

What are the Characteristics of Emotional Metaphors?

Cornelia M. Verspoor

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Abstract

Metaphors are extremely pervasive in language. They provide a powerful manner of making abstract concepts explicit. For these reasons, they are frequently utilized to describe emotional state. The current research supports the idea that metaphors used in emotional domains tend to be conventionalized. This conventionalization is what makes it possible to identify common themes in the metaphors referencing each emotional domain. The research identifies such common themes, and shows that they can provide a basis for accurate grouping of metaphors from the same domain.

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Part I

Background Information

1 Introduction

Emotion is a fundamental component of the human psyche. It has ramifications for almost every aspect of daily existence—it affects decision making, supplies motivation for particular behaviors, and influences the interpretation of physiological arousal and situational factors. Emotions involve a complex subjective experience, a combination of feeling and thought. They are abstract concepts which are often expressed metaphorically since they lack objective grounding.

Cues for emotional meaning can come from several sources. In speech, tone of voice, volume, and speech rate are among the many factors which influence a listener’s interpretation of a statement. In written language, however, this interpretation becomes more complex. Emotional state can be referred to directly (“I am angry”), but frequently there is no such explicit reference and the reader or listener must infer it. How does one infer emotional state from written dialogue? Cues can come from grammatical construction, vocabulary diversity, and verbal immediacy. The most powerful method of communicating emotion, however, is through metaphor.

1.1 Emotional Expression

Emotions can be inferred from language even without a direct or indirect (metaphorical) reference to an emotion. They can be evidenced by “physical” attributes of expressions. As mentioned in the introduction, speech is a particularly effective example of such attributes. Pauses in speech, changes in volume, and the other dynamic components of speech, such as facial expression and gestures, are clear clues of the emotional state of the speaker.

Despite the lack of such obvious clues in written language, it is still possible to discern the emotional state of the speaker. A. Dittman [7] mentions the verb/adjective ratio in speech as one indicator of the speaker’s state. This is thought to be a result of general arousal. Such arousal increases more dominant, stereotyped responses, which results in reduced diversity in the

language used. Language becomes relatively simple. Thus more verbs would be used relative to adjectives when a speaker is aroused. This point is emphasized by G. Collier[3] in his analysis of active vs. qualitative statements. He argues that the more excitable a person is, the more action words he/she will use.

Collier goes on to analyze several emotions in terms of the effect of that emotional state on the language output of the speaker. He argues that there are systematic differences in the way people use sentences that vary with emotions and attitude. Such effects apply to both spoken and written language. For example, someone who is distressed will tend to phrase his/her sentences as commands. Descriptions of unpleasant emotions are generally more grammatically complex than descriptions of pleasant experiences. They are longer and contain more embedded sentences, more negation, and more adverbial phrases. Negation itself implies anxiety or denial. Anxiety tends to motivate defensive, adaptive behavior. This results in frequent use of such phrases as “I can’t”, “I don’t know”[20].

Another aspect of emotional expression is the concept of verbal immediacy, or the degree of closeness between participants within an interaction. The degree that speakers separate themselves from the listener, the object of conversation, or the message itself can be influenced by emotional state[3]. This separation can come in the form of spatial separation (for example, demonstratives implying greater distance “those” vs. “these”, “that” vs. “this”), temporal separation (as implicated with verb tense, or through the use of phrases such as “you know”), selective emphasis of events, or modifiers and qualifications (“I think”, “It seems to me”). The combination of all such characteristics results in language which is richly implicative of emotional state. It is different, however, from the topic currently under discussion, because it deals with the emotional state of the speaker, as opposed to being a concrete reference to an emotion.

1.2 What is a Metaphor?

Metaphor is defined in Webster’s Ninth New Collegiate Dictionary as “a figure of speech in which a word or phrase literally denoting one kind of idea is used in place of another to suggest a likeness or analogy between them”. It generally involves two objects or concepts which have shared attributes, although these attributes may not necessarily be obvious. The similarity

may even be implied rather than real[31].

Metaphor has also been described as “an intentional, linguistic device employed by people to convey ideas that might be otherwise inexpressible” [18]. It is often used to communicate continuous experiential information because such information is otherwise difficult to express[2]. This description reflects the usefulness of metaphor for abstract concepts. The function of a metaphor is to clarify, illuminate, or explain some concept through reference to a better understood, and generally more concrete, concept.

Metaphor is a powerful device for communicating emotion from two distinct perspectives. Emotions are abstract concepts. The relation of an emotion to some other concept tends to make the emotion more concrete. It can create an image reflecting the expressions and gestures generally associated with a particular emotion. It can also make the scale of the emotion more obvious. For example, there is a clear difference in the level of sadness in the two metaphors “He is in low spirits” and “He is depressed”. The implication in the latter of being pushed down by something adds the element of lack of control over the situation, which augments the severity of the emotion. This idea of having scale implicit in the metaphor stems from the concept of metaphors embodying certain attitudes. To quote Sapir, “Every perspective requires a metaphor, implicit or explicit, for its organizational base” [36]. By “causing” words to take on extended meanings, metaphor can influence the structure of a concept. This idea was further developed by Lakoff and Johnson (see Section 2.3).

The second perspective on metaphor and emotion is that the metaphor actually causes affective arousal by creating tension between the two objects or concepts in the metaphor. It can transform the reader or listener’s perspective on the topic of the metaphor by evoking an affective response[29]. This is thought to be one of the reasons why metaphor can be a powerful method of “explaining” a concept.

Natural language is filled with metaphorical expressions. Some of the metaphors, however, are no longer metaphors in the generally accepted sense of the term. The original metaphorical sense of many expressions has disappeared. Such expressions are known as idioms or “frozen” metaphors. In these cases, the metaphoric uses of the predicate have become distinct meanings in the “dictionary” for the term. For example, when one talks about the “mouth of a river”, one does not have to search for the relationship between a mouth and the end of a river. The word “mouth” has acquired a

meaning specific to the context of a river. Living metaphors, on the other hand, are those metaphors for which the literal sense of the predicate is at least dimly felt. For example, when we talk about “pumping someone for information” an image is evoked which strongly depends on the function of physically “squeezing” the person until more information comes out, just as we do a pump until water comes out.

Metaphors essentially consist of a topic, a vehicle, and a ground. The topic is the subject of the metaphor, or the source domain. The vehicle is the term used metaphorically, or the target domain. The ground is the relationship between the topic and the vehicle. The topic and vehicle are thought to interact to create the ground[8]. The comprehension of metaphor is something that is not currently completely understood. There are, however, several perspectives on how this comprehension occurs.

1.3 Understanding Metaphor

An important issue in understanding metaphor is the recognition of the metaphor. Metaphors read literally violate the interpretation norm that a sentence should be sincere and relevant to its context. This idea led D. Miall to propose a two step model of metaphor comprehension in which the metaphor is first read literally and rejected, and then read figuratively[28]. As emphasized by E. MacCormac, “We recognize a metaphor because the literal reading of it produces a semantic anomaly, which we seek to resolve”[27].

There is little evidence for the two-stage model. In fact, there is much evidence to the contrary. An interesting result from work done by B. Keysar is that comprehension of metaphor is easiest when both literal and metaphorical meanings of a sentence are plausible in context[19]. That is, if only one type of interpretation is meaningful, there is slower comprehension than if both types are meaningful—once one interpretation makes sense, comprehension is complete. If there are two possible meanings, it is likely in a statistical sense that semantic processing of one of the possibilities will complete more quickly than if there is only one possible meaning. The implication of such a result is that non-literal meanings are generated automatically, and are integrated within the context whenever a coherent interpretation can be formed. The metaphorical meaning is evaluated simultaneously with the literal meaning.

Other evidence comes from Harris (1976), who found that there was no speech onset difference when metaphors and their non-metaphorical equiva-

lents were presented to initiate paraphrases, and Ortony, Schallert, Reynolds, and Antos (1978), who concluded that whether or not sentences require a relatively great amount of processing is a function of how easily interpreted they are in light of contextually evoked expectations, not their degree of literalness[10]. Ortony et al. concluded this after they found that only in cases where subjects were given little context information did they take longer to understand metaphorical than literal targets. Glucksberg, Gildea, and Bookin (1982)[10] found that when subjects were asked to judge sentences as literally true or false, they took longer when a metaphorical interpretation was available (as in “Some jobs are jails”) than when none was possible (as in “Some birds are apples”). The general conclusion from all such evidence is that there is a process in which different meanings become available at roughly the same time and context either allows selection of one possible reading or suppression of other readings. Thus if there is no context and several possible interpretations, the selection task is more difficult.

The key to understanding metaphor, once a sentence has been recognized as a metaphor, seems to be to discover the common features between the topic and vehicle[8]. According to D. Miall and R. Vondruska, “reconstruction of an implied comparison is a critical step in understanding metaphor”[29].

How is this common feature discovered? According to R. Gibbs, the metaphorical relation is established by mapping only those aspects of the source and target domains which are thought to be nonliterally similar for the specific conversational context[11]. He believes that new meanings for the source domain are actually created when the metaphor is understood. This is further explained by Miall and Vondruska: an attribute of the target seems to transfer to the source, requiring the creation of a new perspective on the source[29].

A. Katz views the metaphorical relation as the arousal of the meaning of one concept and the mapping of that meaning to a second concept[18]. Katz studied the nature of the target domain chosen to create various metaphors. He found, interestingly, that target domains with only moderate semantic similarity to the source domains were the most preferred metaphorical vehicles. His measure of similarity was calculated by the number and saliency of the features shared by the two concepts. The chosen targets maximized the differences in the two domains while also highlighting similarities. He also found that the imagery of the target is strongly correlated to comprehension, less so than the imagery of the source[18]. This seems to confirm the useful-

ness of relating abstract ideas to concrete targets. Imagery will be addressed further in the context of cognitive approaches to metaphor (Section 3.2.1).

Such mapping ideas rely heavily on the cultural context in which the mapping is made. Figurative material fits into a larger cultural framework. That is, the means by which the less familiar is assimilated to the more familiar is heavily dependent on cultural experience[36]. Even the choice of metaphor topic and vehicle is culture-dependent. The classes from which speakers select metaphors are those that capture aspects of their simplified representation of the world. This mapping, then, allows two or more related elements of the source domain to be mapped onto a corresponding set of related elements in the cultural model[13].

The mental processes used to interpret metaphor can be thought of as the same as those used to arrive at the intended meaning on indirect speech acts. It is a complex reasoning process which depends on sufficient shared background about the specific context of the metaphor as well as the cultural context in which the metaphor is presented[9]. As Lakoff and Johnson said, “We understand a statement as being true in a given situation when our understanding of the statement fits our understanding of the situation”[21].

2 Linguistic/Philosophical Theories of Metaphor

2.1 Aristotle

Aristotle was the first to discuss metaphor. He viewed metaphor as based on objective similarities between the objects related by the metaphor[6]. As he states in *Poetics*[1], “[A] good metaphor implies an intuitive perception of the similarity in dissimilars”. His idea, then, is that metaphor is powerful when it emphasizes a subtle, but extrinsic, similarity between two things which are not generally related.

Aristotle considered metaphor to be an elliptical simile—that is, a metaphor of the form “An X is a Y” could be directly transformed to a simile of the form “An X is like a Y”[6]. This is a direct result of his view of metaphor as based on objective characteristics. That is, the transformation of a metaphor into a simile implies that a metaphor can be reduced to a list of similarities between the objects.

It is now generally accepted, however, that metaphors of this form are not

interpreted as implicit similes, but rather involve a more complex mapping between the source (X) and target domains (Y)[19]. A metaphor can bring similarities implied by the metaphor into existence[6]. That is, relationships which are not clear from a direct mapping of the properties specific to each domain can emerge from a more complicated mapping based on higher-level similarities. It is the nature of this mapping which remains the subject of metaphorical research.

2.2 Max Black

Max Black introduced what is currently known as “interaction theory”. He viewed the source and target of a metaphor as systems of beliefs rather than as isolated words. These systems consist of general knowledge and conventionally held beliefs[14]. The concept of including conventional beliefs is important, because many metaphors do not depend on factual knowledge but rather draw from ideas generally held to be true, regardless of whether they actually are. As Black himself explains,

“Imagine some layman required to say, without taking special thought, those things he held to be true about wolves; the set of statements resulting would approximate to what I am calling the system of commonplaces associated with the word ‘wolf.’... From the expert’s standpoint, the system of commonplaces may include half-truths or downright mistakes (as when a whale is classified as a fish); but the important thing for the metaphor’s effectiveness is not that the commonplaces shall be true, but that they should be readily and freely evoked” Max Black, in [6].

Interpretation of the metaphor is accomplished by constructing a set of beliefs about the source parallel to the set about the target[28]. This approach is called the interaction view because the two systems are seen to interact—the metaphor highlights certain aspects of each system. An organization is imposed on the source system that is not part of it[14]. The target system filters and organizes the source system, selecting and emphasizing features of the source which normally apply to the target[6].

Interaction theory was introduced to counter the earlier approach of attempting to find strict matches between source and target domains. Such a matching approach does not address the metaphors in which the explicit

properties shared are unrelated to the focus of the metaphor[28]. In such metaphors, the relation seems to emerge out of these properties, but is more than a simple match between the properties. This is solved by finding attributes in the systems that *parallel* one another, rather than directly matching. Then the attributes in the source are transformed to “fit” the attributes in the target.

2.3 George Lakoff and Mark Johnson

Lakoff and Johnson have done much work with “conventional” metaphors, or metaphors which have been incorporated in the manner in which people within a culture talk about certain domains. They believe that many of the fundamental concepts of our conceptual system are inherently metaphorical and cannot be characterized non-metaphorically[21]. These metaphorical concepts structure what we perceive, how we get around in the world, and how we relate to other people. “We can use metaphorical linguistic expressions to study the nature of metaphorical concepts and to gain an understanding of the metaphorical nature of our activities”[21].

In this approach, the metaphor is viewed as a means of understanding one domain of experience in terms of the conceptual structure of another domain[24]. They are used automatically and unconsciously[22]. The metaphors themselves have an internal structure. Slots, relations, and properties in the source domain¹ map to corresponding structures in the target domain. Even knowledge from the source maps to the target—inference patterns from the source can be mapped to the target[25].

Metaphor actually creates “experiential similarities”[14]. Objects in the world are thought to shape the human conceptual system through the experiences one has with them. Properties and similarities, according to Lakoff and Johnson, “exist and can be experienced only relative to a conceptual system. Thus, the only kind of similarities relevant to metaphors are *experiential*, not *objective* similarities”[21]. That is, the similarity of two objects is strictly dependent on how they are experienced and conceptualized, rather than on any “objective similarities”[14]. The position of metaphor at the foundation of the conceptual system causes people to experience things in

¹Please note that Lakoff views the *topic* as the target domain, and the *vehicle* as the source domain.

particular ways based on these metaphors, thereby creating the experiential similarities. Metaphors create structure in our understanding of a domain due to the structure of our knowledge in another domain. Concepts are given structure which is not there independent of a metaphorical base[25].

One reason this structuring occurs is that comprehending one aspect of a concept will necessarily hide other aspects of the concept—specifically, the aspects which are inconsistent with the metaphor will be suppressed. The result is that some features of reality are highlighted while others are hidden[6]. This property is a direct consequence of the fact that the conventional metaphors are systematic and coherent.

Lakoff believes that categories in the conceptual system which are based on metaphor cannot correspond to anything objective or non-experiential in the world. He justifies this by example. He begins with the definition of a method for determining whether a metaphor is motivated by the structure of experience, based upon analysis of the metaphor. 1) What determines the choice of source domain? 2) What determines the pairing of source domain and target domain? 3) What are the details of the source to target mapping?[23]. He proceeds to analyze several conventional metaphors in this fashion, showing how they are derived from experience, rather than objective characteristics of the concepts involved.

An interesting effect of having metaphors shape the conceptual system is that the metaphors do not only function “directly”, that is, in terms of a direct mapping from the one domain to the other. Due to the property of metaphorical entailment, details of knowledge from the source domain are carried over to the target domain. Thus, a sort of metaphorical extension occurs. For example, if one conceptualizes anger in terms of hot fluids, the properties of hot fluids themselves can be used as metaphors for anger. So, “We got a rise out of him” comes from the property of bubbles escaping from a boiling liquid[23].

Lakoff and Johnson argue that the reason humans are not aware of the fundamental nature of metaphor in the conceptual system is that metaphor is too pervasive, too conventional. “[They] are so natural and so pervasive in our thought that they are usually taken as self-evident, direct descriptions of mental phenomena. The fact that they are metaphorical never occurs to most of us”[21]. One example they put forth is the metaphorical model of “Mind as an entity”. This base metaphor is elaborated to “Mind as a machine” and “Mind as a brittle object”, which in turn lead to such metaphors as “I’m a

little rusty today” and “He *broke* under cross-examination”.

Emotions in the Lakoff and Johnson approach are generally understood in terms of orientational metaphors. For example, “Happy is up”, and likewise “Sad is down”. These are thought to be grounded in the physical effects of the emotions. For example, a drooping posture goes with sadness, while an erect posture is associated with a positive emotional state. These orientational metaphors are, then, a result of systematic correlates between emotions and sensory-motor experiences. The effectiveness of these metaphors is captured in the quote “such metaphors allow us to conceptualize our emotions in more sharply defined terms and also to relate them to other concepts having to do with general well-being”[21].

2.4 Eva Kittay

E. Kittay[6] has presented a view of metaphor that is known as “perspectival theory”, which has its roots in interactionist theory. She proposes that metaphors function by providing perspectives on the target[14]. That is, the

“role of metaphor is to provide a perspective from which to gain an understanding of that which is metaphorically portrayed...a language speaker makes use of one articulated domain to gain an understanding of another experiential or conceptual domain.”
(Kittay, in [6])

Kittay defines semantic fields, in which the meaning of a word is invariably connected to the meanings of other words, as composed of two parts. One part is a group of lexical fields. These are a structured set of uninterpreted labels reflecting the meaning of the word. The other consists of a context domain, which is the realm in which the labels are to be interpreted. Understanding a metaphor is viewed as an interaction between lexical fields and context domains[14]. Interpretation requires the identification of the semantic fields of both the source and target domains. The semantic fields of the target are used to articulate the context domains of the source.

Kittay, like Lakoff and Johnson, views metaphor cognitively. “The key notion in seeing a metaphor as cognitive is the recognition that in metaphor two concepts are operative simultaneously”(Kittay in [6]). She sees metaphorical thinking as “an initial structuring or ordering of a previously ‘unarticulated’

conceptual or experiential domain by an already ‘articulated’ one” [6]. Concepts emerge from the articulation of a domain in an expressive medium. Kittay also proposes that what is seen as metaphorical is relative to a given conceptual organization for different language communities— “metaphors are always relative to a set of beliefs and to linguistic usage which may change through time and place” (Kittay in [6]). This seems to be directly related to the Lakoffian idea of metaphor as based on experience.

2.5 Earl MacCormac

Yet another cognitive view of metaphor has been introduced by MacCormac. His approach is cognitive in that it emphasizes the need to combine semantic, emotive, speech act, contextual, and cultural aspects into a theory of metaphor [27]. Furthermore, metaphorical theory must fit into the more general account of literal meaning. Semantic aspects arise from the association of the semantic features of the referents. This is based on a cognitive process which juxtaposes the two normally unassociated referents, producing semantic and conceptual anomaly. The disparate concepts are put together in a new and vibrant fashion.

The context of a metaphor is a particularly important component of MacCormac’s view. He believes that metaphors can only have significance in context. A context offers a pragmatic interpretation of which possible meaning of a metaphor to accept. Furthermore, the force of a metaphor presumes a series of mutual contextual beliefs that the speaker and hearer share [27].

MacCormac believes that every metaphor has 3 levels: the surface language level, the semantic level, and the cognition level. Although his main interest lies at the cognition level, he has developed a fairly complex theory at the semantic level. He argues that the semantic meaning of words is generated by classes of objects represented by fuzzy sets. For more details of MacCormac’s theory, see [27] and [6].

3 Psychological Explanations of Metaphor

Psychologists interested in metaphor seek to explain metaphorical *behavior*—comprehension and retention as well as production of metaphors. The study is also concerned with motivational and cognitive factors. In this exposition

of psychological approaches to metaphor, the focus will be on the problem of comprehension of metaphor.

3.1 Behavioral Approaches

There are several approaches to metaphor within the behavioral framework. Skinner was the first to analyze metaphorical behavior from this standpoint. His analysis is based on the idea that verbal responses are controlled by environmental stimuli through the mechanism of generalization[31]. The metaphor is not *created* by the speaker, it is simply a response to the properties of stimuli present with the the object used metaphorically. For example, a metaphor such as “the eye of the needle” is a response to the properties of an eye which can also be applied to the needle—such as “oval”, “near the top”, “part”, and “recessed”[31].

Some of Skinner’s explanations also require mediating processes. That is, there must be some type of common mediating reaction between the topic and vehicle of the metaphor. So, in the metaphor “Juliet is the sun”, the metaphor might have been a result of the common emotional reaction to Juliet and the sun in the context of *Romeo and Juliet*[31].

The verbal associative interpretation of metaphor proposes that the similarity relation between key terms in a metaphor is through common verbal associations, rather than common properties of the actual objects. Such an approach allows for more abstract relations than the strict Skinnerian approach. It is related to associative priming effects based on context. Contextual stimuli have a modifying effect on the associations most likely to occur between individual words. Koen[31] gave subjects a sentence and asked them to choose either a metaphorical or literal term to fill in a blank in the sentence. The result was that the metaphorical word was greatly preferred over the literal word when cued by its frequent associates (chosen according to associative norms), but not otherwise.

Another approach within the behavioral framework is Osgood’s mediational theory. In this theory, Osgood proposes that the basis of similarity between the topic and vehicle is the common affective reactions aroused by sensory stimuli and by the words[31]. More specifically, the reactions can be viewed at an abstract level, as a group of components which together differentiate among classes of meaning. This idea is similar to that of the semantic differential, where a series of rating scales with bipolar endpoints

such as “good–bad”, “hard–soft” are used to rate distinct concepts. Clearly the bipolar terms must be understood metaphorically if they are to be applied to diverse ideas. One can then use such scales to create the “classes of meaning” to which Osgood refers.

3.2 Cognitive Approaches

In the cognitive approach to metaphor, it is thought that the general model of comprehension of literal language can be extended to account for metaphor[2]. Were this not the case, metaphor would have to be treated as a special function, distinct from all other types of language. In this view, a metaphor can be understood by retrieving the semantic representation of both the source and target, and then determining the resemblance of the two. This is not considered different from comprehending the categorical and property relations of sentences.

An experiment by Verbrugge and McCarrell indicates that we identify the underlying similarity relation in a metaphor during the comprehension process. Subjects were given a series of metaphors orally, and then cued for recall with the source, the target, and the ground. The ground was at least as effective as the source and target as a recall cue although the ground is not explicitly stated in the metaphor. This implies that the relation between the source and target is processed when the metaphor is stored in memory[2].

Metaphor is a problem of meaning, based on long-term memory information associated with the terms of the metaphor (semantic memory)[30]. The organizational structure of this information is crucial for determination of what attributes of the topic and vehicle mediate the metaphorical relationship.

3.2.1 Perceptual Experience

Both the comprehension and recall of some metaphors depends on perceptual experience such as sensation and imagery. Perceptual experience has been the traditional mode for analysis of metaphor. In imagery, the confrontation of two images produces changes in their perception. That is, the pairing of two images brings out the common qualities, creating a perceptual abstraction. This was the method by which metaphor was said to be understood—the subject and topic evoke distinct images which, when juxtaposed, interact to

result in one coherent picture representing the metaphor. Recall Katz' work discussed in Section 1.3 above, which suggested that vehicle imagery is a strong correlate of comprehension. Referential concreteness and the ability to picture the properties of the vehicle seems to aid in the interpretation process.

Imagery is not the only perceptual basis for metaphor. Sensory experience also seems to influence it. Roger Brown has proposed that the extension of the vocabulary of sensations to metaphors, such as the application of "warm", "heavy", and "dull" to personality, is based on "correlations of sense data in the non-linguistic world" (1958, in [31]).

A 1975 study done by Billow suggests that metaphor interpretation is largely a linguistic task, with imagery playing only a minor role. He showed that the presence of pictures during the processing of a metaphor by children gives only a slight advantage for comprehension. Furthermore, in many instances, the pictures actually caused the children to change their interpretation from a correct to an incorrect one. Billow's study, however, used highly concrete metaphors, which therefore were high in image-evoking value. The pictures may have added little relevant imagery and sometimes contributed irrelevant detail that led to erroneous interpretations[31].

Metaphorical imagery may be quite different from literal imagery in that it appears to be of a symbolic or abstract nature. An experiment by Honeck, Riechmann, and Hoffman (1975) showed that interpretations conceptually related to an accompanied metaphor later serve as more effective recall cues than unrelated interpretations, but only for high-imagery metaphors[31]. While this suggests that imagery may be a component of the comprehension of metaphor, the actual process remains unclear.

Another aspect of the influence of perceptual experience on metaphor is the role of sensory processes in the origins of metaphor. Emotional tension often leads to the recognition of a metaphor. The creation of the new perspective on the topic defamiliarizes the topic and creates a tension which is affectively arousing[29]. Another perspective on tension comes from Berlyne (1960), who proposes that the incongruity of metaphor induces a psychological state of arousal which a one seeks to reduce by means of a conceptual resolution of the disparate elements[31].

3.2.2 Conceptual Representation

Conceptual representation is an abstract approach to the process of metaphor interpretation. Originally proposed by R. Malgady and M. Johnson, it depends on the feature model of semantics. Features are units more abstract than words which derive from descriptive associations. It is conventional to assume that features resemble attributes or properties which are associated with adjectives. This construction stems from Malgady and Johnson's belief that "language segments do not have meanings per se, but are associated with a set of meaning possibilities that might or might not be realized in any given individual"[15].

In the feature model, the meaning of word combinations is determined by an additive summation of the feature sets for the individual words in the compound. Feature elements *shared* by words being combined in a metaphor are raised in salience in the resultant representation of meaning[16]. Malgady and Johnson proposed that in metaphor interpretation, the separate, feature-defined meanings of the constituents are encoded to assume a single feature representation with a qualitatively distinct meaning. Specification of the nature of the features and the new integrated representation remains unclear, however[31].

One implication of this theory is that the more redundant a stimulus is, the less ambiguous it is. That is, the more dominant or salient certain of the properties of the metaphor are, the more they will constrain the realized interpretation[15]. This idea seems to bring Katz' finding that vehicles only moderately close to the topic are preferred into question, but in fact the two ideas could be seen as complementing one another—the properties of the two domains which are essential to the metaphor are raised in salience. Since there will only be a small number of such properties, the interpretation is more constrained.

Verbrugge and McCarrell's study, discussed in Section 3.2, can be used as evidence for an abstract relation over and above the sum of the attributes of each constituent. The use of the ground as an effective prompt in metaphor recall emphasizes that a representation is formed which incorporates more than the shared properties. If it were simply shared properties, the whole concept of a "ground" would be vague. That is, having a "ground" which one can state and recognize implies that a special representation of the relationship between topic and vehicle must exist, at a more abstract level than

the shared properties.

3.2.3 Dual-Coding Theory

Dual-coding theory is the idea of combining the imagery system with the verbal system. The processes, then, are thought to cooperate in metaphor processing and more generally in language and thought. Imagery is used to construct organized information structures analogous to the structure of the perceptual world. These representations would have just those properties that would account for the integrated representation which emerges when a metaphor is fully interpreted. The verbal system is used to organize discrete linguistic units into higher-order sequential structures. Together, the systems provide the cognitive mechanisms for conveying continuous experiential information using a discrete symbol system.

There are many advantages to using a dual-coding approach to the problem of metaphor. They will only be addressed in brief here. For more detail, see [31]. First, with two sources of information, the problem of determining the ground of the metaphor becomes less difficult—an association in the verbal system might be more salient than one in the imagery system, or vice versa. The combination of the systems increases the likelihood of finding the appropriate relationship, over single-system approaches. Second, each of the (sub)systems contributes different things to the overall system. Integrated images lead to efficient information storage. Imagery also ensures processing flexibility. That is, memory search is relatively free from sequential constraints in the realm of images. The verbal processes keep search and retrieval “on track”—the relevance of the ground which is determined in metaphor interpretation to the topic and vehicle depends on a logical sequence in the flow of ideas. In sum, the independent yet cooperative contributions of these two systems provide a more complete approach to the processes underlying metaphorical interpretation than other theories.

Part II

The Project

4 Purpose and Motivation

It is the purpose of this research to investigate the general characteristics of metaphors used to describe the emotions anger, happiness, love, sadness, and fear. It is based on the assumption that there are conventional metaphors which are regularly used to express emotional concepts. This research attempts to define the “conventional” themes for the metaphors in each emotional category.

The motivation for this project lies in computational processing of natural language. Computer programs currently have no way of dealing with emotion-referential language, other than simple processing of direct statements. It has been argued, however, that metaphor is a crucial method of discussing emotion. In order for computer programs to truly understand emotional references, then, they must have the ability to interpret metaphorical statements in the realm of emotions. The hope is that the identification of a fairly small set of characteristics which accurately reflects the general themes found in each category of emotional metaphors will endow a computer program with the ability to infer the appropriate emotion from metaphorical statements.

5 Derivation of the Project

The idea for this project stems from concern for the inability of natural language processing systems to understand emotion. The original interest (See the original idea in Appendix A) was in how to infer emotional state of a speaker from written language, that is, to investigate the issues discussed in Section 1.1. This was shifted slightly in favor of the focus on interpreting references to the various emotions, due to the more interesting cognitive nature of metaphor as compared to that of word choice and sentence structure.

Background research indicated that a “theme analysis” of specific categories of metaphors would be possible. L. Ross and H. Pollio studied metaphors for death to determine the basic views of death embedded in

the metaphors. The approach entailed having subjects choose from a list of metaphors the ones which most closely resembled their beliefs, and then having them discuss why and how the metaphors reflected death. Ross and Pollio analyzed the theme and frequency of each metaphor to determine the three main views[35].

B. Weiner studied the metaphors used for motivation, and found four basic metaphors used to discussed it. This work is in the Lakoff and Johnson style of finding the metaphorical models for a specific topic. The metaphors he found were “A person is a machine”, “A person is god-like”, “A person is a judge”, and “A person is a scientist”[39]. Also in this tradition is work done by R. Solomon, on the models for love. The basic models he captured from his data are an economic model (love as a fair of exchange), a work model (relationship as a project), and metaphors derived from communication, flames, depth, and falling[37].

Solomon is a strong proponent of “themes” or ritualistic knowledge within the context of love. His thoughts, however, can seemingly be generalized to other emotions. He says

“[A]s participants in the love world, we have to accept the rules and rituals as they are, without question and without explanation. There is no other way to understand except by understanding that, on the inside, one systematically refuses to understand”[37].

This can be taken to mean that there must be themes common to the metaphors referring to a particular phenomenon, such as an emotion. That is, without “rules and rituals”, no one can understand metaphorical references.

Emotion-referent metaphors seem to lend themselves to easy interpretation. A study performed by J. Waggoner and D. Palermo indicates that even young children can interpret metaphors referring to the basic emotions love, hate, fear, anger, happiness, and sadness. Using both concrete and abstract metaphors embedded in stories structured such that characters could experience either of two contrasting emotions, Waggoner and Palermo analyzed interpretation differences among children of various ages[38]. The results are not particularly relevant in this context, but the stories and metaphors that they used are indicative of how to establish a more elaborate, but still not disambiguating, context for metaphorical interpretation. See Appendix A.

5.1 Davitz and Mattis Study

The main source for the design of this research is work done by Joel Davitz and Steven Mattis, as described in the chapter entitled “The Communication of Emotional Meaning by Metaphor” in the book *The Communication of Emotional Meaning* (1964)[4]. The Davitz and Mattis research had three main goals: to define the characteristics of metaphors communicating each of several different emotional meanings (the portion of their research which really sparked the current design), to develop a test of ability to identify metaphorical expressions of emotional meaning, and to investigate the relation between ability to identify emotional meaning expressed metaphorically and ability to identify emotional meaning expressed in other modes of communication.

The focus here will be on the first phase of their study. In this phase, they generated 72 statements, interpreted as metaphors, by presenting Rorschach inkblots to 16 subjects. Each subject was asked to report “what the blot reminded him of or what the blot looked like” based on a prompt from one of five emotional meanings: anger, anxiety, joy, love, or sadness. The cards were rotated so that different subjects were asked to express different meanings for each card. The statements were then presented to 26 “judges” who were asked to identify which of the five emotional meanings was being expressed. 51 statements were selected from the 72, based on whether the number of judges who agreed with the intended meaning exceeded the number expected by chance. These 51 were studied for the cues which characterized the statements in each category. Their initial characterization is found in Appendix C.1.

The above procedure was repeated to obtain 62 more statements. Three “judges” were asked to classify the metaphors using the characteristics in Appendix C.1. The results essentially supported the generality of their tentative characterization. Judge 1 correctly classified 84% of the new statements, judge 2 correctly classified 75%, and judge 3 classified 82%. The initial characterization was then modified slightly to accommodate the 62 new statements. The updated chart is in Appendix C.2. Davitz and Mattis refer to this chart as “a beginning in the direction of empirically defining the characteristics of one kind of verbal statement which communicates emotional meaning”.

6 Procedure

6.1 Design

Collection of the Metaphors A list of 199 metaphors was collected from *A Dictionary of American Idioms*, compiled by Makkai[26] and *Roget's Thesaurus*[34]. Makkai's book was carefully processed in search of all emotion-descriptive metaphors. The definition of each expression included in the book was read. Any one that referred to one of five emotions – anger, happiness, sadness, love, and fear – was picked out. Roget's thesaurus has a section focusing on “affections”. This section contains labels for various affective states and the many expressions associated with them. Each expression specifically referring to one of the emotions of interest was found and added to the list. The complete list of metaphors is in Appendix D.

Selection of the Strongest Metaphors A set of 50 subjects was asked to read each metaphor from the list compiled in the previous step and then assign it an emotion from the set {Anger, Fear, Happiness, Love, Sadness}. Furthermore, the subjects were instructed to rate the strength of each of metaphor on a scale of 1 (weak) to 5 (strong). The definition of “strength” was verbally given as “how good you think the metaphor is”, and further explained as “how well the emotion reflects the emotion selected” on the instruction sheet for the form. This data is indicative of the strength of a metaphor as representative of a particular emotion. 19 subjects completed and returned the form. The instructions and format of the form can be found in Appendix F. The list collected in the previous step was placed in random order for this part of the study. The results, selected metaphors, and specific selection criteria will be presented in Section 7.2.

Analysis of the Metaphors The strongest metaphors within each emotion category (as selected in the previous phase) were analyzed for their thematic characteristics. This analysis was performed through a series of steps.

1. Within each category, there were subsets of clearly related metaphors. The specific relation for each subset was determined.

2. Any metaphor which seemed not to fall nicely into any of the subsets was analyzed in terms of its “implications”, or its interpretation. All of the resulting interpretations within a category were compared to one another and against the previously determined relations. After such comparison, commonalities were generally found.
3. Through discussion with Dr. Copeland in the Linguistics department, labels for the general types of themes were found. This provided a fairly straightforward structure for the thematic commonalities.
4. The structure and relations were combined in the form of a chart of the basic characteristics within each emotion category. This chart will be introduced and discussed in Section 7.3.

Verification of the Analysis This phase of the research was an attempt to validate the chart of characteristics. The chart was given to a set of 50 subjects, with the emotion category labels replaced with group numbers. For example, instead of the row for anger characteristics being labeled with “Anger”, it was labeled with “group 1”. 25 of the subjects were given the first 100 metaphors, and the other 25 subjects were given the remaining 99. They were not referred to as “metaphors”, however. They were simply referred to as “statements”, so as to avoid as much as possible an indication of what the categories might represent. The subjects were asked to assign each statement to a group based on the characteristics of both the statement and the group. That is, “Assign the statement to the group which you believe has characteristics closest to the idea of the statement”. The meaning of the columns in the chart was also briefly explained (both verbally and in the instructions). The form for this study can be found in Appendix G.

The results from this phase were correlated with the strength of the metaphors. That is, strength of the metaphor for a specific emotion was correlated with the percentage of subjects that categorized the metaphor in the “group” with characteristics corresponding to that emotion. The higher the correlation, the greater the apparent validity of the characteristics. The results will be introduced in Section 7.4.

6.2 Changes to the Davitz and Mattis Procedure

Although the design of this research essentially follows that of Davitz and Mattis, there are some crucial differences. The most obvious, and the most important, is the source of the metaphors. What Davitz and Mattis claim to be metaphors are not actually metaphors. They are images. Without justification, they have seemingly excluded any origin for metaphor other than imagery. The characteristics that resulted from these images cannot be construed as characteristics for general emotion-descriptive metaphors, as there are origins for metaphor beyond imagery.

Furthermore, it seems clear that the subjects were simply responding to the ink blots, and unaware that they were generating metaphors. Images associated with an emotion will share many characteristic elements with metaphors, but they will also differ in that a metaphor involves the mapping of properties from one domain to another, while descriptions don't necessarily have the same powerful effect of highlighting particular aspects of the emotion through relation to a more familiar domain. It seems also that there is a qualitative difference between pictorial response and metaphor generation. This difference is intent.

Even if one accepts that the imagery-based descriptions produced should be interpreted as metaphors, there remain problems in the Davitz and Mattis study. One is that in relying upon their subjects for metaphor generation, they are going from emotional category to metaphor, whereas the current study goes from metaphor to emotional category. This is a problem because Davitz and Mattis have no way of knowing that the metaphors that were generated are metaphors which would be generally interpreted as reflecting the category that primed the metaphor for a specific subject. This means that the chart which they generate and the validation procedure is dependent on the subjective interpretation of their initial set of subjects. In going the other direction, by having subjects assign a given metaphor to the emotional category, the characteristics can be identified based on metaphors which are commonly agreed to reflect a certain emotion.

Another problem is that they view metaphors and similes as equivalent. They show their ignorance of metaphorical theory with this nondifferentiating treatment of similes and metaphors. It is generally agreed that metaphors cannot be directly reduced to similes. Similes are not comprehended through the complex cognitive mappings which metaphors seem to elicit. In sum, the

source of the statements for the Davitz and Mattis study as well as their treatment of these statements reflect their lack of interest in the cognitive implications of metaphor. The source of metaphors for the current study seems to avoid the pitfalls associated with simple imagery.

A more minor difference is the number of validation judges. There were only three judges used to verify the chart of characteristics in the Davitz and Mattis study. This seems rather low given the importance of that phase. Without validation, the chart cannot truly be hypothesized to accurately reflect the *fundamental* characteristics underlying the statements analyzed.

6.3 Other Design Considerations

The original plan for this research can be found in Appendix D. This design had to be modified in several respects. First, the source of the metaphors was changed due to reasons to be discussed in Section 7.1. Second, the “explanation input” that was to be collected from subjects in Part I was excluded due to the time commitment that would be required from the voluntary subjects. It was decided that the focus should be simply on the strength of each metaphor. Then the analysis of the metaphors would be based solely on their actual characteristics, rather than the apparent basis for their interpretation.

Another design decision was based on a study done by A. Katz, A. Paivio, and M. Marschark[17]. An important point which they made was introduced into the current design. They standardized the form of all metaphors to minimize stylistic variations and context effects. Thus, in their work, all metaphors were of the form “An A is a B”. Likewise, the metaphors in this study were converted to the form “He is X” where possible. The pronoun “he” was always used as the subject, and “she” as the object of the statements. This was to avoid any gender-association effects for the various emotions.

7 Results

7.1 Collection of the Metaphors

The original hope for the metaphors was to find examples in written language. Plays were originally chosen as the source for metaphors due to their resemblance to spoken language, without the benefit of speech cues. Several

plays by Lorraine Hansberry, Tennessee Williams, and Arthur Miller were read, with close scrutiny of the emotion-descriptive language. It was found that while these plays are full of emotion, the emotion is mostly reflected in the interactions between characters, and the specific language structures used. Thus the emotional expression occurred in terms of methods such as those described in Section 1.1. References to a character's emotional state, whether direct or indirect (metaphorical), did not occur frequently.

After the lack of success in finding metaphors in these plays, it was decided that teenage romance novels should be the next source to be searched for emotional metaphors. This was based on the idea that these types of books would be replete with "sappy" emotional references. Thus several, by authors Francine Pascal, Rosemary Vernon and Beverly Cleary, were read. It turned out that these books are written at such a low level that language which requires "complicated" interpretation, such as metaphor, is virtually nonexistent. The metaphors which were present did not vary from metaphors which are highly conventional, that is, those that some would argue are frozen. Examples of such metaphors were, "She seemed to light up"[33], and "She was warm"[32]. Thus the metaphors in these books were restricted to a small number which were used over and over again.

The difficulty in finding metaphors from these sources was somewhat surprising. It seemed to be contrary to the basic assumption that metaphor pervades all language. This problem could possibly be explained as follows. This research would be pointless if there were not common themes in the metaphors we use to talk about emotion. That is, if there were not basic models used to describe emotional state, metaphors for these states could not be related. It is possible that the existence of these themes or models precludes creation of new metaphors to describe emotional state. That is, if there already exists a way of talking about emotional state with an effective metaphorical approach, there is no real reason to come up with a new way to refer to it. Thus it may be that most metaphors referring to emotional state are widely accepted or considered frozen, such that they are difficult to identify as metaphorical.

After two failed attempts at collecting a large number of metaphors, it was decided to use the *Dictionary of American Idioms*[26] and *Roget's Thesaurus*[34] at the suggestion of Dr. Copeland. From this point, the collection of metaphors proceeded as explained in Section 6.1 without problem.

7.2 The Strongest Metaphors

As specified in Section 6.1, 19 subjects participated in the “classification” phase of this project. Each subject specified which emotional category he/she thought a metaphor belonged in, and rated the strength of the metaphor in terms of that category. The data was ranked five times, each ranking reflecting the strength of the metaphors in terms of a specific emotion. The primary key on which the metaphors were sorted was the number of subjects which placed each metaphor in the emotional category under consideration (number of “votes” for the category). The secondary key was the average strength of the metaphor in terms of that category [(sum of all strength values given by those who voted for the current category) / (number of “votes”)]. This sorting procedure resulted in tables for each emotional category, in which the strongest metaphors were at the top of the list. That is, metaphors which had received the most number of votes as belonging to a particular category and the highest strength values as reflecting that category were at the top of the ranking with respect to that emotional category.

The strongest metaphors from each ranking were picked out by looking at the vote and strength values. The criteria differed for each emotional category, a result of discrepancies in the number of metaphors belonging to each category. There were many more anger metaphors than for any other category, and thus the selection criteria were more exclusive. For anger, all metaphors with at least 17 votes *and* an average strength rating of greater than 3.5 (on a scale of 1 to 5, where 5 is the strongest) were picked out. 20 anger metaphors were thereby chosen. For happiness, sadness, and love, all metaphors with at least 16 votes and an average strength rating of at least 3.0 were selected. There were 15 happiness, 18 sadness, and 12 love metaphors meeting these criteria. The criteria for fear was at least 15 votes and an average strength of at least 3.0. 10 fear metaphors were chosen. The list that follows shows the strongest metaphors picked out in each category.

Anger:

1. He is boiling.
2. He is blowing a fuse.
3. He is blowing up.
4. He is flying at her throat.
5. He is flaring up.
6. He is foaming at the mouth.
7. He is exploding.
8. He is blowing his top.
9. He is on the warpath.
10. He is fuming.
11. He is raising the roof.
12. He is storming.
13. He sees red.
14. He is flaming.
15. He is flying off the handle.
16. He is rabid.
17. He is red hot.
18. He is burning.
19. He is hitting the ceiling.
20. He is jumping down her throat.

Happiness:

1. He is flying high.
2. He is in high spirits.
3. He is sunny.
4. He is making merry.
5. He is on cloud nine.
6. He is on top of the world.
7. He is walking on air.
8. He is basking in the sunshine.
9. He is full of life.
10. He is tickled pink.
11. He is in heaven.
12. He is in paradise.
13. He is in the clouds.
14. He is glowing.
15. He is jumping over the moon.

Sadness:

1. He has the blues.
2. His dreams are coming crashing down.
3. He is hitting rock bottom.
4. His heart is being wrung.
5. He is depressed.
6. He is broken up.
7. He has a heavy heart.
8. He is in the dumps.
9. He has a long face.
10. He is down in the dumps.
11. He is downtrodden.
12. He is weighed down.
13. He is in low spirits.
14. He is sinking.
15. He is crest-fallen.
16. It is breaking his heart.
17. He is aching.
18. He is breaking down.

Love:

1. He is starry-eyed.
2. He is falling for her.
3. He has a sweetheart.
4. He is stuck on her.
5. He is struck with her.
6. He is the apple of her eye.
7. He is taking her heart.
8. He is her jewel.
9. He is being swept off of his feet.
10. He prizes her.
11. He has a towering passion.
12. He is losing his heart to her.

Fear:

1. He is petrified.
2. He is white as a sheet.
3. He is shaking in his shoes.
4. It is spine-chilling.
5. His flesh is creeping.
6. He gives her the creeps.
7. He is paralyzed.
8. His hair is standing on end.
9. He is pale around the gills.
10. He is jumping out of his skin.

7.3 Characteristics of the Metaphors

The procedure outlined in Section 6.1 for the analysis of the metaphors resulted in the chart below.

Experience	Static		Dynamic	
	Situation of Experiencer	Experiencer as Agent	Situation of Experiencer	Experiencer as Agent
Anger	Heat [1,5,14,17,18] Pressure [1,10,16,9] Red[13,17]	Flying at[4,15] Jumping at[20]	Release of Pressure [2,3,8,7,1,12,10,6] Direction of Release: up, out [11,19,7]	hitting [11,19]
Sadness	Blue[1] Heavy[7,12] Painful [4,6,16,17,18] Low[3,8,10,13]	Sinking to[14]	Pushed down[5,11] Weighed down[12,9] Broken[6,16,18] Falling[2,3,15]	(None)
Happiness	High[1,2,5,6,7,11,12,13] Bright [3,8,14] Complete[9]	Jumping over[15]	Release of Energy [1,4,10,14,15] Direction of Release: up	(None)
Love	Desire[6] Passion[11] Starry-eyed[1]	Loss of control [5,7,12] Falling[2] Swept Away[9]	Possession [3,7,8,10,4]	(None)
Fear	Part/Whole ² : Pale color[2,9] Immobility[1,7]	(None)	Part/Whole ² : Shaking[3,5,6,10] Chilled[4]	(None)

The numbers in brackets refer to the numbers of metaphors in the strongest metaphors lists which have the associated property.

²The characteristic listed can be used in reference to both parts of the experiencer and the whole experiencer

The “general types of themes” referred to in the procedure section are reflected in the columns of the chart. Some necessary definitions follow:

Experience The current state of the experiencer.

Situation of Experiencer

Static This is the static situation of the experiencer—what he experiences at all times while in the current state.

Dynamic This is the reaction the experiencer has in the current state.

Experiencer as Agent These columns reflect an activity.

Static The state of the experiencer causes him to act upon something or someone.

Dynamic The specific dynamic reaction to the state described in the Situation/Dynamic column leads to an action by the experiencer upon something or someone.

The chart attempts to capture the basic themes underlying the metaphors in each category. Clearly not all of the metaphors are equally well described by the chart as others, but this could simply be a reflection of the typicality of the metaphor.

7.4 Verification

Out of the 50 subjects given the forms, only 12 returned them: 8 focusing on the first 100 metaphors, and 4 focusing on the last 99. With so few subjects, it would be expected that there would be much variation in the responses. Despite this, however, the results do seem to indicate that the characteristics in the chart are fairly representative of the metaphors in this study, in all emotional categories. Since the characteristics were developed from only a subset of the 199 total metaphors, this means that the chart generalized to the other metaphors well.

A “vote” count was again made for each metaphor. These values were converted into percentages. That is, if 6 subjects out of 8 respondents placed a certain metaphor in the group corresponding to anger, the metaphor would

be taken to relate to the characteristics in this group at a 75% level of accuracy (call this the “metaphor reflectivity” value).

At this stage, it was realized that a quantitative measure of strength – a strength index – was required, to be based on the data from the previous experiment (see Section 7.2). A quantitative measure was necessary to allow numerical correlation of the strength of a metaphor with its metaphor reflectivity value for a particular emotion. The index value was calculated for each metaphor with the following formula:

$$\begin{aligned} & (\text{number of votes for a particular emotional category} / \text{total number of votes}) \\ & * (\text{average strength previously calculated}) \end{aligned}$$

This formula thus adjusts the strength rating of the metaphor to account for the strength in terms of the number of votes it received. The metaphors were ranked according to this measure, for each emotional category. The strongest metaphors, according to the new strength index, corresponded almost exactly to the strongest metaphors picked out previously (that is, those chosen according to the procedure as described in Section 7.2). The specific ordering of the metaphors varied slightly, while the overall ranking remained essentially the same. That is, the same metaphors were at the top of each list.

The new strength index was correlated with the metaphor reflectivity value calculated from the second experiment, across all metaphors, for each emotion. That is, each metaphor has a distinct strength index associated with it for each emotion, and each also has a metaphor reflectivity value associated with it for each emotion (actually, for the set of characteristics describing each emotion). For each emotion in turn, these two values were correlated. So, for example, the strength index values for anger were correlated with the metaphor reflectivity values for (the group of characteristics corresponding to) anger, across all of the metaphors.

The correlation formula used is called the Pearson Product Moment Correlation (Pearson’s Correlation). This correlation reflects the degree of linear relationship between 2 variables. A +1.0 correlation would reflect a perfect linear relationship, where all points fall exactly on a line. Deviation from this maximum correlation reflects the degree to which the points fall around the line. Thus, the more consistency in the data, the higher the correlation (the closer the points cluster around the line representing the linear relationship). The formula is:

$$r = \frac{\Sigma XY - \frac{\Sigma X \Sigma Y}{N}}{\sqrt{(\Sigma X^2 - \frac{(\Sigma X)^2}{N})(\Sigma Y^2 - \frac{(\Sigma Y)^2}{N})}}$$

X = the current strength index

Y = the metaphor reflectivity value of the characteristics for the emotion currently under consideration

N = the total number of metaphors correlated (199)

The resulting correlation values are displayed in the chart below:

Emotion	Correlation Value
Anger	0.854384421
Sadness	0.844474188
Happiness	0.837672195
Love	0.831792082
Fear	0.766906030

These correlation values are quite good. This shows that the characteristics in the chart capture the “essence” of the emotional categories well, for the metaphors in this study.

8 Discussion

8.1 Issues

There are many issues about both metaphor and emotion which are highlighted by this research. One such issue is whether it is possible to generalize the “theme-finding” process to metaphors outside of the realm of emotion. Lakoff and Johnson would say that clearly this is possible. It does not seem clear, however, that it is necessary that all metaphors within a specific semantic category must be related in specific ways simply because there are several semantic categories which do have this property. Lakoff and Johnson have identified many of the metaphorical “models” which provide the foundation for clear discussion of certain semantic areas, within our culture. But the existence of such models should not imply that metaphor cannot exist

free of the constraints of models. This is evident from metaphorical language in literature, particularly poetry.

Another issue in this research is what a person means when he/she says someone is happy or angry or sad. The research is limited to emotional *labels*. Identifying in which emotional “category” a metaphor belongs depends greatly on a person’s subjective definition of the emotions. As discussed in J. Davitz’ book, *The Language of Emotion*[5], most definitions refer to experience. When researchers analyze “emotions”, they generally deal with words from the non-technical language of conversation, which must involve individual differences in meaning. This is the case in the current research as well. In focusing on metaphors for “anger”, “happiness”, etc. common definitions for these terms are assumed, but there are certainly differences. In his book, Davitz attempts to objectify the definitions for these terms through identification of areas of intersubjective agreement.

For the goals of this research, however, this issue does not seem to be of such great importance, since metaphorical interpretation is in itself a subjective process. The mapping process depends upon the cognitive structure, which is based in each individual’s experiences. The focus is on cultural agreement of the interpretations. Based on the results of this research, it is possible to show that individual understanding of emotions and emotional metaphors tends to agree with some sort of “cultural” understanding. Although there were variable levels of agreement (reflected in the strength of the various metaphors), there are clearly certain interpretations which cannot be considered ambiguous whatsoever. Thus, an interpretation may be affected by subjective experience, but then it seems that there are certain “subjective experiences” which everyone in a culture shares.

This is further supported through analysis of some of the comments that subjects made on their forms in the first phase. Many subjects who were not able to classify a particular metaphor into an emotional category explained this inability in terms of their unfamiliarity with the metaphor. That is, “I’ve never heard this before”. Thus, if a metaphor was not “conventional” according to their cognitive structure, and thereby did not agree with their cultural conceptions, they could not interpret it. This goes back to the point made in Section 7.1 that there may be no real reason to come up with new metaphors for domains which are highly conventionalized. Likewise, subjects may have no real experience with interpreting metaphors in the domain of emotion which are not conventionalized. They do not expect

novel metaphors, so when they come across a metaphor which does not map into one of their models for the domain, they cannot interpret it.

There may be interpretability differences for various metaphors based on how abstract or concrete they are. This was originally suggested in Section 1.3, due to work done by A. Katz which showed that referential concreteness and the ability to picture the properties of the vehicle seems to aid in the interpretation process[18]. The study mentioned in Section 5 by Waggoner and Palermo made a point of using equal numbers of abstract and concrete metaphors. In their case, a component of the study was to determine if there was a difference in children’s interpretation ability on each type. It does, however bring up an interesting issue: if the current research had focused on this distinction, would there have been a clear difference in strength of concrete vs. abstract emotional metaphors? Furthermore, what is really the difference between abstract and concrete metaphors? In the Waggoner and Palermo study, “bouncing bubble” is considered a concrete metaphor for happiness and “sizzling wave” is considered an abstract metaphor for anger. What are the elements of these metaphors that distinguish them from one another? These are things that certainly require further research.

8.2 Ambiguities

Any single metaphor may well contain characteristics of several emotional meaning. In analyzing the data, it was noticed that metaphors which seemingly clearly belonged in a particular emotional category often were not strongly supported as a member of that category by the data. This often seemed to occur due to ambiguities.

8.2.1 Interactions Between Emotions

There were pairs of emotions which seemed to have overlapping characteristics. The result was that “votes” for a certain metaphor were often split between the two related emotional categories. These problems tended to center around the category of love. Love metaphors generally seem to imply some aspect of the state of being in love which corresponds to other emotions.

For example, the characteristics of happiness and love are often similar. Thus, a metaphor such as “He is starry-eyed” could be interpreted to reflect either one of the two states. Surprisingly, this particular example turned out

to be strongly interpreted as a love metaphor, but the potential for ambiguity seems clear. Other examples include “He has a towering passion” (anger and love), “He is flying into a passion” (anger and love), and “He is fluttering” (fear and love).

There is a particular difficulty with certain sadness metaphors, as related to the emotion of love. Many of these metaphors incorporate the image of the heart. This resulted in confusion between the emotion expressed by the metaphor and the metaphorical vehicle. For example “He’s breaking my heart” is a sadness metaphor that was frequently confused with love.

The above analysis was, however, in no way quantified. It would have been valuable to correlate the votes for each metaphor between all sets of pairs of emotions to determine exactly what the classification ambiguities were.

8.2.2 Context Effects

Some of the interactions between the different emotions could have been avoided by introducing context. “He has a towering passion” is a perfect example of this problem. Had there been a context surrounding this particular metaphor, the context could have been used to determine what sense of the word “passion” is intended here.

In the first experiment of this research, the form was firmly grounded in the realm of emotions. That is, the metaphorical interpretation was restricted to one of five emotions. This in itself provides somewhat of a context. For instance, the metaphor “He is red hot”, taken out of the context of emotions could be used to describe someone who, for example, is playing particularly well in a basketball game. Or it could mean that he is sexy. The context for the second experiment was also restricted by the characterizations of each of the groups in the chart. Thus “basketball performance” or “sexy” interpretations would be thrown out because they have no relevance to any of the group descriptions.

Metaphor interpretation generally seems to depend heavily on context, because the context primes the meaning assigned to the target domain. This is particularly true if one holds the Kittay view of metaphor interpretation (see Section 2.4). It seems obvious that it is much more difficult to understand any statement, and particularly metaphors which depend on subtle aspects of semantics, without context. The implication of this fact for the current

research is that given a context, the agreement among subjects about the category in which each metaphor belonged would probably have been much higher. On the other hand, since the goal of the research was to identify the common themes of these metaphors, it may make sense to focus on those metaphors which characterize the emotion well with or without context. These metaphors must be strong representatives of the characteristics of the emotion if they can function independent of a priming context.

8.2.3 Indirect Metaphors

Several of the metaphors in this project were difficult to relate to the other metaphors. They seemed to carry interpretations which were related through “indirect” means. This meant that even though there was a characteristic already found in other metaphors to which they could be related, the relationship was not necessarily straightforward. This characteristic then would not necessarily be a good cue for the placement of the metaphor in the appropriate group.

One example of this is the sadness metaphor “He has a long face”. The attribute “long” does not really seem to be the key to the meaning of this metaphor. This was related to the characteristic “weighed down” (roughly) by the following chain:

Long face \implies When does this happen? \implies Sad \implies Why does this happen?
 \implies Due to the weight of the burden.

A second example can be found in the metaphor “He is tickled pink”. Again, the attributes of being “tickled” or “pink” seem to be secondary. The following parallel chains of explanation were constructed:

Tickling \implies Laughing \implies When does this happen? \implies Happy \implies Why does this happen? \implies Release of excess energy

Pink \implies Rosy \implies Glowing \implies Release of energy

Even the metaphor “He sees red”, although the specific characteristic “red” was included in the chart for anger, seems to be indirect. Redness is generally reflective of something that is hot, or an attribute of a flame. Thus the characteristic “red” could simply be a derivative of the characteristic “heat”. It was included because there seem to be several metaphors based on this “indirect” characteristic.

These indirect metaphors are interesting because they seem to be indicative of how one basic metaphor is incorporated into the culture and then extended, such that characteristics of the base themselves become metaphorical.

8.2.4 Selection Ambiguities

Selection ambiguities exist in two senses. First, in terms of the abilities of subjects to identify emotional meaning. The individual variations in metaphorical interpretation ability must, given the decision mechanism in this research, directly influence the selection of the metaphors to be analyzed. Due to the fairly small subject pool, it is likely that these individual variations have a fairly serious effect on this specific aspect of the project. On the other hand, the chart developed from these metaphors generalized to the other metaphors in the list well, for a different set of subjects, and therefore one can propose that the subject pool is actually quite representative of the general population, despite its small size.

The second sense of selection ambiguity has to do with the meaning of “strong” and “weak” in terms of rating metaphors. The rating in the first experiment of the “strength” of the metaphor was defined as how well the metaphor reflected the emotion which it seemed to represent. This is clearly a subjective measure, but it was a necessary component of the selection of the metaphors. Although there are certainly individual differences in the interpretation of this measure, it is assumed that these interpretations are consistent within each individual. Thus, a higher average strength value in a specific emotional category for some metaphor over another can be interpreted to be indicative of a consensus within the subject pool that the former metaphor is more easily understood with respect to the given emotion. Although the actual strength value has no real meaning outside of the given subject pool due to its size, the relative values are certainly of use.

“Weakness” of a metaphor in terms of a specific emotion could have been caused by many factors. It could have simply been a result of few “votes” in favor of the emotion for that metaphor. This property in itself is not necessarily clear. It could be a reflection of the ambiguity of the metaphor. That is, since subjects were asked to choose one emotion out of five, those metaphors for which interaction between the categories occurred are likely to have received fewer votes for each of the interacting emotions. These

metaphors do not necessarily poorly reflect any emotion. They may be strong metaphors, but simply do not fit well into a single emotional category.

Weakness could also simply be a reflection of low strength ratings. Again, this is a subjective measure. It can be understood to mean that the metaphor is difficult to interpret in terms of the emotion to which it was assigned, but it bears no resemblance to any other emotion, so that it fits weakly into the specified category.

One hypothesis for what strength/weakness represents is how intense the emotional state is. Then, a metaphor with a low strength rating would simply imply that the metaphor reflects a low level of the emotion. If the intensity of an emotion is described along a continuum (for example, from lowest possible level of anger to greatest possible level of anger), then the strong metaphors may reflect those metaphors which are further to the right along the continuum.

As a result of the unclear interpretation of “strong” and “weak”, it is difficult to state what being one of the “strongest” metaphors in this study truly meant. One can only discuss the meaning in terms of the qualitative measures of average strength value and number of votes, which themselves depend on subjective interpretation and are affected by ambiguities.

8.2.5 Correlation Values

The meaning of the value resulting from correlation of strength index with the metaphor reflectivity value of the characteristics for each emotional category is not completely clear. By definition of correlation, it means that the more strongly a metaphor reflects a particular emotion, the more likely it was to be assigned to that emotional category, based solely on the characteristics of the category.

The problem is that the subjects in the second experiment were required to choose one of the five groups described in the chart. Thus what the reflectivity value actually represents is what percentage of the subjects assigned a metaphor to the same category. The implication of this is that the characteristics may not be satisfactory to characterize the metaphors in a category, they may simply be satisfactory to discriminate between the categories. The distinction here is subtle, but important. Given a metaphor, a subject has to decide which one of five categories to place it in, based on the description of the category. He/she looks at the metaphor, looks at the descriptions,

and picks the category which seems to reflect most closely the gist of the metaphor. This does not mean that the description of the category is sufficient to assign the appropriate metaphor to it. It only means that it is sufficient to enable the subject to eliminate the other four categories.

Furthermore, the correlation value is heavily dependent on the strength of the metaphor, which was previously shown (Section 8.2.4) to be somewhat ambiguous.

8.3 Comparison to the Lakoff/Johnson Analysis

An overview of the Lakoff and Johnson approach to emotion in terms of metaphor was given in Section 2.3. A more complete analysis can be found in both *Metaphors We Live By*[21] (of love) and *Women, Fire, and Dangerous Things*[23](of anger). The approach in each of these analyses is to identify the basic metaphorical models which govern the language we use to discuss the particular emotion. For love, one such model is “love is a journey”. This is fully analyzed in terms of the different types of actors, actions implied by a journey. Others are “love is a physical force”, “love is a patient”, “love is madness”, and “love is war”. Examples of the characterization of anger are “anger is heat”, “anger is hot liquid”, and “anger is insanity”.

The idea of identifying common themes is basic to both the Lakoff and Johnson approach and the analysis in the current research. Several of the characteristics identified here even correspond to the models which Lakoff and Johnson(L&J) propose, specifically for anger. Heat, pressure, redness, and release of the pressure are all characterizations which overlap. For love, the characteristic defined as “loss of control” is addressed in the L&J approach. However, several additional characteristics for both of these emotions were found in the current research. Similarly, no evidence was found for many of the L&J models.

It is difficult to know which approach is more accurate in terms of identifying the *fundamental* characteristics of the emotional metaphors. The problem really lies in slightly differing viewpoints on the function of metaphor. The Lakoff and Johnson approach essentially segments all domains into groups of metaphorical models, outside of which there can be no discussion of the domain. That is, the metaphorical models define the domain. This research does not take such an extreme viewpoint. Metaphor is useful and powerful for describing many domains, and these metaphors do have certain themes,

but they do not necessarily preclude other ways of thinking or talking about a domain. It may be difficult to structure the characteristics identified in this research in such a way as to describe a specific domain, thereby preventing them from being fundamental in the L&J approach. However, even if one accepts the L&J approach, the characteristics identified here may be an accurate reflection of the statements we actually can “recognize” as metaphoric, as opposed to those that are “too pervasive” to identify (See Section 2.3).

9 Conclusion

There is clearly no consensus on the role of metaphor in the human cognitive structure. Countless viewpoints exist on all aspects of metaphor, from its adaptability within general theories of meaning and the processes of metaphoric interpretation, to context and culture effects.

The perspective taken in this research is that metaphors are extremely pervasive in language. They provide a powerful manner of making abstract concepts explicit. For these reasons, they are frequently utilized to describe emotional state. The current research supports the idea that metaphors used in emotional domains tend to be conventionalized. That is, there is a good deal of consensus in both the interpretation and use of these metaphors. This consensus is what makes it possible to identify common themes in the metaphors referencing each emotional domain. The research identifies such common themes, and shows that they can provide a basis for accurate grouping of metaphors from the same domain.

Conventional metaphors such as those under consideration here are often the only linguistic expressions which can accurately characterize a given concept. The identification of the specific elements in the metaphors which are “conventional” is therefore important for the development of a greater understanding of cognitive properties underlying the communication of emotional meaning. The existence of themes in metaphor indicates that the process of metaphor interpretation is largely dependent on the context and familiarity of a metaphor and its domain. That is, the process of understanding conventionalized metaphor likely differs from that of interpreting novel metaphor. Furthermore, it is clear that cultural context plays a large role in this process. In fact, responses from subjects in the current research suggest that the conventionalized nature of the metaphors in this domain stifles the creation

of and ability to understand novel metaphors.

In sum, metaphors play a central role in expression of emotional state. Much of the metaphorical language used in each specific emotional domain is derived from a fairly small set of general characteristics. This result is interesting due to its implications for the role of metaphor in cognition, and the process of metaphor understanding.

Part III

Appendices

A Original Idea

(September 2, 1992)

The field within Cognitive Sciences which has fascinated me the most is Natural Language Processing. I have written several papers on both syntactic and semantic analysis of natural language. What has struck me the most in this research and in my study of Psychology is the common understanding we, as humans, have of emotion. Emotion lies at the heart of difficulties in Natural Language Processing. Computer programs to date have had great difficulty with dimensions of speech other than the sequential flow of words, which in itself is a complex task. When we speak, there is often an emotional component to the speech—not only in the physical manifestation of our pitch, and speed, but is also reflected in word choice and structure. The latter two components allow emotion to come out in writing. What is it exactly about word choice and structure that enables us to determine emotion from writing?

To approach this question, I propose the following study:

I would begin by selecting passages reflecting various emotions such as happiness, sadness, anger, tension, etc. Participants in the study would be asked to read these passages and describe the emotions present in the passages and what clues they had of the presence of these emotions. Furthermore, they would be asked to define various emotions in whatever form they choose.

Using this data, I would attempt to construct characterizations of the emotions based on common threads in the data. I would also contrast the interpretation of emotion from the passages with the direct and conscious analysis of these emotions from the definitions. My hope is to determine how it is possible for humans to convert such non-verbal things as emotions into verbal (written) expressions that others understand. The ultimate goal of such research is to determine whether or not there is a way to encapsulate feelings such that it would be possible to teach a computer to interpret emotion, despite the fact that computers are incapable of “feeling” in the same

sense as humans (Computers are highly digital—0 or 1, on or off, etc—while we are analog). Are the clues that humans use to determine emotion fairly standard, such that we come to similar interpretations for the same reasons? If so, it may be possible to explain these clues to a computer. If not, the task of “multi-dimensional” language processing may be unachievable.

B “Betty is a Bouncing Bubble” Sample Stories

Story A:

Betty went to the fair with her father. Together they went on the rides and they played some of the games. Betty saw a big stuffed animal she wanted her Dad to win for her. All he had to do was knock over the bottles with three baseballs. She begged him to try. He paid the man for three balls. Betty watched him throw and hoped he could do it. She would feel so sad if she couldn't take the animal home and so happy if the animal were hers. After her Dad had thrown the third ball Betty was a:

Bouncing bubble	Happy	Concrete
Silver minute	Happy	Abstract
Sinking boat	Sad	Concrete
Used joke	Sad	Abstract

Story B:

Rosemary was walking down a dark street on her way home. The moon was bright, and there were lots of shadows moving across her path. As she got closer to home, she saw a shadow that seemed to be following her. She did not know what to do. If it was someone she didn't know she would be afraid, but if it was her brother trying to scare her she would be angry. Finally she turned around to see who it was and she was a:

Bucking horse	Anger	Concrete
Sizzling wave	Anger	Abstract
Hiding leaf	Fear	Concrete
Shivering pencil	Fear	Abstract

C Davitz and Mattis Characteristics

C.1 Initial Table

(From *The Communication of Emotional Meaning* by J. Davitz)

Emotional Meaning	Situation	Characteristic Expressive Behavior	Words with Subjective Referent
Anxiety	Threat, Danger	Hair standing up	Fragmentation, instability, confusion
Anger	Active Hostility	Hissing	
Sadness	Loss, death	Drooped mouth, crying, lying prostrate	empty, hollow
Love	Two coming together	Hugging	Serene, peaceful
Joy	Pleasure, enjoyment ongoing	Smiling, laughing	Animated, brightness

C.2 Revised Table

Emotional Meaning	Situation	Characteristic Expressive Behavior	Words with Subjective Referent
Anxiety	Threat, impending hostility or danger, fearful object	Grimacing, staring, hair standing up	Fragmentation, instability, confusion, tension
Anger	Hostility ongoing or momentarily imminent, warlike figure	Hissing, teeth bared, smoke springing from mouth	Harsh
Sadness	Loss, death or dying, hostility already occurred	Drooped mouth, crying, lying prostrate	Empty, hollow, dismal, dark, grey, somber
Love	Two animals or persons coming together, objects in harmony or unity	Hugging, kissing	Serene, peaceful, warm, soft
Joy	Ongoing active pleasure	Smiling, laughing	Animated, brightness, lightness

D Original Project Proposal

Purpose

The research has two major purposes:

- I. to determine whether people agree on the emotional meaning of metaphors.
- II. to define the characteristics of metaphors which communicate each of several different emotional meanings.

Part I

The study of emotional meaning expressed in metaphor will be accomplished by compiling a list of metaphors.

- Selected plays of various 20th century playwrights (Arthur Miller, Tennessee Williams, and Lorraine Hansberry) will be read as a source for metaphors. Plays were chosen because there is little author-imposed explanation or description of emotion built into the works, while providing metaphors which reflect those in general use.
- A set of subjects will be asked to read each metaphor from the list compiled above and then assign it an emotion from the list. They will be asked to explain why, to the best of their abilities, the metaphor evokes a particular emotion. For example, if given the image “A face with a droopy mouth”, a subject may respond that this phrase is a metaphor for sadness because a droopy mouth is a physical expression of being sad. The data from this subpart will be indicative of the strength of a metaphor as representative of a particular emotion.
- The reasons stated for the assignment of a metaphor to a category will be used to help define the characteristics of metaphors which communicate the emotional meaning. The metaphors themselves will also be analyzed for the important, thematic characteristics assigned to each emotion in compiled above.

Part II

Once a set of defining characteristics of emotional metaphor has been designed, another group of subjects will be used to validate the sets of characteristics. This will be accomplished by giving each subject a set of characteristics for each emotion, without an emotional label (they will be labeled “group 1”, “group 2”, etc.). The subjects will then be given the list of metaphors used in Part I, and will be asked to assign each of the metaphors to a group based on the set of characteristics for that group.

If there is a high correlation between the groups to which the metaphors are assigned in Part II, and the emotions which they were assigned in Part I. subpart 2., then we can conclude that the set of characteristics will have a high degree of generality.

E Collected Metaphors

1. He is out of spirits.
2. He looks black.
3. It is bringing him down.
4. He is smarting.
5. He is boiling.
6. It is getting his goat.
7. He is burning.
8. He is hot under the collar.
9. It is a bitter pill.
10. He got up on the wrong side of the bed.
11. He is in high feather.
12. He is flipping out.
13. He is cloudy.
14. He is dark.
15. He is in a sweat.
16. He is raising the roof.
17. He is in the clouds.
18. He is drawing blood.
19. He is flaming.
20. He is fluttering.
21. He is red hot.
22. He is flying high.
23. He is worked up.
24. He is stranded.
25. He is looking daggers.
26. He is sunny.
27. He is sour.
28. He has a sweetheart.
29. He is suffering a body blow.
30. He has a faint heart.
31. The bottom is dropping out of his day.
32. He is lost.
33. He is going to pieces.
34. He is white as a sheet.
35. He is flaring up.
36. He is light-hearted.
37. He is a man after my own heart.
38. He is flying at her throat.
39. He is in a stew.
40. He has taken to her.
41. He is eating his heart out.
42. It is getting his back up.

43. He is rabid.
44. He is broken up.
45. His blood is running cold.
46. He is blowing a fuse.
47. He is sinking.
48. He is shaking in his shoes.
49. He has a towering passion.
50. He is stuck on her.
51. He is in high spirits.
52. He is exploding.
53. He is falling for her.
54. He is aching.
55. He is the apple of her eye.
56. He is attached to her.
57. His blood is boiling.
58. He is coming apart at the seams.
59. He is glowing.
60. He is at ease.
61. He is down on her.
62. He is making merry.
63. He is in orbit.
64. He has hot blood.
65. He is in heaven.
66. He is in a bed of roses.
67. He is hitting the ceiling.
68. He has the blues.
69. He is wearing on her.
70. He is in the dumps.
71. He is starry-eyed.
72. He is blasting off at her.
73. He is struck with her.
74. He is petrified.
75. He gives her the creeps.
76. He has a heavy heart.
77. He is bursting.
78. He is blowing up.
79. He is buoyant.
80. He is sweet on her.
81. He is being tortured.
82. He is falling over backwards.
83. He is lighting up.
84. He is sitting on high cotton.
85. He has a dagger in his breast.
86. He is stirring up her bile.
87. He is at sword's points with her.
88. His blood is boiling.
89. He is at odds with her.
90. He is sitting on thorns.

91. He is up in arms.
92. He is carrying a torch for her.
93. He is full of beans.
94. He has a long face.
95. He is a burnt child who dreads the fire.
96. He lost his heart to her.
97. It is curling his hair.
98. His dreams are coming crashing down.
99. He is crest-fallen.
100. He has cold feet.
101. He is a chicken.
102. He is catching the flame.
103. He is all shook up.
104. His heart is standing still.
105. He is hitting rock bottom.
106. He is firing up.
107. He is bitter.
108. He is having palmy days.
109. He is falling over himself.
110. He is causing the fur to fly.
111. He is somber.
112. He is foaming at the mouth.
113. He sees red.
114. He has the jumps.
115. It is getting him going.
116. He is on the warpath.
117. He is jumping down her throat.
118. He is in paradise.
119. He is her jewel.
120. He is able to breathe freely.
121. He is storming.
122. He is pale around the gills.
123. He is breaking down.
124. He is faint-hearted.
125. He is down in the dumps.
126. He is savage.
127. He has a sweetie-pie.
128. He is jumping out of his skin.
129. He is jumping over the moon.
130. He is sober.
131. He looks sweet upon her.
132. He is fuming.
133. His heart is in his mouth.
134. He is showing his teeth.
135. He is tickled pink.
136. He is basking in the sunshine.
137. He is cut to the quick.

- | | |
|--|------------------------------------|
| 138. He is in her good graces. | 162. He is on top of the world. |
| 139. It is spine-chilling. | 163. He prizes her. |
| 140. He is fit to be tied. | 164. He is in a blue funk. |
| 141. He is depressed. | 165. He is bright. |
| 142. He is in low spirits. | 166. He is steamed up. |
| 143. He is downtrodden. | 167. His hair is standing on end. |
| 144. He is paralyzed. | 168. He is taking her heart. |
| 145. He sees with rose colored glasses. | 169. He feels like a million. |
| 146. He is taking a nose dive. | 170. It is giving him fits. |
| 147. He is sticking in her craw. | 171. He is in hell. |
| 148. It is breaking his heart. | 172. He is carrying a cross. |
| 149. He is flying into a passion. | 173. They are turtle-doves. |
| 150. He is being swept off of his feet. | 174. He is going off the deep end. |
| 151. He is in a tailspin. | 175. They are close-kint. |
| 152. He is losing his heart to her. | 176. He is down in the mouth. |
| 153. His flesh is creeping. | 177. It is under his skin. |
| 154. He is treading on enchanted ground. | 178. He is attacking her. |
| 155. He is out of humour. | 179. His heart is in his boots. |
| 156. He is on cloud nine. | 180. He is all in all to her. |
| 157. He is flying off the handle. | 181. He is weighed down. |
| 158. He is cross. | 182. He is frothing up. |
| 159. It is stinking in his nostrils. | 183. He is blowing his top. |
| 160. His spirits are dampened. | 184. He has a bleeding heart. |
| 161. He is rosy. | 185. He is her pet. |

186. It is a nightmare.
187. He is full of life.
188. His head is in the clouds.
189. They are going at each other.
190. He is sore.
191. It cuts him.
192. He is a crumpled rose leaf.
193. He is jumping on her.
194. It is sticking in his throat.
195. He is losing his temper.
196. He is blue in the face.
197. He is on a honeymoon.
198. His heart is being wrung.
199. He is walking on air.

F Experiment Form #1

Instructions for Experiment of Emotional Metaphors

Purpose: The goal of this experiment is to determine how closely interpretations of metaphors describing emotional state agree, and to determine the strength of various metaphors. Each of the metaphors selected reflects a specific emotion.

Instructions:

1. Please read each metaphor carefully.
2. Determine which of the emotions **anger**, **fear**, **happiness**, **love**, or **sadness** the metaphor seems to reflect, and check the appropriate column.
3. Rate the strength of each metaphor from 1 to 5: 1 is weak and 5 is strong. The strength represents how well the metaphor reflects the emotion selected.

Please feel free to comment on any ambiguities or difficulties you encounter in the margins.

The format of the table was as follows:

The metaphors were exactly those found in Appendix D.

Metaphor	Anger	Fear	Happiness	Love	Sadness	Strength of the Metaphor ³
He is out of spirits.						
He looks black.						
:						

³Strength of the metaphor is rated on a scale from 1 (weak) to 5 (strong).

G Experiment Form #2

Experiment on Assignment of Statements to Categories

Cornelia M. Verspoor

March 29, 1993

Instructions

Your main task in this experiment is to group various pre-composed statements into various categories. These categories were designed to reflect the common characteristics of these statements. The purpose of the experiment is to determine how accurately the statements can be assigned to the categories, as a measure of the validity of the the coherence/identifiability of the categories.

- Look over the chart. Try to get a grasp of each group before looking at the statements.
- Read each statement.
- Assign the statement to the group (1-5) which you believe has characteristics closest to the idea of the statement.

Note: Please comment on any difficulties you encounter in assigning a statement to a category.

[Here the explanation of the columns in the chart found in Section 7.3 was inserted].

Group	Static		Dynamic	
	Situation of Experiencer	Experiencer as Agent	Situation of Experiencer	Experiencer as Agent
Group 1	Heat Pressure Red	Flying at Jumping at	Release of Pressure Direction of Release: up, out	hitting
Group 2	Blue Heavy Painful Low	Sinking to	Pushed down Weighed down Broken Falling	(None)
Group 3	High Bright Complete	Jumping over	Release of En- ergy Direction of Release: up	(None)
Group 4	Desire Passion Starry-eyed	Loss of con- trol Falling Swept Away	Possession	(None)
Group 5	Part/Whole ⁴ : Pale color Immobility	(None)	Part/Whole ⁴ : Shaking Chilled	(None)

⁴The characteristic listed can be used in reference to both parts of the experiencer and the whole experiencer

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