what is meant by applying the meanings of the predicate term to the subject term, I would like to discuss a hypothetical example using the word *table* as the predicate term. For the sake of argument, assume that the attributes associated with *table* are the following:

1) has a horizontal top

2) has four legs

3) is used to rest things on

In addition, assume that the order in which they are listed also represents the order of salience. Consider the phrase *A merg is a table*. If one had never encountered the word *merg* prior to reading this statement, there would be no semantic expectations or restrictions on what can be predicated from *table* to *merg*. In a case where the subject term was never encountered previously, therefore, the interpretation of such a phrase would be that a *merg* was very much like a *table*. The new meaning structure for *merg* would be very similar to the weighted

concept configuration of *table*. In other words, the influence of the component attributes for the word *table* would be in direct proportion to their resting salience. This would likely be perceived as a literal sentence.

On the other hand, if the listener had already encountered the word *merg*, and knew that a *merg* was something which had three legs, then the application of meaning of the word *table* to the word *merg* would be restricted or modified to some degree. There would be some expectations or restrictions imposed by the subject term so that the influence on meaning would no longer be proportional only to the salience of attributes in the predicate term. If the general process of predication is one of transferring all the highly activated concepts, then the filtering process (Verbrugge, 1980) could occur when a feature which is already represented by the subject term conflicts with a feature which is being transferred from the predicate term. Note that the impression we would have of a phrase like this would be that it was a literal statement. The person interpreting the phrase would now understand *mergs* to be:

1)has a horizontal top

2)has three legs

3)is used to rest things on

This illustrates that some of the attributes, even highly salient ones may not form the meaning of the statement.

If the conversation preceding the statement had been about the usefulness of various objects, this may have led to expectations for attributes that fit a useful function. In this case the third listed attribute may be enhanced so that it forms the ground or meaning of the statement.

One final example will illustrate how this filtering process would operate in a metaphorical statement. Suppose we know that a *merg* is a type of geological formation like a mountain. This would constrain the interpretation to a great degree, because many of the attributes which would otherwise be predicated would conflict with those which already form the meaning of *merg*. In this example, the interpretation would likely be that a *merg* has a

horizontal top because all other highly salient concepts of the word *table* conflict with those already forming the meaning of the word *merg*. On this view, one of the important differences between metaphorical and literal phrases would be in the number of highly salient attributes of the predicate term which conflict with the subject term.

If there is no requirement for a separate set of inferential processes, then we must consider what distinguishes a metaphor from a literal statement. Ortony's (1979) analysis on the basis of salience imbalance has already been discussed and its inadequacies described. With the mechanisms proposed in this thesis, the appreciation of a metaphor as a metaphor would come after the fact of comprehension. One candidate for an indicator of metaphoricity may be the number or quality (i.e., defining versus charicteristic features, Rosch and Mervis, 1975) of the highly salient attributes of the predicate term that are in conflict with the restrictions imposed by the subject term. To assess the number or quality of these conflicting attributes, however, the process of comprehension must have already been completed.

The principle advantage of the view outlined in this thesis over Ortony's view based on similarity is that this view allows for predication of new information. Most of the ground attributes used in this study are better exemplified as characteristics which *can be* true of the subject, not as already existing attributes. Intuitively, this is closer to what would occur, as a rule, in everyday conversation.

It was noted earlier that some of the expected attributes of the subject term may also be listed frequently as features of the term. For example, the phrase *That brick is* was most often ended with reference to weight, and *heaviness* was the most often listed feature. Not only does this pose problems for Ortony's (1979) analysis of metaphoricity - the ground attribute should be at a low level of salience for the subject term - but it also suggests that the view outlined in this paper can be applied to a more general set of metaphors. My view does not preclude nor does it require that the ground attribute is present as part of the existing meaning of the subject term, whereas a model based on the comparison of overlapping feature sets does require that the attribute be part of the representation of both terms.

Throughout this thesis I have discussed the expectancy effect only as an effect and have said little about how it could be represented or by what mechanisms it could influence the meaning of the predicate term. I have treated the subject term as an element of context and the expectancy effect could be seen to be one of directly priming the relevant variables. It would be difficult, however, to account for all expectancy as a direct prime because the so-called relevant attributes may not be represented in the subject term.

The subject term could also be discussed in terms of schemata (Rumelhart & Ortony, 1977) or frames (Minsky, 1975). One relevant aspect of schemata or frames is that they have some variables or slots that can be filled by information about a particular class of instances. This not only provides additional structure to the representation of meaning (Brewer & Nakamura, 1981), it also provides some inherent constraints on the interpretation of an utterance. When predicating information to a particular subject term, the statement will be easiest to understand when the attributes predicated fit the range of values acceptable to the slots or variables. This kind of process may be similar to what Verbrugge (1980) meant by a filtering process.

Not only may particular attributes fit better into the variables in the schema representation, it may also be the case that some variables may be more ready to be filled given the comprehender's long and short term experience with a particular subject term. The degree of comprehensibility of an *X is Y* phrase would then be the result of both the readiness of the variable in the subject term to accept predication of a particular attribute as well as the strength of the attribute in the Y or predicate term. One of the effects of context, therefore, may be to prime the variables in the representation of the subject term to render them more ready to accept the particular information they are able to accept.

Another question that the research in this thesis addresses is the asymmetry question brought up by Verbrugge and McCarrell (1977). The reason that the highly salient attributes of two terms of the metaphor have different recall value is that the influence they have on the interpreted meaning arises from different sources. The subject term's influence arises from

the expectations and restrictions it generates, whereas the predicate term's influence comes from the salient attributes which are associated to it. It is important for comprehension that the intended ground attributes are highly salient for the predicate term. Thus we should expect that this factor should be related to what makes a good recall cue. On the other hand, it is not salience of the intended ground attribute that is an important influence of the subject term, so we should not expect highly salient features of the subject term to be good recall cues.

Black (1980) claims that the quality of a metaphor can be graded in terms of its *emphasis* and its *resonance*. Emphasis refers to the degree to which the metaphor cannot be adequately replaced by some literal phrase, and still retain the intended meaning. Resonance refers to the richness of the meaning, or in the terminology of this thesis, the number of attributes that reach threshold and form part of the meaning of the phrase. For strong metaphors, a translation of a metaphor into literal language may require a brief explanation rather than a single word (Sadock, 1980). The use of many metaphors may be to predicate a unique combination of attributes. They may also include affective meaning, and therefore may be used for affective emphasis. They would, therefore, often be difficult to replace with a single literal term and still communicate the same meaning.

For very rich metaphors many attributes or components of meaning may exceed threshold; the vastness of meaning experienced as richness. In this respect, most literal adjectives would be extremely unresonant because as we have mentioned, literal adjectives have very few components of meaning, though they may be very salient. Metaphors, on the other hand, provide more opportunity for rich predication because they have many highly salient attributes that can be used to create meaning. The best metaphors would likely be the ones for which many attributes are transferred from the predicate term to the subject term. These metaphors will be perceived as being more apt (Tourangeau and Sternberg, 1981).

The metaphors produced naturally are likely those that are emphatic and resonant. Their function is not merely decorative, but they convey meaning that could not be conveyed easily without the use of a figure of speech. Metaphors are not simply used to state the

obvious but, rather, to convey new insights or express difficult to express affective signification.

Perhaps the reason metaphors have been traditionally used to convey imprecise emotions or new ways of looking at things, is not because metaphors are uniquely processed, but because novelty of emotion and insight do not have readily available literal terms of expression. Using a metaphor and taking advantage of the formation of meaning created by the novel interaction between the expectations/restrictions on the components of meaning, imposed by either the subject term or by context, and the salience of the components of meaning in the word used allows one to express unique ideas or to refer to things not referred to previously. Discussions of metaphor use by children should consider the possibility that the child may use what we perceive as a metaphor simply because he or she can best express an idea in that way. Gilligan and Bower (1984) presented a theory in which affect was represented as *emotion nodes* with the same operational characteristics of other cognitive nodes. The theory presented in this thesis may be an interesting avenue of investigation as applied to conveying affective information represented in nodes through metaphor.

The views presented in this thesis suggest that the problem of metaphor comprehension should be considered as a special case of the larger question regarding how the meaning of a word is selected within context. I have examined the role of contextual expectations solely in terms of the context provided by very simple subject phrases. This has been done because of the particular issues to which this research is addressed, namely, the role the the components of a metaphorical sentence on comprehension. Previous treatments of metaphor comprehension have regarded the subject phrase of a metaphor as a special component of language. The treatment in this thesis is one that views the influence of the subject phrase as essentially an element of context. My main aim has been to demonstrate that the components of a metaphor behave in much the same fashion as components of literal language.

The experiments have demonstrated that treating the subject phrase of a metaphor as short-term sentential context rather than as a special component called the *topic* can effectively

influence the comprehensibility of metaphorical phrases. On the definition presented in this thesis, the comprehensibility of the phrase increased with the increased accuracy of the context. This bolsters an argument that we should be looking for a general set of comprehension processes to explain both literal and metaphorical comprehension because, as I have shown, the determination of metaphorical meaning may simply be the product of contextual facilitation or suppression of the salient components of a word. This explanation could be applied to either metaphorical or literal language.

The view put forward here is that the interpretation of any word involves the activation of a number of components of meaning and that the contextual effects somehow enhance or suppress the impact of these components on one's interpretation of the meaning of a particular word. Other, more general, forms of context should also be examined with a view to determine the manner in which the expectations generated by a simple subject term act with the more general contextual influences of word meaning.

Bibliography

Anderson, J. R. (1981). Effects of prior knowledge on memory for new information. Memory & Cognition, 9, 237-246.

Anderson, J. R. (1983). The architecture of cognition. Cambridge MA: Harvard University Press.

Anderson, R. C. (1975). On putting apples into bottles- a problem of polysemy. Cognitive Psychology, 7, 167-180.

Bierschenk, B. (1982). An ecological model for the processing of symbolic information. Perceptual and Motor skills, 54, 663-674.

Black, M. (1962). Models and Metaphors. Ithica, NY: Cornell University press.

Black, M. (1979). More about metaphor. In A. Ortony (Ed.), Metaphor and thought (pp. 19-43). Cambridge, MA: Cambridge University Press.

Britton, B. K. & Tesser, A. (1982). Effects of prior knowledge on use of cognitive capacity in three complex cognitive tasks. Journal of Verbal Learning and Verbal Behavior, 21, 421-436.

Carbonell, J. G. (1982). Metaphor: An inescapable phenomenon in natural-language comprehension. In W. G. Lehnert & M. H. Ringle (Eds.), Strategies for natural language processing (pp. 415-434). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Clark, H. H. & Gerrig, R. J. (1983). Understanding old words with new meanings. Journal of Verbal Learning and Verbal Behavior, 22, 591-608.

Clark, H. H. & Lucy, P. (1975). Understanding what is meant from what is said: A study in conversationally conveyed requests. Journal of Verbal Learning and Verbal Behavior, 14, 56-72.

Clifton, C., Frazier, L., & Connine, C. (1984). Lexical expectations in sentence comprehension. Journal of Verbal Learning and Verbal Behavior, 23, 696-708.

Clifton, C. & Slowiaczek, M. L. (1981). Integrating new information with old knowledge. Memory & Cognition, 9, 142-148.

End, L. J. (1984). Comprehension of metaphors: Priming the ground. Presented at the conference on Knowledge and Language, Warsaw, 6-8 June 1984.

Fainsilber, L. & Ortony, A. (1984). Metaphorical uses in the expression of emotion. Unpublished paper presented at the meeting of the Midwestern Psychological Association, Chicago, 1984.

Gentner, D. (1977). Children's performance on a spatial analogies task. Child Development, 48, 1034-1039.

Gentner, D. (1983). Structure-Mapping: A theoretical framework for analogy. Cognitive Science, 7, 155-170.

Gibbs, R. W. (1980). Spilling the beans on understanding and memory for idioms in conversation. Memory and Cognition, 8, 149-156.

Gick, M. L. & Holyoak, K. J. (1983). Schema induction and analogical transfer. Cognitive Psychology, 15, 1-38.

Gildea, P. & Glucksberg S. (1983). On understanding metaphor: The role of context. Journal of Verbal Learning and Verbal Behavior, 22, 577-590.

Gilligan, S. & Bower, G. H. (1984). Cognitive consequences of emotional arousal. In C. E. Izard, J. Kagan, and R. B. Zajonc (Eds.), Emotions, cognition, and behavior (pp. 547-588). Cambridge MA: Cambridge University Press.

Glucksberg, S., Gildea, P., & Bookin, H. B. (1982). On understanding nonliteral speech: Can people ignore metaphors? Journal of Verbal Learning and Verbal Behavior, 21, 85-98.

Greenspan, S. L. (1984). Semantic flexibility and referential specificity. Paper presented at the 21st meeting of the Psychonomic Society, San Antonio, Texas.

Grice, H. P. (1975). Logic and Conversation. In P. Cole & J. L. Morgan (Eds.), Syntax and semantics: Speech acts (pp. 64-75). New York, NY: Academic Press.

Haviland, S. E. & Clark, H. H. (1974). What's new? Acquiring new information as a process in comprehension. Journal of Verbal Learning and Verbal Behavior, 13, 512-521.

Inhoff, A. W., Lima, S. D., & Carroll, P. J. (1984). Contextual effects on metaphor comprehension in reading. Memory and Cognition, 12 558-567.

Kucera, H. & Francis, W. N. (1967). Computational analysis of present day american english. Providence, RI: Brown University Press.

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

Mcnamara, T. P. & Sternberg, R. J. (1983). Mental models of word meaning. Journal of Verbal Learning and Verbal Behavior, 22, 449-474.

Miller, G. A. (1979). Images and models, similes and metaphors. In A. Ortony (Ed.), Metaphor and thought (pp. 202-250). Cambridge, MA: Cambridge University Press.

Minsky, M. (1975). A framework for representing knowledge. In P. H. Winston (Ed.), The psychology of computer vision (pp. 211-277). NY: McGraw-Hill Book Company.

Ortony, A. (1979a). Beyond literal similarity. Psychological Review, 86, 161-180.

Ortony, A. (1979b). Metaphor: A multidisciplinary problem. In A. Ortony (Ed.), Metaphor and thought (pp. 1-16). Cambridge, MA: Cambridge University Press.

Ortony, A. (1980). Metaphor. In R. J. Spiro, B. C. Bruce, and W. F. Brewer (Eds.), Theoretical issues in reading comprehension (pp. 349-369). Hillsdale NJ: Lawrence Erlbaum Associates Publishers.

Ortony, A., Schallert, D., Reynolds, R., and Antos, S. (1978). Interpreting metaphors and idioms: Some effects of context on comprehension. Journal of Verbal Learning and Verbal Behavior 17, 465-477.

Reder, L. M. (1983). What kind of pitcher can a catcher fill? Effects of priming in sentence comprehension. Journal of Verbal Learning and Verbal Behavior, 22,

189-202.

Richards, I. A. (1962). The philosophy of rhetoric. NY: Oxford University Press.

Riesbeck, C. K. (1982). Realistic language comprehension. In W. Lehnert & M. Ringle (Eds.), Strategies for natural language processing (pp. 37-54). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Rosch, E. & Mervis, C. B. (1975). Family resemblances: Studies in the internal structure of categories. Cognitive Psychology 7, 573-605.

Rumelhart, D.E. (1977). Some problems with the notion of literal meanings. In A. Ortony (Ed.), Metaphor and thought (pp. 78-90). Cambridge, MA: Cambridge University Press.

Rumelhart, D. E. (1980). Schemata: The building blocks of cognition. In R. J. Spiro, B. C. Bruce, and W. F. Brewer (Eds.), Theoretical issues in reading comprehension (pp. 33-58). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Rumelhart, D. E. & Abrahamson, A. A. (1973). A model for analogical reasoning. Cognitive Psychology, 5, 1-28.

Rumelhart, D. E. & Ortony, A. (1977). The representation of knowledge in memory. In Anderson, R. C., Spiro, R. J., and Montague, W. E. (Eds.), Schooling and the acquisition of knowledge (pp. 99-135). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Sadock, J. (1977). Figurative speech and linguistics. In A. Ortony (Ed.), Metaphor and thought (pp. 46-63). Cambridge, MA: Cambridge University Press.

Searle, J. R. (1977). Metaphor. In A. Ortony (Ed.), Metaphor and thought (pp. 92-123). Cambridge, MA: Cambridge University Press.

Shipley, J. T. (1945). Dictionary of Word Origins. New York, NY: Philosophical Library, Inc.

Sternberg, R. J. (1977). Component processes in analogical reasoning. Psychological Review, 84, 353-378.

Sternberg, R. J. (1977). Intelligence, information processing, and analogical reasoning: The componential analysis of human abilities. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Sternberg, R. J. & Nigro, G. (1980). Developmental patterns in the solution of verbal analogies. Child Development, 51, 27-38.

Swinney, D. A. & Cutler, A. (1979). The access and processing of idiomatic expressions. Journal of Verbal Learning and Verbal Behavior, 18, 523-534.

Verbrugge, R. (1980). Transformations in knowing: A realist view of metaphor. In R. Honeck & R. Hoffman (Eds.), Cognition and figurative language (pp. 87-125). Hillsdale, NJ: Lawrence Erlbaum Associates. 87-125.

Verbrugge, R. R. & McCarrell, N. S. (1977). Metaphoric comprehension: Studies in reminding and resembling. Cognitive Psychology, 9, 494-533.

Appendix A: Stimuli

Condition # 1

HIGH EXPECTANCY - HIGH SALIENCE (metaphor)

1. His arteries are metal
2. This ballet is a swan
3. Those children are houseflies
4. That coffee is moonshine
5. That brick is an anchor
6. That desk is a junkyard
7. That drug is a dagger
8. His ears are elephants
9. That fish is a dinosaur
10. These floors are aluminum
11. Her gossip is poison
12. That house is an atom
13. That jacket is a sauna
14. Her jewels are caviar
15. That lake is the antarctic
16. That letter is a telescope
17. That music is a jackhammer
18. That park is a lizard
19. That paycheck is an ant
20. That restaurant is platinum
21. His shirt is a slum
22. His shoes are mountains
23. These seatbelts are a cage
24. His speech is a turtle
25. This sponge is melba toast
26. His stomach is a tank
27. That surgeon is a swiss watch
28. Her teeth are cocaine
29. That train is a cheetah
30. Her voice is a trumpet
31. His wallet is a ghost town
32. This weekend is a sermon
33. This vacation is a party
34. Her writing is a slaughterhouse
35. This sofa is fur
36. That wind is ammonia

Condition # 2.

HIGH EXPECTANCY - LOW SALIENCE (metaphor)

37. His arteries are nails
38. This ballet is a stallion
39. Those children are dandelions
40. That coffee is a hammer
41. That brick is a piano
42. That desk is a road map
43. That drug is tuberculosis
44. His ears are the earth
45. That fish is a bathtowel
46. These floors are crystal
47. Her gossip is pollution
48. That house is an ion
49. That jacket is a lamp
50. Her jewels are medicine
51. That lake is an asteroid
52. That letter is a submarine
53. That music is a gun
54. That park is a bruise
55. That paycheck is a thorn
56. That restaurant is a tuxedo
57. His shirt is a badger
58. His shoes are vaults
59. These seatbelts are a closet
60. His speech is a hippopotamus
61. This sponge is a nest
62. His stomach is a hospital
63. That surgeon is an architect
64. Her teeth are a cocoon
65. That train is a hurricane
66. Her voice is a hairdryer
67. His wallet is a desert
68. This weekend is a professor
69. This vacation is a sport
70. Her writing is a war
71. That sofa is a haystack
72. That wind is a moose

Condition # 3

LOW EXPECTANCY - HIGH SALIENCE (metaphor)

73. His shoes are metal
74. Those children are swans
75. That fish is a housefly
76. His arteries are moonshine
77. These seatbelts are an anchor
78. That letter is a junkyard
79. That surgeon is a dagger
80. That sponge is an elephant
81. Her jewels are dinosaurs
82. Her teeth are aluminum
83. That wind is poison
84. Her writing is an atom
85. That train is a sauna
86. That desk is caviar
87. That park is the antarctic
88. This vacation is a telescope
89. This ballet is a jackhammer
90. Her voice is a lizard
91. These floors are an ant
92. That coffee is platinum
93. That brick is a slum
94. This sofa is a mountain
95. His shirt is a cage
96. That music is a turtle
97. That lake is melba toast
98. His wallet is a tank
99. That paycheck is a swiss watch
100. That house is cocaine
101. This weekend is a cheetah
102. Her gossip is a trumpet
103. His stomach is a ghost town
104. That restaurant is a sermon
105. His speech is a party
106. His jacket is a slaughterhouse
107. His ears are fur
108. That drug is ammonia

Condition # 4

LOW EXPECTANCY - LOW SALIENCE (metaphor).

109. His shoes are nails
110. Those children are stallions
111. That fish is a dandelion
112. His arteries are a hammer
113. These seatbelts are a piano
114. That letter is a road map
115. That surgeon is tuberculosis
116. That sponge is the earth
117. Her jewels are a bathtowel
118. Her teeth are crystal
119. That wind is pollution
120. Her writing is an ion
121. That train is a lamp
122. That desk is medicine
123. That park is an asteroid
124. This vacation is a submarine
125. This wallet is a gun
126. Her voice is a bruise
127. These floors are a thorn
128. That coffee is a tuxedo
129. That brick is a badger
130. This sofa is a vault
131. His shirt is a closet
132. That music is a hippopotamus
133. That lake is a nest
134. His wallet is a hospital
135. That paycheck is an architect
136. That house is a cocoon
137. This weekend is a hurricane
138. Her gossip is a hairdryer
139. His stomach is a desert
140. That restaurant is a professor
141. His speech is a sport
142. His jacket is a war
143. His ears are a haystack
144. That drug is a moose

Condition # 5

HIGH EXPECTANCY - HIGH SALIENCE (literal)

145. His arteries are hard
146. This ballet is graceful
147. Those children are bothersome
148. That coffee is strong
149. That brick is heavy
150. That desk is messy
151. That drug is dangerous
152. His ears are large
153. That fish is large
154. These floors are shiny
155. Her gossip is harmful
156. That house is small
157. That jacket is warm
158. Her jewels are expensive
159. That lake is cold
160. That letter is long
161. That music is loud
162. That park is ugly
163. That paycheck is small
164. That restaurant is expensive
165. His shirt is dirty
166. His shoes are large
167. These seatbelts are confining
168. His speech is slow
169. This sponge is dry
170. His stomach is big
171. That surgeon is precise
172. Her teeth are white
173. That train is fast
174. Her voice is loud
175. His wallet is empty
176. This weekend is boring
177. This vacation is fun
178. Her writing is messy
179. This sofa is soft
180. That wind is strong

Condition # 6

LOW EXPECTANCY - HIGH SALIENCE (literal)

181. His shoes are hard
182. Those children are graceful
183. That fish is bothersome
184. His arteries are strong
185. These seatbelts are heavy
186. That letter is messy
187. That surgeon is dangerous
188. That sponge is large
189. Her jewels are large
190. Her teeth are shiny
191. That wind is harmful
192. Her writing is small
193. That train is warm
194. That desk is expensive
195. That park is cold
196. This vacation is long
197. This ballet is loud
198. Her voice is ugly
199. These floors are small
200. That coffee is expensive
201. That brick is dirty
202. This sofa is large
203. His shirt is confining
204. That music is slow
205. That lake is dry
206. His wallet is large
207. That paycheck is precise
208. That house is white
209. This weekend is fast
210. Her gossip is loud
211. His stomach is empty
212. That restaurant is boring
213. His speech is fun
214. His jacket is messy
215. His ears are soft
216. That drug is strong

Appendix B: Instructions

Instructions for Normative study 1:

Sentence Completion

In this study I am interested in getting a measure of what highly expected quality, action or feature would appropriately fit as the ending to simple sentences like the sentences you see on the blackboard. On the sheets of paper in front of you there is a list of 36 phrases that each form the beginning of a sentence. I would like you to write down a single ending which you think fits most appropriately as the end of the sentence. As an example, consider the 1st phrase I have written on the blackboard. You see the first part of the sentence *This pencil is* ____. If the first thing you think of to end the sentence is *dull* then I would like you to write the word *dull* in the space provided. The second example on the blackboard reads *Her watch is* ___ and could be completed by adding something like *behind time*. Another way to end the second sentence would be to write *a Bulova* so that the entire sentence reads *Her watch is a Bulova*. Some other ways to end the phrase *Her watch is* ___ would be *expensive* or *scratched*. I would like you to write down the ending that you think is most appropriate. It will usually be the first ending that occurs to you. Is it clear what I am looking for?

This is not a test of your creativity or intelligence so please do not try too hard to think of strange or funny ways to complete these phrases. I am interested in finding out how most people would expect them the end, so please keep that in mind as you do the task. Please keep your endings short: three or four words should be the maximum. Your cooperation is greatly appreciated.

Do you have any questions?

When you have finished the entire list please bring both the pencil and paper up front, and I will sign your participation cards.

Alright, turn the sheets over and proceed.

Instructions for Normative study 2:

Feature Generation

In this study I am interested in getting a measure of the kinds of characteristics most people associate with particular words. On the sheets in front of you there is a list of 30 words. In the space provided after each word, I would like you to write down the characteristics or features of each word. For example, if the word in the margin was *basketball* you might list the following features:

orange, round, bounces, relatively big,

filled with air, etcetera.

Once you have listed the features for one word please to on to the next. For example if the next word was *spike*, you might list:

pointed, heavy, metal, etc.

Is it clear what I am asking you to do?

This is not a test of your creativity or intelligence so please do not try to think of strange characteristics of the words on your list. I am interested in finding out what most people think of as characteristics of these particular words.

Do you have any questions?

Please do all thiry words. When you are finished bring the pencil and the forms up fron and I will sign your participation cards.

Alright turn your papers over and begin. do not try too hard to think of strange or funny ways to complete these phrases. I am interested in finding out how most people would expect them the end. Please keep your endings short: three or four words should be the maximum.

Instructions for Experiment 1

In this project I am investigating some of the factors that influence sentence comprehension. To collect my data I am asking people to read a series of sentences one at a time and to let me know when they have understood each one. In particular, you will see a series of sentences displayed one at a time in the centre of the screen in front of you. Your job is to read the sentence, understand what it means and touch this touch pad as soon as you do understand.

Each sentence will be displayed until you respond that you have understood it. To register your response you can use this touchplate. Please rest your palm on the larger plate and rest your index finger on the wooden resting pad. To make a response that you understand the sentence you simply bring your finger down onto the small plate and then return it to the pad. It is important that you return your index finger to the resting pad after each sentence or the computer will not go on to the next trial.

It is very important that you understand each sentence, but it is also important that you respond as soon as you have understood the phrase. I am interested in how quickly and completely people understand the particular sentences you will see displayed. As soon as you have understood a particular sentence, please respond by touching the plate. Is it clear what I want you to do in this task?

To make sure that you are reading for comprehension, every now and again, on randomly selected trials, you will be asked to paraphrase the sentence you have just claimed to have understood. On these trials you will hear a beep from the machine and you will see the message:

PLEASE PARAPHRASE THAT SENTENCE # 32

When you see this message please write down the number that is on the screen (32 in this example) on this piece of paper and then write down the meaning of the sentence in your own words. Once you have recorded the sentence in your own words please replace your hand in

position and touch the plate with your index finger to continue. Do you have any questions so far?

We will begin with some practice sentences to get you used to the task and the way I want you to respond. Each trial will begin with the words "Press to continue" in the centre of the screen. You are then to touch the plate and bring your finger back to rest on the resting pad. A short time later a sentence will appear in the centre of the screen. You then touch the plate once again when you have understood the meaning of the sentence.

Remember, the first few trials you will do are practice trials. I will remain in the room during these trials so feel free to ask me any questions during the practice trials.

Instructions for Experiment 2

In this project I am investigating some of the factors that influence sentence comprehension. To collect my data I am asking people to read a series of sentences one at a time and to decide if each sentence is literally true or not. In particular, you will see a series of sentences displayed one at a time in the centre of the screen in front of you. Your job is to read the sentence, decide if it is literally true or literally false, and then respond using these touch plates. Examples of literally false sentences are *SOME CARS CAN FLY* or *SOME CARS ARE MONKEYS*. Examples of literally true sentences are *SOME CARS HAVE WHEELS* or *SOME CARS ARE MOVING*. Is it clear what I mean by literally true or literally false?

Each sentence will be displayed until you respond whether it is true or false. To register your response you can use these touchplates. Please rest your palms on the larger plate and rest your index fingers on the wooden resting pad. To respond that the sentence is true you simply bring your finger down onto the small plate on this pad(preferred hand). To respond that the sentence is false you bring your index finger down onto the small plate on the other pad. It is important that you return your index finger to the resting pad after each sentence or the computer will not go on to the next sentence.

It is important that you respond as quickly and as accurately as you can. As soon as you have made your true-false decision, please respond by touching the appropriate plate. Is it clear what I want you to do in this task?

Each sentence will be preceded by an asterisk. It is important that you look at the asterisk because the sentence you will see will begin at that point on the screen. You will hear a beep from the machine and the asterisk will disappear. Keep looking at the spot where the asterisk was because a short time after the beep the sentence will appear. You then read the sentence, make your decision, and respond. Do you have any questions about the procedure?

We will begin with some practice sentences to get you used to the task and the way I want you to respond. During these practice trials you will see the words TRUE and FALSE

where the sentences will appear. Please respond by touching this(point-preferred hand) touchplate if the the word TRUE appears, and this (other) touchplate if the word FALSE appears. These signs in front of the pads will help you remember which pad to press. Any questions before I get the practice session started?

Remember, the first few trials you will do are practice trials. I will remain in the room during these trials so feel free to ask me any questions during the practice trials.

Now you will see the actual sentences displayed where the words TRUE and FALSE were previously. Remember that you are to decide as quickly and as accurately as you can whether each sentence you see is literally true or literally false. If there are no more questions I will start up this session and return when you are finished.