PSYCHOSEMANTIC ASPECTS OF FIGURATIVE LANGUAGE

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Abstract

Unusual but meaningful combinations of ideas and their expression in language are common in everyday life but no theory has yet been able to explain adequately their nature nor their effects upon human thought and behavior. Four hypotheses to explain different aspects of figurative language were proposed and elaborated: a structural hypothesis, an imagery hypothesis, and two linguistic hypotheses, one based upon semantic feature violations and the other upon Fillmore's case grammar. The structural hypothesis specified a number of conceptual relations which underlie the operation of figures—similarity, contiguity, hierarchy, and, most generally, conceptual integration. The imagery hypothesis distinguished those figures comprised of constituents with high imagery ratings from those with low imagery ratings and implied that certain combinations of high and low imagery constituents would produce more effective figures than other combinations. The linguistic hypotheses generated expectations regarding the relative effects of [-human] selectional restriction violations and the effects of violating agentive, objective, and dative case requirements.

To test the hypotheses 240 grade eight, nine, and ten students from a high-SES area of Greater Vancouver were given group cued-recall tests, and likeability, similarity and comprehension scales for several lists of figurative expressions representing aspects of the various hypotheses in two syntactic patterns—nominal-copula-nominal figures, such as "A thicket
is a city", and nominal-verb-nominal figures such as "The daffodil cripples the shadow".

Grade trends were slight, although students in higher grades understood figurative language in a more abstract way and liked it better than students in lower grades.

The psychological relevance of the structural hypothesis was particularly well substantiated by the observations. For recall and likeability, but especially for comprehension, students discriminated amongst figures in such a way as to show that the conceptual relations of similarity, contiguity, hierarchy, and integration are functional aspects of thought operative during the retrieval and interpretation of figurative language. Moderate similarity between concepts in high imagery metaphors produced more likeable figures than either extreme similarity or dissimilarity, but for figures of mixed imagery and embedded conceptual relations highly similar concepts produced more likeable figures.

High imagery proved to be related strongly to figure recall, moderately to figure likeability but only modestly to figure comprehension. Figures with high imagery nouns surpassed those with high imagery verbs on all measures, and order of high and low imagery constituents favored Paivio's "conceptual peg" hypothesis for recall.

Figures involving human semantic feature violations were less well recalled than those involving other violations, figures involving dative case violations were less well recalled than those involving objective case violations, and two case violations produced higher likeability and better comprehension than a single case violation. These effects are more difficult to integrate theoretically than those observed under the
imagery or structural hypotheses.

Because the structural hypothesis is more consistently supported by the data than are the linguistic hypotheses, and because the imagery hypothesis can largely be subsumed within the structural one, the latter, it is argued, provides the most adequate explanation of the psychological effects of figurative language. Fundamental in the comprehension of figurative thought is conceptual integration, a cognitive process facilitated by high imagery-inducing qualities of figure components, clear structural relations between them, and presence of sufficient semantic anomaly to maintain an optimal level of cognitive arousal.
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A. The Importance of Figurative Thought

Unusualness and appropriateness together comprise the hallmark of figurative thought and of creativity in any human expression. The medium of such expression may be accessible to any of the senses, and the message may be philosophic, aesthetic or technical, but whatever its mode and content, regular experiences with expressions of figurative thought are unavoidable.

The term **figure** is defined in this investigation to mean an unusual but meaningful combination of ideas; the term **figurative thought** to mean thought characterized by such combined ideas; and the term **figurative language** to mean language distinguished by unusual but meaningful combinations of linguistic units.

Language is the vehicle in which figurative thought is most commonly encountered. Metaphors, metonyms, synecdoches and oxymorons are linguistic representations of elementary cognitive structures. These structures are dynamic in so far as they are thought-provoking and stimulate mental searches for possible meanings. When a metaphor, for example, no longer provokes thought it ceases to be dynamic and we refer to it as a dead or frozen metaphor.

Through the process of conceptual integration these and other rudimentary conceptual structures merge into more complex ones--analogies,
proverbs, riddles, models, myths, theories, ideologies, etc. These constructions are limited by the parameters of the root metaphors from which they grow (Black, 1962; Hester, 1967; Levi-Strauss, 1963; Pepper, 1971, 1972; Sarbin, 1965, 1968; Shibies, 1971a, 1971b, 1972; Turner, 1974). Technical innovation (Crovitz, 1970; Gordon, 1971, 1966; Prince, 1970), scientific revolutions (Kuhn, 1962; Leatherdale, 1974), ideological changes, psychopathologies and psychotherapies (Caruth & Ekstein, 1966) all involve a rejection of old ways of conceiving and speaking of things and substitutions of new world-views. Initially such views are judged as figurative, and only over time do they become an integrated part of ordinary language and thought. Knowledge thus expands by a process of metaphorical and analogical extension to new domains. Inchoate subjects are given shape by metaphorical predication (Fernandez, 1974), and radical metaphors establish identities when there are no traditional ways to speak or conceive of the issues of concern (Alleman, 1967; Cassirer, 1923).

Not only is figurative thought central in everyday language and in our appreciation of literature; it is no less important in the "hard" sciences. The conception of the benzene ring, the double helix model of DNA, and wave and quantum theories of light all originated in metaphorical extensions from other semantic domains, in many cases through figural or structural modes of expression rather than purely linguistic ones. In the social sciences too figurative thought plays a key role. We explore computer and perceptual analogues of cognitive functioning (Paivio, Note 1); during psychotherapy and much of our everyday lives we are engaged in a process of redefining "self", a process entailing metaphorical predication, a continuing change in our conceptualization of what we are
and what we might be; and Karl Marx provides a radical metaphor of immense social consequence by describing society as a struggle between controlling and subservient classes rather than as a mutually beneficial alliance between free agents.

In the practical areas of technical innovation, advertising, political propaganda, and educational and other persuasive communications a better understanding of the mechanisms of figurative thought can aid us in creating effective materials and enlighten us as to how figurative expressions produce their effects.

With these general purposes in mind more specific objectives emerge.

B. Objectives of the Investigation and Research Questions

The chief aim of the investigation was to develop and empirically test two cognitive and two linguistic hypotheses of figurative language processing. The cognitive approaches included a structural hypothesis and an imagery hypothesis; the linguistic approaches included a traditional transformational grammar and a case grammar.

The term hypothesis is used here as the most applicable of several possible terms (e.g., model, system, theory, conceptual framework) and in the sense of being a set of provisional explanatory propositions proffered with less formality and less empirical support than would be so in the case of theory (Marx, 1970, p. 9). Like "theory", the word "hypothesis" is used in a variety of ways (Kaplan, 1964; Marx, 1970) but in this investigation the intent is to provide a label for sets of propositions modest in scope and closely tied to empirical observations.

The first list of figures for Study I was designed to examine the
effects of (a) the different conceptual relations inherent in metaphors, metonymy and synecdoches, (b) the rated imagery and judged similarity of their components, and (c) different types of semantic restriction violations on the recallability, likeability and comprehensibility of the figures. The second list in Study I focused solely on metaphors composed of nouns with high imagery ratings, and examined the importance of (a) inter-concept similarity and (b) semantic restriction violations on metaphor likeability.

Study II aimed at discovering the effects of (a) violations of the agentive, objective and dative cases (Fillmore, 1968) and (b) different rated imagery levels of constituent units on the recallability, likeability and comprehensibility of more complex figures of speech.

A secondary objective in both studies was to record possible differences in responses to the various types of figures by adolescents in different grades.

Inherent in all the approaches was the view that comprehension of figurative language depended upon achieving an integration of the concepts involved. The attributes of imagery, structural and case relations, and semantic feature violations were examined for their relevance in effecting this conceptual integration.

Although the empirical aspect of the inquiry was restricted to figurative language, reliable prediction of psychological responses by the cognitive hypotheses would permit generalization of those hypotheses to figures expressed in non-linguistic modalities. The inquiry was thus seen as an examination of figurative thought and not only of figurative language.

In general, it was hoped to determine which of the hypotheses had
the greatest psychological relevance. Results of a pilot study (Wilkinson, Note 2) suggested that the linguistic approaches were less powerful than either of the cognitive approaches in predicting likeability and recallability. Imagery was particularly powerful in predicting recallability of figures, whereas judged similarity between the major components of simple figures was the best predictor of likeability, with moderate inter-concept similarity producing the most preferred figures.

Guided by the findings of the pilot study, the present investigation sought to answer the following seven major questions:

1. Are figures of speech embodying different conceptual structures responded to differently in terms of recall, likeability and comprehension?

2. How closely related is the rated mental imagery of words to the recall, liking and comprehension of figurative language using those words, and what effects are there, if any, of varying the ordinal position of high imagery elements in a figure or the imagery levels of different grammatical form classes?

3. Can semantic feature violations or case category violations account for the recollection, liking or understanding of figurative language?

4. How important is inter-concept similarity or dissimilarity in predicting psychological responses to figurative language?

5. Do the recollection, liking and understanding of figurative language increase with school grade?

6. Can psychological responses to figurative language be adequately explained by linguistic variables, or would figurative language be better considered as a manifestation of figurative thought and explained in terms of cognitive variables?
7. Can the relationship between imagery and conceptual structure be clarified by observing the relative importance of these factors in predicting responses to figurative language?

Answers to these questions demanded, first of all, further elaboration of the relevant hypotheses.
CHAPTER II

HYPOTHESES FOR THE ANALYSIS OF FIGURATIVE THOUGHT

I have already suggested that figurative language can be seen as a particular example of a more general phenomenon that occurs in all sign systems, for example, in graphic, musical or gestural systems. Anthropologists (e.g., Levi-Strauss, 1969, 1973) and semioticians (e.g., Barthes, 1970, 1973; McLuhan, 1964) commonly speak of figures in these other modalities, and artists, advertisers, and cartoonists frequently employ them. One way of studying figures, therefore, is to examine the general concepts and relationships that underlie particular modes of expression, that is, to delineate and test principles that could apply to sign systems other than verbal ones.

Excessive attention to the verbal system alone may, in fact, have hampered development of an adequate explanation for figurative language (e.g., Angel, 1967). Failure to maintain distinctions amongst (a) signs, (b) those situations that they signify, and (c) the internalized concepts for which the signs stand has been a frequent source of confusion in writings on figurative language despite the fact that this tripartite analysis was clearly outlined by Ogden and Richards as early as 1928. It is useful to note that when deviant verbal strings are generated (for example, by the arbitrary juxtaposing of words), anomalous cognitive representations can result, with a potential for being reformulated in other external sign systems. It is important in theory construction to
maintain the distinction between these internal and external representations, despite homologies between them.

Whatever the external mode of representation several internal modes can be inferred. On the basis of past research two of these appear particularly interesting--that of quasi-logical structures and that of imagery. Consideration of both of these possible modes led to the elaboration of two theories for predicting responses to figurative expressions. Two other hypotheses were developed by examining the external form of representation, in this case linguistic.

A. Cognitive Approaches

1. A Structural Hypothesis

   Concepts can be considered as the basic cognitive units from which figures are constructed, and some of the relationships that produce integration of those concepts can be specified. The resulting partial, but systematic, account of figurative language can then be tested by observing psychological responses to the structures so defined. If there are discernible differences in responses to differently structured figures it can be inferred that the internal processing of those figures differs.

   While the distinction between concepts and words has frequently been blurred in the works of literary scholars, they and semioticians usually regard a metaphor as an expression entailing a similarity relationship between two concepts (e.g., Brooke-Rose, 1958; Kögås Maranda, 1971).

   The two concepts need not be present verbally in a particular string of words for the metaphor to be active if a suitable context is presupposed.
Reddy (1969) notes that:

1. The rock is becoming brittle with age
does not establish a metaphor in the context of a geological expedition,
but may if one is discussing an elderly professor emeritus. A metaphor
is usually established on the basis of a structural, perceptual or
functional similarity between concepts but, in some cases, the similarity
may be at a more abstract semantic level. Natural examples of verbal
metaphor abound:

2. The river sweats
Oil and tar  (Eliot, 1961, p. 61)

3. mustardseed sun  (Thomas, 1952, p. 170)

4. Pickets choke off city mail by
surrounding post office  (Vancouver Sun, March 13,
1975, p. 1)

5. We speak of our memories as
vivid, faded, or erased  (Paivio, Note 1)

6. Light consists of waves

7. Organization lightens the
burden of the reader  (American Psychological
Association, 1967, p. 12)

8. WORDS
Axes
After whose stroke the wood rings,
And the echoes!  (Plath, 1965, p. 86)

The most rudimentary linguistic form of a metaphor seems to be
that of nominal-copula-nominal as, for example,

9. The medium is the message

and

10. An avalanche is an acrobat.
Other conceptual relations besides similarity, however, may be concealed
by this surface form.
When the relationship between two concepts is one of contiguity or causality\(^1\) the resulting figure is termed a **metonym**. Thus the two concepts in

(11) An answer is a problem

are metonymically linked because of their frequent co-occurrence. Figures of this sort are considered in this investigation to be metonyms despite the linguistic frame "N\(1\) is N\(2\)" which, on first consideration, suggests that they are metaphors.

In a like manner, two terms whose corresponding concepts are in hierarchical relation, i.e., genus to species, whole to part, entity to attribute (or the inverse of these), are considered here as forming a **synecdoche**, for example:

(12) A minstrel is a musician \((\text{species-genus})\)

(13) A hoof is a cow \((\text{part-whole})\)

(14) Wisdom is a monk \((\text{attribute-entity})\).

Paired terms whose corresponding concepts are in a relationship of opposition are, classically and here, defined as **oxymorons**:

(15) Black is white

(16) Cruel kindness.

Since antonyms are alike in all but just one respect they are, paradoxically, very close to similarities or metaphors.\(^2\) For this reason they did not receive separate consideration in this investigation. Since synecdoche can be considered as similarity of logical associations and

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\(^1\)Hume (1748) maintained that causality was inferred when particular objects were constantly conjoined (i.e., contiguous) with each other.

\(^2\)"An antonym is a synonym" is an oxymoron.
metonym as similarity of spatio-temporal location, similarity, and thus metaphor, can be taken as the more rudimentary notions.

Simile involves the same cognitive relationship as metaphor but a different linguistic form that forewarns the addressee of the hypothetical nature of the espoused similarity. Direct comparison is even more explicit, specifying the features of the concepts that are to enter into the similarity relationship.

In natural language it is not always easy to determine which conceptual relations are operating to integrate a figure. In some cases more than one may be present, as in (9) or

(17) A father is a mother
in which both metaphoric and metonymic relations between the concepts are evident. In other cases several successive interpretations may be necessary for a full understanding of a figure. On one reading of

(18) Macbeth murders sleep
"sleep" might be considered as a metonymic substitution for "the sleeping King"; on another reading, "murder" as a metaphorical substitution for a verb such as "disturbs" and "Macbeth" as a synecdoche for "Macbeth's actions"; finally, the whole expression might be taken as a concrete and metaphorical way of saying that both patricide and the disruption of the accepted order are deeply disturbing events. Similarly, in

(19) He sang his didn't he danced his did (e. e. cummings)
simple metaphorical replacement of the anomalous words (e.g., with "song" and "dance" respectively) does not give a complete understanding of the figure, which should perhaps be taken to mean something like "he verbalized his dislikes and enacted his desires". Since the structural
hypothesis, at its present level of development, results in somewhat ad hoc analyses of these more complex figures, an initial inquiry should be limited to simple forms, and a search made for other systematic methods of analysis of complex figures.

The structural concept of conceptual integration, however, applies to the interpretation of all figures. A figure of any complexity can be said to be integrated to the extent that the concepts encoded in it can be related in some coherent way or ways to one another. This means that practically any collection of concepts can be interpreted given that sufficient efforts are made to establish appropriate semantic links amongst the conceptual elements.

Integration may entail a direct linking of the concepts by contiguity, indirect linking through a mediating element or elements, or both. If no linking can be made the figure will be perceived as meaningless or uninterpretable. While it is a necessary condition, conceptual integration is not a sufficient condition for a figure's acceptability, since a degree of quality is also demanded. Such quality might be determined on the basis of completeness, or the level or the number of levels (or dimensions) of the integration, but it seems likely that judgement of figural quality varies widely amongst individuals, relating perhaps to their conceptual styles, preferences for complexity or simplicity, and so on.

Two empirical studies touch on the role of structural variation in figure effectiveness but neither deals with it in any depth. Chun (1971) reported the results of a study of the effects of role demand (accuracy versus thematic orientation), stimulus materials (abstract versus figurative), and personality attributes (aesthetic sensitivity, cognitive
fluency, and analyticality) on subjects' failure to heed the "as-if" or figurative status of prose passages and subjects' subsequent propensity to reify such figures from the passages. A tendency to reify was correlated positively with the "opacity" of the materials (a construct apparently reflecting the unfamiliarity, abstractness, and ambiguity of the passages), low IQ test scores, low aesthetic sensitivity test scores and high ideational fluency. Chun suggested that further examination of the effective dimensions of opacity was required. This is essentially what the present study undertakes.

Koen (1965) showed that adults would reliably complete figurative expressions by choosing from a pair of words in a sentence the one with associative meaning closest to that of a given set of cue words. However, Koen did not examine the structural basis of this word association response (cf. Pollio, 1966).

The ability to use and explicate different conceptual structures is normally linked to age and maturity. Asch (1958), Asch and Nerlove (1960), and Gardner (1974) reported studies with children aged three to twelve years that revealed a developmental trend in the ability to comprehend and explain certain "double-function" words such as "hard" and "bright". Apparently, the physical sense of such words is acquired earliest and the psychological sense later as an independent homonymic vocabulary item, while recognition of the polysemous nature of the words occurs at a still later stage. Pollio and Pollio (1974) pointed out that the terms apparently used in these investigations involved only frozen (dead) figures rather than novel ones. Consequently, both the physical

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3 When this inquiry was begun only a few empirical studies had taken a developmental approach to figurative language.
and psychological senses of such words are part of the normal dictionary entries for the words and may be acquired no differently than the meanings of other polysemous words such as "ball".

The Pollio's own investigations examined the production of figurative language by third, fourth and fifth grade students. Using judges trained to reliably discriminate amongst literal, frozen and novel expressions they observed that production of frozen figures was uncorrelated with the production of novel figures, but that the production of both increased over grades and varied according to task demands. Comparing their findings with those of Asch and Nerlove they concluded "that children in the stage of concrete operations are able to use frozen and novel figurative language within a specific context but may be unable to explicate the use of such language in completely abstract terms until they move from the stage of concrete operations to the stage of formal operations" (p. 200). This latter stage is normally encountered in early to middle adolescence and is marked by the ability to perform logical operations in the absence of concrete examples and by a psychological "centering" on or preference for this theoretical mode of functioning.

Groesbeck (1961) reported an increase over grades three to five in the number of figures found in children's school texts and also reported that children in these grades can profit from instruction in figurative language. Leondar (1968) suggested an important limitation in this early use of figurative language:

Dessoir . . . mentions a youngster who, on first seeing falling snow, exclaimed "look at the butterflies playing together." Such an inadvertent trope demonstrates, not the inventiveness of the child's imagination, but the poverty of his vocabulary. Only when his conception of butterflies is sufficiently delimited to exclude snowflakes can he yoke these terms metaphorically. His
production of metaphor waits on his acquisition of a supply of stable, literal, and socially sanctioned categories. If metaphor contributes to the development of early language, it is as metaphor encountered. Metaphor created would appear to be a later and surely more complex achievement. (pp. 172-173)

"figurative" language in the very young may be simple generalization—that is, not metaphor at all. (Leondar, 1968, p. 220)

Acquisition of normal semantic categories and the ability to utilize formal operations are therefore likely to be prerequisite conditions for the thorough comprehension of figures of speech.

In order to establish the psychological reality of the metonymic/synecdochic/metaphoric trichotomy it was necessary to observe systematic differences in responses to (or production of) figures incorporating those structures. Because of time limitations and because the practical applications of figurative language depend upon knowing its effects upon human responses, only response measures were considered in this investigation. Of the many possible measures (e.g., cf. Anglin, 1970; Collins & Quillian, 1969; Creelman, 1966; Fillenbaum & Rapoport, 1971; Osgood, Suci & Tannenbaum, 1957; Paivio, 1971b; Perfetti, 1972) three appeared to be both important and practical—recall, likeability and comprehension.

Recall of materials can be assessed either by recording the extent of free or spontaneous recollection, or by cueing recall with some material previously associated with it. While free recall would provide a more accurate assessment of complete figure memorability, it would also be a more difficult task and one highly susceptible to recency and primacy effects (Wilkinson, Note 2). Randomized cued recall greatly reduces these effects and, therefore, was chosen as the method for measuring recall in this study.

Figures embodying metonyms and synecdoches were expected to be
easier to recollect than those embodying metaphors because of the more common, and consequently stronger, associations between the two terms making up the figures. Because the contiguity relationship involves less abstraction than the hierarchic one it was expected that the recall of metonyms would also surpass that of synecdoches. To the extent that the similarity between the two concepts could be scaled it was also expected that figures composed of highly similar concepts would be more readily recalled than those composed of less similar concepts because the associations between the highly similar concepts would be more extensive, and consequently stronger, than those between less similar ones.

Measuring the extent to which figures of speech are liked taps emotive as well as cognitive responses to the figures. Psychologists have only a modest understanding of what happens neurologically when something is liked. The work of Berlyne and others (Anderson, 1964; Berlyne, 1970; Berlyne, Craw, Salapetek & Lewis, 1963; Berlyne & Boudewijus, 1971; Berlyne, Note 3) suggests that items which are liked stimulate an optimal level of cortical arousal. Disliked items have either insufficient arousal potential or are overly arousing. This explanation fits well with traditional discussions about the range of effective metaphorical predications. For example, Thomas (1969) argued that a combination of highly dissimilar concepts in a metaphor is disliked, as is a combination of concepts that are semantically too similar. Koen (1965) observed that synaesthetic metaphors were considered by undergraduates to be better figures of speech than metaphors in which the semantic shift remained within a single sense modality. It appears that only moderately differing concepts combined in metaphorical relation can produce the appropriate arousal level to be judged as pleasing. In this
study, figures with two components that were moderately similar were expected to receive higher likeability scores than figures comprised of either highly similar or greatly dissimilar concepts. Since similarity judgements can be made of concepts set together for reasons other than the degree of their similarity, it was expected that similarity effects would be observable across a range of structures, including those based upon the contiguity or hierarchy between the concepts involved, although it was anticipated that such effects might be masked by the conflicting structures.

Comprehension poses some special problems. While the understanding of frozen figures, proverbs, riddles, etc. can be assessed much as the understanding of any other normalized linguistic pattern, there is no way of judging when a novel figure is correctly comprehended since, in principle, there exists no normative interpretation for such a figure. Even for semi-traditional figures like

(20) dull roots (Eliot, 1961, p. 51)
(21) dry brain (Eliot, 1961, p. 33)
(22) the river's tent is broken (Eliot, 1961, p. 58)
(23) When the evening is spread out against the sky
Like a patient etherised upon a table
(Eliot, 1961), p. 11)

experts would be hard pressed to agree upon correct interpretations or adequate comprehension.

With simpler figurative constructions agreement as to the major meanings may be more readily forthcoming, even if a singular meaning cannot be determined. Furthermore, if guiding principles can be determined for establishing several acceptable alternative meanings of
such figures we can then begin to examine the quality of understanding rather than the mere presence or absence of understanding.

For figures comprised of two concepts the relational functions already discussed—similarity, contiguity and hierarchy—provide such guiding principles for the establishment of alternative meanings. Using this system, a comprehension question for example (11) might appear as follows:

"An answer is a problem" means that an answer and a problem
(a) both produce further questions (major similarity)
(b) are often found together (contiguity)
(c) are parts of tests (hierarchy)
(d) are both composed of ideas (minor similarity).

Each of these options provides an integration of the two nominals in the figure.

Since similarity of spatio-temporal location, i.e., contiguity, seems to be one of the more salient of similarities and to involve minimal abstraction it was expected that contiguity-based responses would be the more rudimentary and the ones displayed in greater proportion by people at earlier stages of cognitive development. Consequently, it was expected that students in lower grades would interpret figures more often on the basis of contiguity than would students in higher grades. Categorical and hierarchical similarities are more commonly encountered in normal usage than those based upon a variety of other features or dimensions, and so there is reason to believe that comprehension of the latter would emerge only at a later stage of development. Consequently, students in higher grades were expected to make more response choices on the basis of these less common similarities than students in lower grades, and
correspondingly fewer hierarchic responses. It was also expected that contiguity-based and hierarchy-based responses would be higher for metonymy and synecdoches, respectively, across all grade levels. Since the category "metaphor" encompasses figures formed on similarities on a variety of dimensions, it constitutes a sort of residual class to which responses were expected to be more volatile and less predictable than for the other two.

In summary, it was conjectured that metonymic, synecdochal and metaphoric relations between two concepts represent increasingly complex structures that would, as a result, be increasingly difficult both to recall and to understand. Liking of figures of this sort was expected to be positively correlated with their comprehension, although moderate similarity of combined elements was expected to produce the most likeable figures.

For figures of thought or speech involving more than two concepts integrated and non-integrated interpretations can be offered as alternative meanings, although the conceptual relations involved in the integration cannot be specified easily. Options for a comprehension question for (24) Ignorance interviews the jungle might include:

(a) jungle dwellers should talk to trees (concrete, not integrated)
(b) there's a lot to be learned about jungles (concrete, integrated)
(c) interviewers prefer tropical climates (abstract, not integrated)
(d) a foolish person tries to do the impossible (abstract, integrated).

Option (c) integrates the verb and second nominal but not the first nominal. Options (b) and (d) integrate the three components by translating them into other planes of discourse, one relatively concrete and the other more
abstract. Option (a) may actually integrate the three concepts at a concrete level, but for most adults at least, it is more likely to appear as a shallow, prejudicial or inept integration. Adeptness at conceptual integration was assumed to increase concurrently with cognitive development. Consequently, it was expected that the integrated interpretations would be chosen more often by students in higher grades than by students in lower grades.

2. An Imagery Hypothesis

It is a well established behavioral law that the use of mental images to represent and integrate verbal materials enhances recollection of those materials (Paivio, 1971a, 1971b). What is not clear is the nature of the imagery process, and debate and research continue as efforts are made to determine whether verbal and visual information are both stored in an abstract, modality-free form (Anderson & Bower, 1973), in separate but interconnected systems each specialized for representing a particular kind of input (Bower, 1972; Paivio, 1971b, 1975; Paivio, Note 1) or in a combination of such systems (Bartram, 1974; Chase & Clark, 1972; Clark, Carpenter & Just, 1973).

While the terms themselves tempt one to equate "figurative thought" and "mental imagery", the former term seems best retained as a broader concept that can include anomalous expressions involving little or no mental imagery. Furbank (1970) similarly argues for retention of a distinction between the literary senses of "metaphor" and "image", a distinction that is frequently blurred in popular usage.

Based on the results of the pilot study (Wilkinson, Note 2) and numerous paired-associate learning studies (Paivio, 1971b), it was predicted with considerable confidence that high imagery figures, regardless of the
interpretation given to the imagery, would be more readily recalled than low imagery figures. Furthermore, it can be argued that high imagery-inducing materials more quickly evoke a satisfying level of cognitive arousal than do low imagery-inducing materials. Although appropriately structured low imagery figures might produce as much arousal as high imagery ones, the low associative meaningfulness which frequently accompanies abstractness (Paivio, 1971b) would, on the whole, be expected to depress the extent of the arousal, while the non-synchronous linear processing required for abstract stimuli (Paivio, 1975) would delay activation of the arousal. This relative depression and delay of arousal for low imagery materials would result in them being less likeable than high imagery materials. Consequently, for this study, the greater the number of high imagery constituents in a figure the greater was its expected likeability. The possible relationship between imagery and comprehension was unclear, so on this topic the investigation was exploratory.

Tentative links between the order of high and low imagery constituents and figurative expression come from Davidson (Note 4) and Thomas (1969) who independently suggest that successful metaphors are generally those which hypostatize or concretize the abstract. While this is clearly not the case for all types of figures, for example

(16) cruel kindness
or (25) less is more,

hypostatization may still be an important function in some figures. Neither Davidson nor Thomas, however, suggest why or how hypostatization might work its effects.

Under the hypostatization argument it was expected that figures formed from low-high pairs of terms, like
(26) Welfare is food
or (27) Hatred is a glutton
would be preferred over those formed from high-low imagery pairs, such as
(28) A wall is an entry
or (29) A horse is an eccentric.
Application of the same argument to the comprehension task suggested the
same order, although it was difficult to see why the understanding of a
figure should be affected by either the number or order of its high and
low imagery constituents.

Paivio (1971b) argued that high-low imagery word pairs yield better
cued recall scores than do low-high imagery word pairs because a high
imagery cue is more readily stored in, and retrieved from, a cognitive
imagery system than is a low imagery cue, and thus serves as a better
mneumonic device or "conceptual peg" to which the response word can be
related. This view was independently tested in this study.

Use of more complex figures permitted the examination of imagery in
relation to linguistic form classes. Noun imagery had, in previous
research (Paivio, 1971b), surpassed verb imagery as a predictor of recall
and the same was expected in this study. These expectations were extended
to the likeability and comprehension measures as well under the belief that
noun-induced images are simpler to store and process cognitively than verb-
induced images.

Because they presumably have more advanced cognitive processes,
students in higher grades were expected to deal more adequately with low
imagery materials than were students in lower grades. For comprehension
tasks older adolescents (presumably using formal operations) were expected
to prefer abstract over concrete alternatives even where both were
acceptable. Consequently, both abstract and concrete options were offered for the more complex figures (cf. example (24) on page 19).

B. Linguistic Approaches

Ordinary conversations and writings abound with expressions which deviate from strict rules of language but which are, nevertheless, interpreted, being meaningful both to speaker or writer and to addressee. Such deviance may occur within the context of a single sentence or within an aggregate of sentences that may otherwise observe normal rules of discourse. Some of these linguistic deviations are unintentional malapropisms or lapses of grammar which, upon reception, are commonly interpreted in the intended sense, clarified sometimes by linguistic and extra-linguistic context, or, if feasible, by replies to questions directed to the producer of the deviant strings of words. Other deviations are either clearly intentional or impossible to do without and it is these latter classes of verbal productions that are considered as figures of speech. More particularly, figurative language can be identified with the presence of selectional restriction violations (Matthews, 1971). Such violations can be examined both in traditional transformational generative grammars (Jacobs & Rosenbaum, 1968) and in case grammars (Fillmore, 1968).

1. Selectional Restriction Violations in Traditional Transformational Generative Grammar

Matthews' account of metaphor subsumes the figures described by the structural theory as metonyms and synecdoches. He argues, after Chomsky (1965, p. 149) that metaphors are sentences that are ill-formed because of violations of what Chomsky called "selectional rules" and "strict subcategorization rules", roughly, semantic and syntactic restrictions on the
choice of formative for a particular position in a given linguistic structure. Matthews refers to both of these types of restrictions as "selectional restrictions", and argues that "the presence of a selectional restriction violation is . . . a necessary and sufficient condition for the distinguishing of metaphor from non-metaphor" (Matthews, 1971, p. 424).

Thus

(30) Golf plays John

and (31) John found sad

are both metaphors by this definition. A sentence like (1) is not a metaphor itself but may have an underlying one like

(32) The elderly professor emeritus is a rock.

According to Matthews we are guided in our interpretation of a metaphor both by the metaphor's phrase structure and by the non-metaphoric uses of the constituent words comprising the figure. The latter are revealed by examination of the lexical features of the constituents. Such features are not to be taken as semantic primitives but as lexical entries which will themselves by "specified in turn by features, ad infinitum" (Matthews, 1971, p. 419), thus constituting a network of semantic relations.

An examination of lexical features in the constituents of a nominal-copula-nominal figure can be expected to reveal both the similarities between the concepts as stressed in the structural model and the selectional restriction violations as stressed by Matthews. Comparing the metaphorical sentence (33) and some associated features with a non-metaphorical sentence with the same phrase structure but different features (34), Matthews observes that (33) violates selectional restrictions placed upon "man" by "wolf", while (34) violates none of the restrictions imposed upon "man" by
"gentleman".

(33) The man is a wolf.

+Noun +count +concrete +animate +mammal +human +adult +linguistic +bipedal
+Noun +count +concrete +animate +mammal +human +adult +linguistic +bipedal

(34) The man is a gentleman.

+Noun +count +concrete +animate +human +male +adult . 
+Noun +count +concrete +animate +human +male +adult . 

Matthews further contends that the features which are most closely connected with the violation (in this case [+human] or [-human]) are less important in understanding the metaphor than features not closely involved in the violation, but he provides no way of determining just which features can be considered as closely involved. Matthews' interpretation would view (18) as violating a selectional restriction imposed by the verb upon the grammatical object, and would thus project "sleep" as the anomalous
term in the figure. It was argued previously, however, that this provides only one of several possible interpretations for the figure.

Thomas (1969) suggests an analysis almost identical to that of Matthews but adds that in the case of a nominal-copula-nominal metaphor "when the features of the two nominals are incompatible, those of the second nominal have predominance over those of the first" (p. 40). Clearly though, this is only true for certain selected features and it is difficult to determine a priori just which features will predominate. This account of figurative language provides a convenient way of constructing metaphors and leads to assessment of the effects of specified feature violations in terms of the response variables proposed here. Concrete and abstract, animate and inanimate, and human and non-human subject and object restrictions are among the more common ones discussed by linguists (e.g., Jacobs & Rosenbaum, 1968), and appear to comprise the more fundamental semantic restrictions. Since the imagery hypothesis is based upon the first of these distinctions attention was directed to the second and third. One of these, however, was considered from a different linguistic viewpoint, that of case grammar.

2. Selectional Restriction Violations in Case Grammar

The theory just outlined describes metaphor as the violation of certain types of linguistic restrictions. In a "traditional" transformational grammar, such as that developed by Jacobs and Rosenbaum (1968), these violations involve the categories of grammatical subject and grammatical object, but as Fillmore (1968) points out, these categories obscure important semantic relationships. Thus, in

(35) John broke the window

and (36) A hammer broke the window
the grammatical subjects are semantically distinct and the differences cannot be specified in terms of subject restrictions required by the verb since the verb is the same in both cases. Fillmore, therefore proposes an alternate system which he terms a "case" grammar.

The case notions comprise a set of universal, presumably innate, concepts which identify certain types of judgements human beings are capable of making about the events that are going on around them, judgements about such matters as who did it, who it happened to, and what got changed. The cases that appear to be needed include:

**Agentive** (A), the case of the typically animate perceived instigator of the action identified by the verb.  
**Instrumental** (I), the case of the inanimate force or object causally involved in the action or state identified by the verb.  
**Dative** (D), the case of the animate being affected by the state or action identified by the verb.  
**Factitive** (F), the case of the object or being resulting from the action or state identified by the verb, or understood as a part of the meaning of the verb.  
**Locative** (L), the case which identifies the location or spatial orientation of the state or action identified with the verb.  
**Objective** (O), the semantically most neutral case, the case of anything representable by a noun whose role in the action or state identified by the verb is identified by the semantic interpretation of the verb itself; conceivably the concept should be limited to things which are affected by the action or state identified by the verb. The term is not to be confused with the notion of direct object, nor with the name of the surface case synonymous with accusative.

Additional cases will surely be needed.  
(Fillmore, 1968, pp. 24-25)

In case grammar, figurative language will result whenever case restrictions are violated. For example,

(37) The assumption climbs the tree

and (38) The volcano burped

both violate the agentive requirement of the verb;

(39) The man melted

violates the objective case;

(40) The balloon crinkles the air

violates both agentive and objective case restrictions; and
(24) Ignorance interviews the jungle
violates both agentive and dative case requirements. Figures of the
nominal-copula-nominal form, as

(9) The medium is the message
or adjective and noun, as
(16) cruel kindness
and (3) mustardseed sun
represent the complex "essive" case and require special treatment (cf.
Simmons, 1972).

Developed primarily to explain linguistic patterns in natural
language, neither of these linguistic theories was intended to predict
psychological responses. Their value would be enhanced, however, if they
could be shown to have psychological relevance as well as purely linguistic
explanatory power. Some research studies (e.g., Brown, 1973) indicates
that case grammar has good correspondence with the psychological reality
of young children. There is some evidence, too, that semantic features
can predict cognitive responses to certain linguistic structures.
Imagery rating of terms is a proven predictor of cued recall, and high and
low imagery ratings correspond roughly to the [-concrete] and [±concrete]
features commonly used in transformational analysis of lexical entries.
It seems reasonable, therefore, that other semantic features might also
have predictive power. Although neither Matthews nor Thomas make any
attempt to assign an order of importance or saliency to semantic features,
and although Matthews refuses to claim any psychological reality at all
for the feature system, a study by Howe and Hillman (1973) lends psycho-
logical credence both to the semantic feature theory and to case grammar.

From a traditional linguistic framework, Howe and Hillman examined
children's judgements of acceptability of semantically anomalous strings of words. They found that children in kindergarten through grade 4 recognized animate subject violations at an earlier age than animate object violations and that strings with violations of "more idiosyncratic" selectional restrictions were acquired at an intermediate stage. Thus, sentences of the type:

(41) The story believed the teacher
or (42) The nest built the bird
were detected as deviant at an earlier age than sentences of the type:

(43) The grass dried the wind
or (44) The baby fed the mother
which, in turn, were more easily detected as deviant than sentences like:

(45) The children pleased the story
or (46) The cowboys warmed the fire.
Furthermore, acquisition of all restrictions occurred at a later age for low-SES children than for upper-SES children.

While there is some doubt as to whether all of the sentences generated by Howe and Hillman as deviant ones are actually deviant given the proper context, for example, (43) and (46) above, and

(47) The skirt cleaned the soap,
their study, nevertheless, illustrates that the semantic feature system can be useful in predicting developmental trends and hence, presumably, in predicting the inherent difficulty, even for adults, of certain linguistic structures.

Utilizing the Katz and Fodor (1963) distinction of semantic markers and semantic distinguishers, Howe and Hillman describe the sentences involving special restrictions as non-reversible by virtue of restrictions
at the level of semantic distinguishers and the animate object and animate subject sentences as non-reversible due to restrictions at the level of semantic markers. This distinction is somewhat arbitrary, and thus untenable, as Weinreich (1966) points out, and an alternate explanation is therefore required for the intermediate difficulty of the special restriction sentences.

For the sixteen examples cited by Howe and Hillman (1973, p. 134) case grammar provides such an explanation. The animate subject sentences are predominantly of the form Agent-Action-Object, while the animate object sentences are predominantly Instrumental-Action-Dative. The special restriction sentences represent a variety of Agent-Action-Object, Instrumental-Action-Object, and Agent-Action-Dative types. This analysis supports the hypothesis that the recall, evaluation and comprehension of more complex figures of speech may be predictable on the basis of which case arguments are violated, and more specifically, that objective case violations will be comprehended more readily and at a younger age than dative case violations.

If it is assumed that recall, liking and comprehension of language is biased by anthropocentrism as Howe and Hillman's study suggests, it can be predicted that violations of [-human] and [-animate] features will produce the most striking psychological effects because of the greater attention given to those features. The violations happen to correspond, roughly, to personification and animism (or animation), two common and popular forms of figurative thought. It seems unlikely, however, that just any personification or animism would be liked, but only those in which there is an appropriate relationship between terms. Hence, animism and personification were expected to be preferred figural forms only within
bounds prescribed by the structural quality of the relationship. Within high imagery metaphors with moderate inter-concept similarity personifications and animations were expected to be preferred, but within other figures there was less reason to expect differences between them and other types.

Examination of animation can be pursued in case grammar by systematically violating agentive and dative cases and comparing the effects of these violations with those obtained by violating cases with inanimate referents. Here, too, moderate and appropriate violation were expected to determine preferred figures by producing optimal cognitive arousal, and lower levels of violation to predict comprehension and recall performance by maintaining normal cognitive links. Adolescents in higher grades were expected to supercede those in lower grades in comprehension of all types of violations.

C. Limitations of Hypotheses, Interactions and Related Measures

The four hypotheses discussed here represent four ways of thinking about figurative thought, four ways of dividing the observable phenomena of expression so as to infer the unobservable processes that underlie them. Although developed independently here it is unlikely that any of the hypotheses alone can account adequately for responses to figurative expressions. Imagery, for instance, can give no account of how more abstract figures operate, and so a verbal or cognitive hypothesis needs to be invoked for rationalizing response differences amongst abstract figures. Likewise, case grammars, in their present state of development, can neither explain nor predict responses to subtler semantic violations as in

(48) The idea melted

where "idea" violates none of the listed case restrictions for the verb
"melted" yet is, nevertheless, unacceptable, or as in Weinreich's (1966) example:

(49) Mice chase cats.  

As has been pointed out, grammatical subject and object categories also obscure important semantic relations, and the structural theory, too, provides only a most general handling of more complex figures. A theory which would integrate the strengths of each of the hypotheses used here would thus be most valuable.

In a sense the structural hypothesis is the more general of the four considered here since the integrative relations that it specifies (similarity, contiguity, hierarchy) can apply variously to images, lexical entries, case categories and other structural relations. What it does not do yet, but potentially could do, is incorporate that vast range of relations represented by verbals in linguistic systems. The linguistic hypotheses can, therefore, be seen as extensions and refinements of a more general theory of structural relations.

The imagery hypothesis seems completely compatible with the structural hypothesis and amenable to being subsumed within it. Two mental images can be contiguous to one another in time, can be assessed of their similarity, can be integrated into a whole and can even be conceived in hierarchical relationship to one another as, for example, if we imagine a cat and a class to which it belongs, such as the class of animals, possibly visualized as a collection of various animals. In addition, some of the structural concepts themselves, notably hierarchy, are readily conceived in a graphic way. What the imagery hypothesis uniquely provides is an explanation of our rapid way of dealing with synchronously organized structures. What the structural system does is provide a primitive
geometry for the imaginal system. Ultimately, the adequate explanation of figurative language rests upon thorough logical and psycho-logical explorations and mappings of semantic space, tasks likely to entail an extensive expansion and systematization of existing semantic categories (e.g., Maranda & Kögås Maranda, Note 5; Maranda, Taylor & Flynn, Note 6).

At this early stage of theoretical development effects of interactions amongst the various factors--structure, imagery, features and case relations--were extremely difficult to anticipate. As a result, the only specific interaction for which there were a priori expectations was that relating to high imagery metaphors. The expectation was that those high imagery metaphors which had moderate similarity between their components would be better liked than those with either more or less similarity.

A number of studies had examined semantic similarity with a method different from that used here, namely, by observing reaction time to judgements about word relations (Collins & Quillian, 1969, 1972; Rips, Shoben, and Smith, 1973; Rumelhart & Abrahamson, 1973; Schaeffer & Wallace, 1970). The relations so examined are commonly hierarchical as, for example, amongst the terms "animal", "bird" and "robin", and reaction times to statements like "A robin is a bird" or "A robin is an animal" are taken as a measure of the distance between the terms in an abstract semantic space. Mathematical techniques can then be applied to examine the implicit structures of relations for a given collection of words. The same mathematical techniques (multidimensional scaling and hierarchical clustering analyses) can be applied to other measures of semantic similarity (Anglin, 1970; Fillenbaum & Rapoport, 1971; Henley, 1969; Storm, 1975) to reveal relations amongst terms. In the case of figurative language there need be less concern about the interrelations amongst many words than about those
between a few words. That is, concern is for a vector of semantic
distances between two concepts along several dimensions.

These various investigations of reaction time generally revealed
structures that accord with intuition about the terms involved (at least
in the case of adults). Since a variety of measures of similarity
yielded similar structures it appeared unnecessary to introduce reaction
time experiments into the proposed study but to use instead subjective
judgements of similarity. Since the study was only concerned with pairs
of words, no mathematical analysis of interrelations was considered
necessary.

The controlled factors and criterial measures used in this study were
selected from the many measures of verbal materials that have been shown to
be predictive of human response to such materials. Measures such as rated
meaningfulness (m), rated familiarity (f), and objective frequency of
occurrence (F) within a given corpus have been the most commonly studied
(Carroll, Davies, & Richman, 1971; Paivio, 1971b; Paivio, Yuille, &
Madigan, 1968). The Semantic Differential (Osgood, Suci, & Tannenbaum,
1957), which provides measures of emotive meaning of symbolic materials
has also been widely used and a variety of attempts have been made to
construct measures which could supplement the stronger predictors such as
imagery. Kintsch's "lexical complexity" (1972a, 1972b) and Kamman and
Streeter's conception of two types of abstractness (1971) fall into this
category.

Clearly, not all of these variables could be manipulated meaning-
fully in a single study. The variables discussed in the preceding sec-
tions, therefore, were chosen to constitute the independent variables in
the proposed investigation. Control or randomization of additional
psychological correlates was attempted wherever feasible, but for the most part they were left to vary arbitrarily.
CHAPTER III

METHODOLOGY

A. Study I: Nominal-Copula-Nominal Figures

1. Design and Materials

List 1: Variations in Structure, Imagery and Semantic Feature Violations

Table I lists the 24 nominal-copula-nominal figures used in the $3 \times 4 \times 2$ repeated measures design. The first factor was the relationship between the nominals (metonymic, synecdochic, or metaphorical); the second factor represented four possible combinations of high ($I > 4.0$) and low ($I < 4.0$) imagery pairs; the third factor separated figures involving human features in the second concept from those involving all other features. With the exception of items 14 and 16, all of those involving human features involved personification (that is, violation of the [-human] feature of the first nominal). Items 14 and 16 involved personification only in the logically trivial sense since in each case the first nominal was already personified (that is, marked by the [+human] feature). All nouns for the items were chosen from a list of 2,448 words provided by Paivio (Note 7). The nouns used had moderate familiarity ratings ($2.5 < f < 7.0$) and represented what was intuitively judged to be a wide range of interconcept similarities.

Four types of responses were recorded for each item—recall, liking, comprehension, and inter-concept similarity scores.
<table>
<thead>
<tr>
<th>Item</th>
<th>Figure</th>
<th>Structural Relation</th>
<th>Concept Imagery</th>
<th>Semantic Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>An answer is a problem.</td>
<td>Metonym</td>
<td>LL</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>A cost is a patron.</td>
<td>Metonym</td>
<td>LL</td>
<td>H</td>
</tr>
<tr>
<td>3</td>
<td>Negligence is poverty</td>
<td>Metonym</td>
<td>LH</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Evidence is a criminal.</td>
<td>Metonym</td>
<td>LH</td>
<td>H</td>
</tr>
<tr>
<td>5</td>
<td>A wall is an entry.</td>
<td>Metonym</td>
<td>HL</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>A building is a creator.</td>
<td>Metonym</td>
<td>HL</td>
<td>H</td>
</tr>
<tr>
<td>7</td>
<td>A ship is an ocean.</td>
<td>Metonym</td>
<td>HH</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>A dollar is a banker.</td>
<td>Metonym</td>
<td>HH</td>
<td>H</td>
</tr>
<tr>
<td>9</td>
<td>A quantity is a bonus.</td>
<td>Synecdoche</td>
<td>LL</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>Deceit is a charlatan.</td>
<td>Metonym</td>
<td>LL</td>
<td>H</td>
</tr>
<tr>
<td>11</td>
<td>Welfare is food.</td>
<td>Metonym</td>
<td>LH</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>Wisdom is a monk.</td>
<td>Metonym</td>
<td>LH</td>
<td>H</td>
</tr>
<tr>
<td>13</td>
<td>A book is a reminder.</td>
<td>Metonym</td>
<td>HL</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>An owner is a wholesaler.</td>
<td>Metonym</td>
<td>HL</td>
<td>H</td>
</tr>
<tr>
<td>15</td>
<td>Winter is snow.</td>
<td>Metonym</td>
<td>HH</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>A minstrel is a musician.</td>
<td>Metonym</td>
<td>HH</td>
<td>H</td>
</tr>
<tr>
<td>17</td>
<td>An obsession is a franchise.</td>
<td>Metonym</td>
<td>LL</td>
<td>0</td>
</tr>
<tr>
<td>18</td>
<td>Chance is an originator.</td>
<td>Metonym</td>
<td>LL</td>
<td>H</td>
</tr>
<tr>
<td>19</td>
<td>An increment is a saloon.</td>
<td>Metonym</td>
<td>LH</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>Hatred is a glutton.</td>
<td>Metonym</td>
<td>LH</td>
<td>H</td>
</tr>
<tr>
<td>21</td>
<td>A skillet is a magnitude.</td>
<td>Metonym</td>
<td>HL</td>
<td>0</td>
</tr>
<tr>
<td>22</td>
<td>A horse is an eccentric.</td>
<td>Metonym</td>
<td>HL</td>
<td>H</td>
</tr>
<tr>
<td>23</td>
<td>A thicket is a city.</td>
<td>Metonym</td>
<td>HH</td>
<td>0</td>
</tr>
<tr>
<td>24</td>
<td>An avalanche is an acrobat.</td>
<td>Metonym</td>
<td>HH</td>
<td>H</td>
</tr>
</tbody>
</table>

\(^aL=\text{low}; \ H=\text{high.}\) \(^bO=\text{other than human}; \ H=\text{human.}\)
Items were tape-recorded in different random orders for each of two study and two recall trials. The taped instructions which preceded each study trial are transcribed in Appendix A along with instructions for the other tasks.

A seven-point likeability rating scale was prepared with the 24 items listed randomly on a single sheet. The scale ranged from a rating of 1 (DISLIKE VERY MUCH) to a rating of 7 (LIKE VERY MUCH). These terminal scale meanings appeared on the response sheets and intermediate positions were printed on the blackboard as (2) DISLIKE MODERATELY, (3) DISLIKE A LITTLE, (4) NEITHER LIKE NOR DISLIKE, (5) LIKE A LITTLE, (6) LIKE MODERATELY. The likeability rating scale for List 1 appears as Appendix B.

A comprehension scale was developed according to the structural principles outlined previously. The original items were examined independently by three graduate students and some ambiguities thereby removed. Items and options were randomly ordered and mimeographed in a four-page booklet. A separate glossary containing meanings for the more difficult words in the figures was prepared for use with the comprehension scale. The comprehension scale and glossary for List 1 are reproduced as Appendices C and D.

A 5-point rating scale was also developed for assessing the similarity between the concepts in List 1. Ratings ranged from VERY LOW (1), through LOW (2), MODERATE (3), HIGH (4) to VERY HIGH (5) similarity. More categories were judged to be meaningless and fewer to lack discriminatory power. The inter-concept similarity rating scale is provided as Appendix E.

Appendix F records the random orders of items for the various tasks.
List 2: High Imagery Metaphors with Variations in Inter-Concept Similarity and Semantic Feature Violations

A second list using only high imagery nouns was constructed as a hedge against the possibility that the abstract nouns of List 1 would screen the expected effects of inter-concept similarity on likeability scores. Table II shows the 24 figures used in the $3 \times 2$ factorial design with four replications within each cell. The first factor was comprised of three levels of inter-concept similarity established intuitively by the investigator. For items 1 through 15 and 17 through 20 the second factor separated personifications (violations of the [-human] feature of the first nominal) from figures entailing other types of semantic violation. For items 16, and 21 through 24 personification occurred only in the trivial sense. All nouns had a rated imagery, $I$, greater than or equal to 4.0.

A seven-point likeability rating scale similar to that used for List 1 was constructed and mimeographed on a single sheet. This scale appears as Appendix G.

2. Subjects

The abstract nature of the tasks implied that only individuals with relatively advanced cognitive skills would be able to cope with them. Consequently, high-school students were sought from relatively high SES areas. Three grade levels of students from two West Vancouver schools became available. The three levels (grades 8, 9 and 10) permitted a between-groups factor representing academic achievement to be added to the design. This grade control, it was assumed, would provide a rough indicator of age and developmental level combined. For the recall, liking and comprehension measures 27 grade eight, 50 grade nine and 21 grade ten students from English classes participated in the study. Inter-concept
# TABLE II

Properties of the High Imagery Metaphors (List 2)

<table>
<thead>
<tr>
<th>Item</th>
<th>Figure</th>
<th>Inter-concept Similarity</th>
<th>Controlled Features of Second Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A cigar is a shoulder.</td>
<td>Low</td>
<td>Non-human</td>
</tr>
<tr>
<td>2</td>
<td>A mountain is a strawberry.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>A flask is a tower.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>An iceberg is a bagpipe.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>A potato is a minstrel.</td>
<td>Low</td>
<td>Human</td>
</tr>
<tr>
<td>6</td>
<td>A code is a henchman.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>A ship is a grocer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>An apple is a butler.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>A city is a thicket.</td>
<td>Moderate</td>
<td>Non-human</td>
</tr>
<tr>
<td>10</td>
<td>A horse is an engine.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Fingers are tweezers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>A tortoise is a tank.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>An avalanche is an acrobat.</td>
<td>Moderate</td>
<td>Human</td>
</tr>
<tr>
<td>14</td>
<td>An accordion is a singer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>An octopus is a busybody.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>A soldier is a butcher.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>A lobster is a scorpion.</td>
<td>High</td>
<td>Non-human</td>
</tr>
<tr>
<td>18</td>
<td>A dog is a cat.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>A car is a truck.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>A typhoon is a hurricane.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>A sultan is a baron.</td>
<td>High</td>
<td>Human</td>
</tr>
<tr>
<td>22</td>
<td>A nun is a monk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>A doctor is a nurse.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>A teacher is a professor.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
similarity ratings were obtained from an independent sample of two grade eight English classes comprised of 63 students. Beyond grade, no further subject controls (e.g., sex or school) were introduced, primarily because the main concerns of the study were with task variables. Roughly equal numbers of males and females participated, complete classes being used in every case.

The same 63 grade eight students who provided inter-concept similarity ratings for List 1 provided likeability ratings for List 2 figures.

3. Procedures

List 1

Data were collected over two class periods spaced from two to seven days apart. In the first session, each class was given a brief introduction to the nature of the study and then asked to listen to the taped instructions. Questions were then answered, answer sheets for the recall task distributed and the first study and recall trial begun. Answer sheets were collected, new ones distributed and the second study and recall task conducted. This procedure took between 30 and 40 minutes. Study trials were spaced with a five-second interval between the end of one item and the beginning of the next. Test trials consisted of the first nominal and copula for each item presented at ten-second intervals. Between the study and test trials subjects were required to count backwards out loud from 50. This counting was also included on the tape for 30 seconds. Its intent was to minimize effects of short term memory storage.

In the second session, classes listened to the taped instructions for the likeability rating task and the categories were listed on the blackboard. The likeability rating scales were then distributed, completed and collected. This procedure took about ten minutes. Finally,
the comprehension scale and glossary were distributed, taped instructions
played, the example on the front page of the scale completed and the task
begun. All students were allowed sufficient time to finish, none
requiring more than 20 minutes.

The two grade eight classes who completed the similarity rating
scale for List 1 received a verbal introduction and then listened to the
taped instructions for the task. The scale was then distributed, com­
pleted and collected. These procedures took about fifteen minutes per
class.

The tasks were presented in such an order as to ensure equal study
time per item for each individual prior to recall, and to maximize contact
with the figures prior to the comprehension task.

List 2

Immediately following completion of the similarity rating scale the
two grade eight classes were played the taped instructions for the like­
ability rating scale and the response categories were written on the black­
board. The likeability rating scale for List 2 was then distributed,
completed and collected, the procedures again taking about fifteen minutes
per class.

4. Scoring

Students were credited with the score of 1 for the correct noun on
the second recall test trial and 0 for any other response on that trial
including synonyms of the correct noun. Incorrectly spelled words that
were still recognizeable were deemed correct.

The likeability and similarity rating scales were scored in a
straightforward manner, each item receiving a score from 1 to 7 and 1 to 5,
respectively, and blank records assigned the neutral ratings of 4 and 3,
respectively.

The comprehension scale was scored in two ways. Initially, the frequency of choice of each response option for each item was recorded within each grade. For the second scoring, choice of metaphoric options was given more credit than choice of other options because the linguistic frame biased the best meaning toward the metaphoric. Consequently, options based on major similarities between concepts were given the score of 4 and those based on minor similarities the score of 3. Because the linguistic frame also favored the synecdochal interpretation this option was given the score of 2, the metonymic response the score of 1 and absence of response the score of 0.

B. Study II: Nominal-Verb-Nominal Figures with Variations in Case Violations and Imagery

1. Design and Materials

Table III lists the 24 items used in the $3 \times 8$ repeated measures design. The first factor represented three categories of case violations: agentive alone, agentive and objective, and agentive and dative. The second factor represented the eight possible combinations of high and low word imagery. Items were constructed from terms with moderate $f$ ratings and what was judged to be a wide range of inter-concept similarity, hierarchic and contiguity relations.

Recall, liking and comprehension scores were recorded for each item. As in Study I, instructions (Appendix A) and items were tape-recorded in various random orders for each of two study and two recall trials.

A likeability rating scale, identical in form to that used for List 1, was also constructed for List 3 (Appendix H).
<table>
<thead>
<tr>
<th>Item</th>
<th>Figure</th>
<th>Case Violations</th>
<th>Concept Imagery\textsuperscript{a}</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mastery establishes justice.</td>
<td>Agentive</td>
<td>LLL</td>
</tr>
<tr>
<td>2</td>
<td>The item indicates the cheese.</td>
<td>Agentive</td>
<td>LLH</td>
</tr>
<tr>
<td>3</td>
<td>The agreement speaks the deceit.</td>
<td>Objective</td>
<td>LHL</td>
</tr>
<tr>
<td>4</td>
<td>The salt bans the trade.</td>
<td>High</td>
<td>HLL</td>
</tr>
<tr>
<td>5</td>
<td>The assumption climbs the tree.</td>
<td>High</td>
<td>LHH</td>
</tr>
<tr>
<td>6</td>
<td>The jelly obtains the sugar.</td>
<td>High</td>
<td>HHL</td>
</tr>
<tr>
<td>7</td>
<td>The basin whimpers the idea.</td>
<td>High</td>
<td>HHH</td>
</tr>
<tr>
<td>8</td>
<td>The hammer sketches the lumber.</td>
<td>High</td>
<td>HHH</td>
</tr>
<tr>
<td>9</td>
<td>The perception abandons the incident.</td>
<td>Agentive</td>
<td>LLL</td>
</tr>
<tr>
<td>10</td>
<td>The idea permits the sky. and</td>
<td>Objective</td>
<td>LHL</td>
</tr>
<tr>
<td>11</td>
<td>Truth folds the advantage.</td>
<td>Objective</td>
<td>LHL</td>
</tr>
<tr>
<td>12</td>
<td>The piano condemns boredom.</td>
<td>High</td>
<td>HLL</td>
</tr>
<tr>
<td>13</td>
<td>The illusion tramples the mirage.</td>
<td>High</td>
<td>LHH</td>
</tr>
<tr>
<td>14</td>
<td>The lantern attends the cellar.</td>
<td>High</td>
<td>HHL</td>
</tr>
<tr>
<td>15</td>
<td>The earth caresses the emotion.</td>
<td>High</td>
<td>HHH</td>
</tr>
<tr>
<td>16</td>
<td>The balloon crinkles the air.</td>
<td>High</td>
<td>HHH</td>
</tr>
<tr>
<td>17</td>
<td>The quality defeats the description.</td>
<td>Agentive</td>
<td>LLL</td>
</tr>
<tr>
<td>18</td>
<td>The estimate flatters the cost. and</td>
<td>Agentive</td>
<td>LLL</td>
</tr>
<tr>
<td>19</td>
<td>The length cheers the origin.</td>
<td>Dative</td>
<td>LHL</td>
</tr>
<tr>
<td>20</td>
<td>The decoy encourages the position.</td>
<td>Dative</td>
<td>HLL</td>
</tr>
<tr>
<td>21</td>
<td>Ignorance interviews the jungle.</td>
<td>Low</td>
<td>LHH</td>
</tr>
<tr>
<td>22</td>
<td>The pebble ousts the river.</td>
<td>Low</td>
<td>LHH</td>
</tr>
<tr>
<td>23</td>
<td>The prairie questions the distinction.</td>
<td>Low</td>
<td>HHL</td>
</tr>
<tr>
<td>24</td>
<td>The daffodil cripples the shadow.</td>
<td>High</td>
<td>HHH</td>
</tr>
</tbody>
</table>

\textsuperscript{a}L = low imagery rating; H = high imagery rating.
Following the principles of abstraction and integration that had been suggested as fundamental in the understanding of more complex figures of speech, a multiple choice comprehension scale was developed for the items in List 3. Items were again examined by three graduate students, improvements incorporated, and both items and options randomized before being mimeographed and combined into a four-page booklet. Again, a separate glossary for the more difficult words was prepared. The comprehension scale and glossary for List 3 are reproduced as Appendices J and K, and the random orders used in each task recorded in Appendix L.

2. Subjects

Different students from the same schools as those participating in Study I participated in Study II. For Study II, 26 grade eight, 36 grade nine and 17 grade ten students from English classes took part.

3. Procedures

Procedures were identical to those used for the recall, liking and comprehension aspects of Study I. Recall test trials presented only the first nominal for each item.

4. Scoring

Recall, likeability and comprehension scores were recorded for each individual on each item of List 3 in a manner similar to that employed for List 1. Recall was only credited when both verb and noun were correctly recalled. Changes of verb tense and pluralizations of nouns were credited. Response options for the comprehension task were weighted as follows: abstract integrated option, 4 points; concrete integrated option, 3 points; abstract non-integrated option, 2 points; concrete non-integrated option, 1 point; no response, 0 points.
CHAPTER IV

RESULTS

A. Study I

Tables IV through VII detail the mean recall, likeability and comprehension scores for each grade, structure, imagery, semantic feature and inter-concept similarity level of the List 1 materials. The statistical significance of the differences displayed in score distributions was assessed in two ways. Because recall scores for individual items were discontinuous data (1 or 0), and because an individual item sometimes represented a factor level of interest, comparisons amongst cell frequencies were first assessed non-parametrically with the maximum likelihood $\chi^2$ statistic (Bock, 1975, pp. 551-552; Bock & Yates, 1973). These are reported in Table VIII.

For the purposes of comparing recall scores with other measures it was assumed that all scores were drawn from larger populations of normally distributed scores. The validity of this assumption was supported by goodness of fit tests which indicated that the distributions of scores over all factors did not deviate significantly from normality. For recall, $\chi^2(13) = 13.46$, $p > .05$; Kolmogorov-Smirnov $D = .056$, $p > .05$. For likeability, $\chi^2(21) = 21.31$, $p > .05$; $D = .035$, $p > .05$. For comprehension, $\chi^2(19) = 29.57$, $p > .05$; $D = .09$, $p > .05$. For similarity ratings, $\chi^2(16) = 25.81$, $p > .05$; $D = .05$, $p > .05$.

For comparisons amongst the stimulus factors cell sizes were equal
### TABLE IV
Mean Scores for List 1 Figures by Embedded Structural Relations

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Grade</th>
<th>Structure</th>
<th></th>
<th></th>
<th></th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Metonym</td>
<td>Synecdoche</td>
<td>Metaphor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recall&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8</td>
<td>5.48</td>
<td>4.67</td>
<td>3.52</td>
<td>13.67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>5.76</td>
<td>5.42</td>
<td>4.32</td>
<td>15.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>6.14</td>
<td>5.67</td>
<td>5.33</td>
<td>17.14</td>
<td></td>
</tr>
<tr>
<td>All Mean</td>
<td></td>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td>15.35</td>
</tr>
<tr>
<td>Grades sd</td>
<td></td>
<td>(1.40)</td>
<td>(1.33)</td>
<td>(1.85)</td>
<td>(3.72)</td>
<td></td>
</tr>
<tr>
<td>Likeability&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8</td>
<td>35.70</td>
<td>35.11</td>
<td>32.18</td>
<td>103.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>37.52</td>
<td>36.02</td>
<td>33.66</td>
<td>107.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>38.95</td>
<td>36.86</td>
<td>32.71</td>
<td>108.52</td>
<td></td>
</tr>
<tr>
<td>All Mean</td>
<td></td>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td>106.33</td>
</tr>
<tr>
<td>Grades sd</td>
<td></td>
<td>(7.08)</td>
<td>(5.47)</td>
<td>(6.56)</td>
<td>(14.75)</td>
<td></td>
</tr>
<tr>
<td>Comprehension&lt;sup&gt;c&lt;/sup&gt;</td>
<td>8</td>
<td>20.92</td>
<td>22.22</td>
<td>25.04</td>
<td>68.18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>21.68</td>
<td>22.20</td>
<td>25.40</td>
<td>69.28</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>21.95</td>
<td>22.33</td>
<td>25.81</td>
<td>70.10</td>
<td></td>
</tr>
<tr>
<td>All Mean</td>
<td></td>
<td>Mean</td>
<td></td>
<td></td>
<td></td>
<td>69.15</td>
</tr>
<tr>
<td>Grades sd</td>
<td></td>
<td>(4.41)</td>
<td>(3.41)</td>
<td>(3.10)</td>
<td>(7.83)</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Total possible per cell = 8; marginals = 24

<sup>b</sup>Total possible per cell = 56; marginals = 168

<sup>c</sup>Total possible per cell = 32; marginals = 96
### TABLE V
Mean Scores for List 1 Figures
by Imagery Levels

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Grade</th>
<th>Imagery Levels</th>
<th>LL</th>
<th>LH</th>
<th>HL</th>
<th>HH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall</td>
<td>8</td>
<td>1.44</td>
<td>3.26</td>
<td>3.63</td>
<td>5.33</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>2.10</td>
<td>3.48</td>
<td>4.28</td>
<td>5.64</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>2.05</td>
<td>4.43</td>
<td>5.00</td>
<td>5.67</td>
<td></td>
</tr>
<tr>
<td>All Mean Grades sd</td>
<td></td>
<td>1.91 (1.30)</td>
<td>3.62 (1.41)</td>
<td>4.26 (1.55)</td>
<td>5.56 (.75)</td>
<td></td>
</tr>
<tr>
<td>Likeability</td>
<td>8</td>
<td>23.92</td>
<td>23.89</td>
<td>25.11</td>
<td>30.07</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>25.00</td>
<td>26.62</td>
<td>26.28</td>
<td>29.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>24.10</td>
<td>27.05</td>
<td>26.71</td>
<td>30.67</td>
<td></td>
</tr>
<tr>
<td>All Mean Grades sd</td>
<td></td>
<td>24.51 (4.75)</td>
<td>25.96 (5.65)</td>
<td>26.05 (4.83)</td>
<td>29.81 (6.03)</td>
<td></td>
</tr>
<tr>
<td>Comprehension</td>
<td>8</td>
<td>16.81</td>
<td>17.26</td>
<td>16.96</td>
<td>17.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>17.30</td>
<td>17.46</td>
<td>16.92</td>
<td>17.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>17.38</td>
<td>17.38</td>
<td>17.43</td>
<td>17.90</td>
<td></td>
</tr>
<tr>
<td>All Mean Grades sd</td>
<td></td>
<td>17.18 (2.96)</td>
<td>17.39 (3.16)</td>
<td>17.04 (3.54)</td>
<td>17.54 (2.21)</td>
<td></td>
</tr>
</tbody>
</table>

---

*a* Total possible per cell = 6  
*b* Total possible per cell = 42  
*c* Total possible per cell = 24  
*d* L = low imagery rating; H = high imagery rating
### TABLE VI

Mean Scores for List 1 Figures by Semantic Feature Violations

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Grade</th>
<th>Feature Violations</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Non-human (0)</td>
<td>Human (H)</td>
<td></td>
</tr>
<tr>
<td>Recall&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8</td>
<td>7.15</td>
<td>6.52</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>8.38</td>
<td>7.12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>9.24</td>
<td>7.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All Grades Mean</td>
<td>8.22 (2.04)</td>
<td>7.12 (2.01)</td>
<td></td>
</tr>
<tr>
<td>Likeability&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8</td>
<td>51.48</td>
<td>51.52</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>54.42</td>
<td>52.78</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>54.62</td>
<td>53.90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All Grades Mean</td>
<td>53.65 (8.33)</td>
<td>52.67 (8.28)</td>
<td></td>
</tr>
<tr>
<td>Comprehension&lt;sup&gt;c&lt;/sup&gt;</td>
<td>8</td>
<td>34.15</td>
<td>34.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>35.12</td>
<td>34.16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>34.90</td>
<td>35.19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All Grades Mean</td>
<td>34.81 (4.39)</td>
<td>34.34 (4.86)</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Total possible per cell = 12

<sup>b</sup>Total possible per cell = 84

<sup>c</sup>Total possible per cell = 48
TABLE VII

Mean Scores for List 1 Figures by Inter-concept Similarity

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Grade</th>
<th>Inter-concept Similarity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>low</td>
</tr>
<tr>
<td>Recall&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8</td>
<td>1.92</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>2.48</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>3.43</td>
</tr>
<tr>
<td></td>
<td>All Grades</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sd</td>
</tr>
<tr>
<td>Likeability&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8</td>
<td>22.30</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>23.30</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>22.62</td>
</tr>
<tr>
<td></td>
<td>All Grades</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sd</td>
</tr>
<tr>
<td>Comprehension&lt;sup&gt;c&lt;/sup&gt;</td>
<td>8</td>
<td>17.37</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>17.76</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>18.05</td>
</tr>
<tr>
<td></td>
<td>All Grades</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sd</td>
</tr>
</tbody>
</table>

<sup>a</sup>Total possible per cell = 6

<sup>b</sup>Total possible per cell = 42

<sup>c</sup>Total possible per cell = 24
<table>
<thead>
<tr>
<th>Cells Contrasted</th>
<th>Likelihood Component</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Metonyms &gt; synecdoches &amp; metaphors</td>
<td>12.27**</td>
<td>1</td>
</tr>
<tr>
<td>2. Synecdoches &gt; metaphors</td>
<td>3.30</td>
<td>1</td>
</tr>
<tr>
<td>3. Imagery: HH &gt; (HL,LH,LL)</td>
<td>182.06**</td>
<td>1</td>
</tr>
<tr>
<td>4. Imagery: (HL &amp; LH) &gt; LL</td>
<td>48.90**</td>
<td>1</td>
</tr>
<tr>
<td>5. Imagery: HL &gt; LH</td>
<td>6.90*</td>
<td>1</td>
</tr>
<tr>
<td>6. Features: Non-human &gt; Human</td>
<td>9.18*</td>
<td>1</td>
</tr>
</tbody>
</table>

7. Negative quadratic trend over four similarity levels | 3.13                 | 1  |

8. Positive linear trend over four similarity levels   | 82.26**              | 1  |

**Note.** Contrasts 1 through 6 are those of theoretical relevance from a full model of 23 orthogonal contrasts amongst response factors across grades. Contrasts 7 and 8 are from a separate analysis using only three orthogonal contrasts. The eight contrasts include the only statistically significant ones from amongst all grade and response factor comparisons.

*_{p} < .05

**_{p} < .01
and large \((N = 98)\) and variances were sufficiently homogeneous that adjustment (Box, 1954; Myers, 1972) made no change in the significance of the relevant \(F\)-statistics. Since all necessary assumptions were therefore met, scores were subjected to multivariate analysis of variance procedures (Finn, 1972, 1974). For comparisons between grades distributions were assumed to be normal and variances homogeneous. Although cell sizes were unequal \((27, 50, 21)\), the likelihood of this assumption being valid was improved by the fairly large sample size of 98.

Twenty-one orthogonal contrasts amongst the repeated measures were examined across and between grades for the initial analysis of variance. Across grades this analysis produced a multivariate \(F(21,75) = 1039.87, p < .001\). Linear and quadratic trends over grade proved to be non-significant, \(F(21,75) = 1.14\) and \(F(21,75) = .53\), respectively.

A second multivariate analysis using nine orthogonal contrasts based on the inter-concept similarity levels of the items was performed on the same data. Across grades there were overall significant differences, \(F(9,87) = 1761.14, p < .001\), but between grades multivariate differences were again non-significant, \(F = 1.36\) and \(F = 1.30\) for the first and second Helmert-type contrasts between grades, (i.e., eight versus nine and ten, and nine versus ten).

Following Hummel and Sligo (1971) and Finn (1974, p. 156) wherever there are significant multivariate \(F\) ratios the univariate \(F\) ratios for each contrast were inspected to determine the source of the variation. These are reported in Table IX.

Although slightly different contrasts were used, comparison of the non-parametric analysis and the analyses of variance for recall indicates that the former provides more conservative tests of the significance of
### TABLE IX
Results of Analyses of Variance for List 1 Recall, Likeability and Comprehension Scores

<table>
<thead>
<tr>
<th>Cells Contrasted (combined grades)</th>
<th>Recall</th>
<th></th>
<th></th>
<th>Likeability</th>
<th></th>
<th></th>
<th>Comprehension</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MS</td>
<td>F</td>
<td>MS</td>
<td>F</td>
<td>MS</td>
<td>F</td>
<td>MS</td>
<td>F</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Metonyms &amp; synecdoches &gt; metaphors&lt;sup&gt;a&lt;/sup&gt;</td>
<td>563.52</td>
<td>57.96***</td>
<td>5,042.95</td>
<td>26.28***</td>
<td>4,816.01</td>
<td>93.71***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Metonyms &gt; Synecdoches&lt;sup&gt;a&lt;/sup&gt;</td>
<td>24.50</td>
<td>13.65***</td>
<td>185.97</td>
<td>4.91*</td>
<td>48.58</td>
<td>2.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Imagery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. HH &gt; (HL,LH,LL)</td>
<td>4,663.02</td>
<td>423.48***</td>
<td>16,303.02</td>
<td>51.48***</td>
<td>100.01</td>
<td>1.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. (HL,LH) &gt; LL</td>
<td>1,616.37</td>
<td>215.37***</td>
<td>876.01</td>
<td>10.37**</td>
<td>.38</td>
<td>.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. HL &gt; LH</td>
<td>39.22</td>
<td>21.00***</td>
<td>.82</td>
<td>.02</td>
<td>11.80</td>
<td>.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Semantic Features</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Non-human &gt; human</td>
<td>119.02</td>
<td>46.61***</td>
<td>94.04</td>
<td>1.59</td>
<td>20.66</td>
<td>.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Similarity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Linear trend (positive)</td>
<td>6,694.89</td>
<td>295.62***</td>
<td>38,880.70</td>
<td>85.57***</td>
<td>986.95</td>
<td>6.33**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Quadratic trend&lt;sup&gt;b&lt;/sup&gt;</td>
<td>44.45</td>
<td>19.28***</td>
<td>200.00</td>
<td>3.66</td>
<td>202.87</td>
<td>6.50**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note.** H = high imagery, L = low imagery. For contrasts 1 through 6 multivariate $F_{(21,75)} = 1039.87$, $p < .0001$; for contrasts 7 and 8 multivariate $F_{(9,87)} = 1761.14$, $p < .0001$; d.f. for univariate $F$s are (1,95).

<sup>a</sup>The direction of this difference is reversed for Comprehension.

<sup>b</sup>For Recall the quadratic trend is positive; for Comprehension the trend is negative.

*p < .05; **p < .01; ***p < .001.
the effects. Under the analysis of variance assumptions, metonyms and
synecdoches were better recalled, as expected, than metaphors, and metonyms
better than synecdoches. Also as expected, items composed of high imagery
constituents were recalled better than those of low imagery constituents.
This was manifested by significantly increasing recall scores over low-low
(LL), low-high (LH), high-low (HL) and high-high (HH) imagery noun pairs.
Presence of human semantic feature violations resulted in lower scores
than presence of non-human feature violations.

Mean inter-concept similarity ratings ranged from 1.51 for item 21
to 4.40 for item 16. With the 24 items divided evenly into four levels
of rated similarity a significant positive linear trend appeared in recall
scores over the four levels from lowest to highest level of inter-concept
similarity. In the analysis of variance a significant positive quadratic
trend in recall was also recorded over similarity levels.

Students consistently reported liking the metonyms and synecdoches
better than the metaphors, and the metonyms better than the synecdoches.
Their preference for figures with a preponderance of high imagery
components was also statistically significant but type of feature viola-
tion had no significant effect on likeability ratings.

Likeability was also affected by inter-concept similarity level so
that there was a significant positive linear trend over the four cate-
gories from low to high similarity. The anticipated negative quadratic
trend did not materialize at a statistically significant level.

On the comprehension scale students proved to be responsive both to
the similarity-based meaning encouraged by the copular verb and to the
particular conceptual relation (contiguity, hierarchy or similarity)
embedded in each figure. Table X details the frequency and percentage of
TABLE X
Frequency and Percentage of Selection of Comprehension Scale
Response Options for List 1: Figures

<table>
<thead>
<tr>
<th>Grade</th>
<th>Embedded Conceptual Structure</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>none</td>
<td>contiguity</td>
</tr>
<tr>
<td>8</td>
<td>metonym</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>synecdoche</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>metaphor</td>
<td>8</td>
</tr>
<tr>
<td>n=648</td>
<td>total f</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>(3.1)</td>
</tr>
<tr>
<td>9</td>
<td>metonym</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>synecdoche</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>metaphor</td>
<td>1</td>
</tr>
<tr>
<td>n=1200</td>
<td>total f</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>(.8)</td>
</tr>
<tr>
<td>10</td>
<td>metonym</td>
<td>1</td>
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<tr>
<td></td>
<td>synecdoche</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>metaphor</td>
<td>2</td>
</tr>
<tr>
<td>n=504</td>
<td>total f</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>(.6)</td>
</tr>
</tbody>
</table>

All | metonym | 13 | 235 | 110 | 49 | 377 |
| synecdoche | 9 | 85 | 298 | 70 | 322 |
| metaphor | 11 | 65 | 162 | 85 | 461 |
| n=2352 | total f | 33 | 385 | 570 | 204 | 1160 |

Note. Underlined figures are those in expected high frequency cells.
selection of each comprehension scale option by grade and by the embedded conceptual structure and illustrates the overriding tendency for students to give responses based on major similarities to all items but especially metaphors, and secondary tendencies to respond on a contiguity basis to metonyms and on a hierarchical basis to synecdoches. No choice and choices based on minor inter-concept similarities proved to be less common responses for all students.

To assess the strength of these tendencies a measure was derived by contrasting the frequency of responses in the expected high frequency cell with the frequency of responses in the remaining cells for both structural and response option dimensions. \( \chi^2 \)-tests of the comparisons resulting from these Kronecker products representing the structure by response option interaction produce the following values: for contiguity response to metonyms compared with other responses, \( \chi^2(1) = 82.74, p < .001 \); for hierarchic response to synecdoches, \( \chi^2(1) = 62.65, p < .001 \); for minor similarity based responses to metaphors, \( \chi^2(1) = 4.58, p < .05 \); for major similarity based responses to metaphors, \( \chi^2(1) = 63.46, p < .001 \). These figures indicate that the observed responsiveness to the embedded structures is in fact statistically significant. Again, however, no significant grade differences appeared, although the percentages of contiguity responses to metonyms decreased with grade, and percentages of hierarchic responses to synecdoches and major similarity responses to metaphors both increased as predicted. These trends are illustrated in

---

4 For example, in assessing contiguity responses to metonyms the Kronecker product was formed by crossing the vector of structure factor coefficients (2, -1, -1) with the vector of response option coefficients (-1, 4, -1, -1, -1). This vector was then used to transform the observed frequencies in the data matrix for the \( \chi^2 \)-analysis.
Figure 1.

With the metaphorically weighted scoring system thus validated, examination of this kind of comprehension in light of the stimulus dimensions was possible (Table XI). Metaphors were significantly better understood than either metonyms or synecdoches combined, and neither of the latter was superior to the other. Furthermore, neither the imagery levels nor the human semantic features of the constituent nouns had significant effects on figure comprehension. Linear and negative quadratic trends in comprehension scores over similarity levels, however, were both statistically significant.

Finally, when mean scores for likeability, recall and comprehension were entered as the first three contrasts, step-down analysis indicated that the effects in terms of the three measures were relatively independent, $F(1,95) = 5093.71, p < .0001, F(1,94) = 10.55, p < .01, F(1,93) = 120.39, p < .0001$, respectively.

Item analyses of the scales (Nelson, 1974) showed them to have moderate internal consistency, the Hoyt estimates of reliability being .77 for recall, .71 for likeability, .58 for comprehension, and .72 for similarity. The lowest of these reflects the plurality of interpretations acceptable to students on the comprehension scale.

List 2 had been designed just in case the expected negative quadratic trend in likeability scores over similarity levels was obscured by other variables such as the variety of embedded structural relations or low imagery figure constituents. List 2 was comprised solely of metaphors with high imagery constituent nouns. Likeability scores were found to be distributed normally, $\chi^2(18) = 27.14, p > .05; D = .12$, $p > .05$, and across similarity levels the expected trend was clearly
Figure 1. Percentage of cases selecting each type of response option for List 1 Comprehension Scores.
present (Table XI). The source of a significant multivariate $F(3,60)$ of 18.27, $p < .0001$, was locatable as a negative quadratic trend $F(1,62) = 43.07$, $p < .001$, but there was neither significant linear trend, $F(1,62) = .07$, $p > .05$, nor effect due to human semantic feature violations, $F(1,62) = 3.61$, $p > .05$. Figure 2 compares the relative likeability scores of Lists 1 and 2 over similarity levels.

The Hoyt estimate of reliability for the List 2 likeability scale was .84, indicating good internal consistency.

B. **Study II**

Tables XII through XV summarize the mean recall, likeability and comprehension scores for the nominal-verb-nominal figures of List 3. As for List 1 both non-parametric and parametric methods (Tables XVI and XVII) were used for assessing the differences in recallability. The distribution of recall scores again did not differ significantly from a Normal distribution ($\chi^2(9) = 14.66$, $p > .05$) and so the two techniques produced comparable results, with the non-parametric method once again being the more conservative of the two.

The likeability rating and comprehension score distributions were both skewed left, $M_3 = -.437$ and $M_3 = -1.128$ respectively, and were both leptokurtic, $K_4 = 1.89$ and $K_4 = 2.15$ respectively, indicating that the figures were generally well liked and well comprehended. The skew and peakedness of the distributions resulted in the $\chi^2$-tests indicating significant departures from Normality but the Kolmogorov-Smirnov tests indicating non-significant departures (for likeability, $\chi^2(16) = 29.54$, $p < .05$; $D = .09$, $p > .05$; for comprehension, $\chi^2(17) = 38.72$, $p < .01$; $D = .09$, $p > .05$). Since variances were relatively homogeneous and the
TABLE XI
Likeability Scale Mean Scores for List 2 Figures

<table>
<thead>
<tr>
<th>Controlled Semantic Features of Second Concept</th>
<th>Inter-concept Similarity</th>
<th>low</th>
<th>medium</th>
<th>high</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-human Mean</td>
<td></td>
<td>15.49</td>
<td>18.11</td>
<td>14.11</td>
<td>47.71</td>
</tr>
<tr>
<td>sd</td>
<td></td>
<td>(5.04)</td>
<td>(4.66)</td>
<td>(4.28)</td>
<td>(10.0)</td>
</tr>
<tr>
<td>Human Mean</td>
<td></td>
<td>13.48</td>
<td>17.35</td>
<td>15.13</td>
<td>45.95</td>
</tr>
<tr>
<td>sd</td>
<td></td>
<td>(3.74)</td>
<td>(5.13)</td>
<td>(4.26)</td>
<td>(9.34)</td>
</tr>
<tr>
<td>Total Mean</td>
<td></td>
<td>28.97</td>
<td>35.46</td>
<td>29.24</td>
<td>93.67</td>
</tr>
<tr>
<td>sd</td>
<td></td>
<td>(7.52)</td>
<td>(8.32)</td>
<td>(7.58)</td>
<td>(17.94)</td>
</tr>
</tbody>
</table>

Note. Total possible score per cell = 28
Figure 2. Comparison of Relative Likeability Scores at different similarity levels for Lists 1 and 2 (Relative Likeability = Mean observed likeability score ÷ maximum possible likeability score × 100)
TABLE XII

Mean Scores for List 3 Figures by Case Violations

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Grade</th>
<th>Cases Violated</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>A+O</td>
<td>A+D</td>
<td>Totals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recall</td>
<td>8</td>
<td>1.54</td>
<td>1.96</td>
<td>1.27</td>
<td>4.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>1.72</td>
<td>2.08</td>
<td>1.19</td>
<td>5.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>1.76</td>
<td>2.53</td>
<td>2.00</td>
<td>6.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Mean</td>
<td>1.67</td>
<td>2.13</td>
<td>1.39</td>
<td>5.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades</td>
<td>sd</td>
<td>(1.06)</td>
<td>(1.35)</td>
<td>(1.35)</td>
<td>(2.83)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likeability</td>
<td>8</td>
<td>28.50</td>
<td>31.88</td>
<td>31.50</td>
<td>91.88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>29.67</td>
<td>34.53</td>
<td>33.33</td>
<td>97.53</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>35.00</td>
<td>39.65</td>
<td>39.53</td>
<td>114.18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Mean</td>
<td>30.43</td>
<td>34.76</td>
<td>34.06</td>
<td>99.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades</td>
<td>sd</td>
<td>(7.21)</td>
<td>(8.01)</td>
<td>(7.98)</td>
<td>(20.72)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comprehension</td>
<td>8</td>
<td>23.31</td>
<td>26.08</td>
<td>27.31</td>
<td>76.69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>24.22</td>
<td>27.22</td>
<td>25.39</td>
<td>76.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>26.12</td>
<td>27.60</td>
<td>28.23</td>
<td>82.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Mean</td>
<td>24.33</td>
<td>26.95</td>
<td>26.63</td>
<td>77.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades</td>
<td>sd</td>
<td>(3.42)</td>
<td>(3.79)</td>
<td>(3.36)</td>
<td>(8.29)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note.  A = Agentive case, 0 = objective case, D = Dative case.

\[\text{\textsuperscript{a}}\text{Total possible per cell = 8; marginals = 24}\]

\[\text{\textsuperscript{b}}\text{Total possible per cell = 56; marginals = 168}\]

\[\text{\textsuperscript{c}}\text{Total possible per cell = 32; marginals = 96}\]
The table shows mean recall scores for List 3 figures by component imagery levels across three grades. The scores are provided for each grade and include the overall mean and standard deviation (sd) for all grades. The note indicates that the total possible per cell is 3.

<table>
<thead>
<tr>
<th>Component Imagery Levels</th>
<th>Grade</th>
<th>All Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>LLL</td>
<td>.04</td>
<td>.22</td>
</tr>
<tr>
<td>LHL</td>
<td>.00</td>
<td>.14</td>
</tr>
<tr>
<td>LLH</td>
<td>.38</td>
<td>.39</td>
</tr>
<tr>
<td>LHH</td>
<td>.69</td>
<td>.53</td>
</tr>
<tr>
<td>HLL</td>
<td>.62</td>
<td>.72</td>
</tr>
<tr>
<td>HHL</td>
<td>.50</td>
<td>.30</td>
</tr>
<tr>
<td>HLH</td>
<td>.85</td>
<td>1.08</td>
</tr>
<tr>
<td>HHH</td>
<td>1.69</td>
<td>1.61</td>
</tr>
</tbody>
</table>

Note: Total possible per cell = 3
TABLE XIV
Likeability Scale Mean Scores for List 3 Figures
by Component Imagery Levels

<table>
<thead>
<tr>
<th>Component Imagery Levels</th>
<th>Grade 8</th>
<th>Grade 9</th>
<th>Grade 10</th>
<th>All Grades Mean</th>
<th>sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLL</td>
<td>11.08</td>
<td>11.47</td>
<td>14.24</td>
<td>11.94</td>
<td>(3.93)</td>
</tr>
<tr>
<td>LHL</td>
<td>9.46</td>
<td>10.17</td>
<td>13.65</td>
<td>10.68</td>
<td>(3.64)</td>
</tr>
<tr>
<td>LLH</td>
<td>11.42</td>
<td>11.72</td>
<td>13.06</td>
<td>11.91</td>
<td>(2.86)</td>
</tr>
<tr>
<td>HLL</td>
<td>11.54</td>
<td>11.72</td>
<td>13.12</td>
<td>11.96</td>
<td>(3.30)</td>
</tr>
<tr>
<td>HHL</td>
<td>10.15</td>
<td>10.64</td>
<td>13.18</td>
<td>11.02</td>
<td>(4.26)</td>
</tr>
<tr>
<td>HLH</td>
<td>12.92</td>
<td>13.53</td>
<td>14.24</td>
<td>13.48</td>
<td>(3.97)</td>
</tr>
<tr>
<td>HHH</td>
<td>13.08</td>
<td>14.75</td>
<td>16.59</td>
<td>14.59</td>
<td>(4.40)</td>
</tr>
</tbody>
</table>

Note. Total possible per cell = 21
TABLE XV

Comprehension Scale Mean Scores for List 3 Figures by Component Imagery Levels

<table>
<thead>
<tr>
<th>Component Imagery Levels</th>
<th>Grade 8</th>
<th>Grade 9</th>
<th>Grade 10</th>
<th>All Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLL</td>
<td>9.81</td>
<td>10.11</td>
<td>11.06</td>
<td>10.22</td>
</tr>
<tr>
<td>LHL</td>
<td>9.73</td>
<td>9.33</td>
<td>10.12</td>
<td>9.63</td>
</tr>
<tr>
<td>LLH</td>
<td>9.12</td>
<td>8.64</td>
<td>8.76</td>
<td>8.82</td>
</tr>
<tr>
<td>LHH</td>
<td>10.46</td>
<td>10.83</td>
<td>11.00</td>
<td>10.75</td>
</tr>
<tr>
<td>HLL</td>
<td>9.81</td>
<td>9.47</td>
<td>10.88</td>
<td>9.88</td>
</tr>
<tr>
<td>HHL</td>
<td>7.85</td>
<td>8.42</td>
<td>9.29</td>
<td>8.42</td>
</tr>
<tr>
<td>HLH</td>
<td>9.96</td>
<td>10.22</td>
<td>11.00</td>
<td>10.30</td>
</tr>
<tr>
<td>HHH</td>
<td>9.96</td>
<td>9.80</td>
<td>9.94</td>
<td>9.89</td>
</tr>
</tbody>
</table>

Note. Total possible per cell = 12
TABLE XVI
Non-parametric Analysis of List 3 Recall Data

<table>
<thead>
<tr>
<th>Cells Contrasted</th>
<th>Likelihood Component</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Two case violations &gt; one violation</td>
<td>.00</td>
<td>1</td>
</tr>
<tr>
<td>2. Objective case &gt; dative case</td>
<td>3.16</td>
<td>1</td>
</tr>
<tr>
<td>3. Imagery A: (LHH,HLH,HHL,HHH) &gt; (LLL,LLH,LHL,HLL)</td>
<td>61.37**</td>
<td>1</td>
</tr>
<tr>
<td>4. Imagery B: HHH &gt; (LHH,HLH,HHL)</td>
<td>119.70**</td>
<td>1</td>
</tr>
<tr>
<td>5. Imagery C: HLH &gt; (LHH,HHL)</td>
<td>17.06**</td>
<td>1</td>
</tr>
<tr>
<td>6. Imagery D: LHH &gt; HHL</td>
<td>8.71*</td>
<td>1</td>
</tr>
<tr>
<td>7. Imagery E: (HLL,LHL,LLH) &gt; LLL</td>
<td>11.36**</td>
<td>1</td>
</tr>
<tr>
<td>8. Imagery F: (HLL,LLH) &gt; LHL</td>
<td>12.07**</td>
<td>1</td>
</tr>
<tr>
<td>9. Imagery G: HLL &gt; LLH</td>
<td>2.00</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. These nine contrasts are those of most theoretical interest from a full model of 23 orthogonal contrasts.

*p < .05

**p < .01
## TABLE XVII

Results of Analyses of Variance for List 3 Recall, Likeability and Comprehension Scores

<table>
<thead>
<tr>
<th>Cells Contrasted (combined grades)</th>
<th>Recall(^a)</th>
<th>Likeability(^a)</th>
<th>Comprehension(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MS</td>
<td>(F(1,76))</td>
<td>MS</td>
</tr>
<tr>
<td><strong>Case</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Two violations &gt; one violation</td>
<td>2.84</td>
<td>.47</td>
<td>5008.11</td>
</tr>
<tr>
<td>2. Objective &gt; dative</td>
<td>44.06</td>
<td>20.01***</td>
<td>38.29</td>
</tr>
<tr>
<td><strong>Imagery</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. (HHH,HLH,HHL,HLL) &gt; (LHH,LLH,LHL,LLL)</td>
<td>471.51</td>
<td>122.35***</td>
<td>652.26</td>
</tr>
<tr>
<td>4. (LHH,LLH,LHL) &gt; LLL</td>
<td>47.10</td>
<td>21.96***</td>
<td>15.51</td>
</tr>
<tr>
<td>5. LHH &gt; (LLH,LHL)</td>
<td>35.56</td>
<td>15.97***</td>
<td>1761.13</td>
</tr>
<tr>
<td>6. LLH &gt; LHL</td>
<td>10.64</td>
<td>38.49***</td>
<td>119.10</td>
</tr>
<tr>
<td>7. (HHH,HLH,HHL) &gt; HLL</td>
<td>69.32</td>
<td>21.41***</td>
<td>816.66</td>
</tr>
<tr>
<td>8. HHH &gt; (HLH,HHL)</td>
<td>336.32</td>
<td>86.33***</td>
<td>1732.91</td>
</tr>
<tr>
<td>9. HLH &gt; HHL</td>
<td>30.39</td>
<td>26.97***</td>
<td>476.40</td>
</tr>
</tbody>
</table>

**Note.** HHL = high imagery noun, high imagery verb, low imagery noun (etc.)

\(^a\) Multivariate \(F(21,56) = 425.80, p < .0001\).

\(^b\) Multivariate \(F(9,68) = 17.43, p < .0001\).

\(*p < .05\)

\(**p < .01\)

\(***p < .001\)
total sample size was fairly large, it was judged that these minor departures from Normality would not seriously bias the results of the $F$-tests. Accordingly, multivariate analyses of variance were conducted as usual.

Because of computer program limitations two separate analyses of variance were used, one with 21 contrasts and one with nine contrasts. In both cases there was a significant overall effect across grades, multivariate $F(21,56) = 425.80, p < .0001$, and multivariate $F(9,68) = 17.43, p < .0001$.

Contrary to expectations the number of case violations involved in a figure had no significant bearing upon its recall, but objective case violations were better recalled than dative case violations, a superiority judged significant under the analysis of variance assumptions but non-significant under the more conservative $\chi^2$ analysis.

Contrasts with respect to imagery were formulated slightly differently in the parametric analysis than in the non-parametric analysis to permit a closer examination of the roles of number, order and grammatical form class of high and low imagery constituents, although the study was not designed to isolate these as fully crossed factors.

As expected, a relative surfeit of high imagery constituents in a figure strongly improved its recallability. On the whole, the presence of a high imagery cue noun also aided recall, although there were exceptions (e.g., Table XVI, contrasts 6 and 9). Consistently, high noun imagery facilitated recall more than high verb imagery did.

For likeability, two case violations were superior to one but there were no significant differences between double violations involving the objective case and double violations involving the dative case. A greater number of high imagery constituents usually corresponded to higher
likeability scores, high imagery cues facilitated likeability more than low imagery cues, and high imagery nouns were consistently superior to high imagery verbs in effecting likeability.

Distribution of comprehension scale response types (Table XVIII) showed that abstract and integrated responses prevailed, but further analysis that took into account item imagery levels (Table XIX) revealed that low imagery items received fewer integrated and fewer abstract responses than did high imagery items. Correspondingly, high imagery items received more integrated and more abstract responses than did low imagery items. Derived scores representing this interaction of item imagery levels with response integration and abstractness proved to be statistically significant ($\chi^2(1) = 15.22, p < .01$). The same interaction was also significantly different amongst grades (for grade eight versus grades nine and ten, $\chi^2(2) = 17.40, p < .01$; for grade nine versus grade ten, $\chi^2(3) = 18.34, p < .01$). As figure 3 clearly illustrates, grade differences can be attributed mainly to the distinct types of choices made by the grade ten students—more abstract integrated responses and correspondingly fewer concrete integrated responses. As was the case for List 1, the distribution of responses validated, to some extent, the proposed comprehension scale scoring system.

Under this scoring two case violations resulted in better comprehension than a single case violation, but there was no significant difference in comprehension between objective and dative case violations.

The number of high imagery elements in a figure was not a consistent

---

5 A product was formed by crossing the vector of coefficients for low-high imagery levels (-1, -1, -1, -1, 1, 1, 1, 1) with the vector of response option coefficients favoring abstract integrated choices (0, 1, -1, -1, 1).
### TABLE XVIII

Percentages of List 3 Comprehension Scale  
Response Options by Grade

<table>
<thead>
<tr>
<th>Grade</th>
<th>No response</th>
<th>non-integrated concrete</th>
<th>non-integrated abstract</th>
<th>integrated concrete</th>
<th>integrated abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>2.1</td>
<td>8.0</td>
<td>14.6</td>
<td>18.9</td>
<td>56.4</td>
</tr>
<tr>
<td>9</td>
<td>.6</td>
<td>8.4</td>
<td>15.5</td>
<td>21.1</td>
<td>54.3</td>
</tr>
<tr>
<td>10</td>
<td>.2</td>
<td>6.1</td>
<td>14.8</td>
<td>10.9</td>
<td>67.9</td>
</tr>
<tr>
<td>Total</td>
<td>1.0</td>
<td>7.6</td>
<td>15.1</td>
<td>18.3</td>
<td>58.0</td>
</tr>
</tbody>
</table>
TABLE XIX

Frequencies of List 3 Comprehension Scale

Response Options by Item Types

<table>
<thead>
<tr>
<th>Item Types</th>
<th>Response Options</th>
<th>concrete</th>
<th>abstract</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>non-integrated</td>
<td>66</td>
<td>162</td>
<td>228</td>
</tr>
<tr>
<td></td>
<td>integrated</td>
<td>192</td>
<td>520</td>
<td>712</td>
</tr>
<tr>
<td></td>
<td>Totals</td>
<td>258</td>
<td>682</td>
<td>940</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>-</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>Low Imagery Items</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(LLL,LLH, LHL,HLL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>non-integrated</td>
<td>79</td>
<td>124</td>
<td>203</td>
</tr>
<tr>
<td></td>
<td>integrated</td>
<td>154</td>
<td>580</td>
<td>734</td>
</tr>
<tr>
<td></td>
<td>Totals</td>
<td>233</td>
<td>704</td>
<td>937</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>-</td>
<td>-</td>
<td>11</td>
</tr>
<tr>
<td>High Imagery Items</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(LHH,HLH, HHL,HLL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1896 = 24 items x 79 individuals
Figure 3. Percentage of cases selecting each type of response option for List 3 Comprehension Scores
predictor of comprehension (e.g., Table XVII, contrasts 3 and 7) although high noun imagery was, consistently, a better predictor than high verb imagery.

In addition to the differences between response variables, a linear trend across grade appeared for the various measures used for List 3 (multivariate $F(21,56) = 1.98, p < .05$; and multivariate $F(9.68) = 2.16, p < .05$). The main sources of this age trend were overall likeability scores, $F(1,76) = 12.74, p < .001$, and three imagery contrasts, one on the likeability scale (Table XVII, contrast 6), $F(1,76) = 4.61, p < .05$, and two on the comprehension scale (Table XVII, contrasts 4 and 8), $F(1,76) = 4.83, p < .05$, and $F(1,76) = 4.08, p < .05$, respectively. Because the likeability and comprehension score distributions deviated slightly from Normality, univariate $F$-ratios with probabilities greater than .01 were considered as non-significant. Thus, only overall likeability scores showed a significant positive trend across grades. For overall recall and comprehension scores, grade trends, though not statistically significant, were in the expected direction.

Hoyt estimates of reliability for the List 3 scales were .65 for recall, .86 for likeability, and .73 for comprehension. The relatively low internal consistency for recall suggests that several factors may underlie recall of these more complex figures.

When considered as the first three contrasts in a step-down analysis, mean likeability, recall and comprehension scores for List 3 were seen to be relatively independent, with $F(1,76) = 2098.43, p < .0001$, $F(1,75) = 4.47, p < .05$, and $F(1,74) = 220.17, p < .0001$.

Comparing students' total scores on the various scales, as well as error scores after grade effects were removed (Table XX), it was found
TABLE XX

Correlations Amongst Response Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>List 1 (N = 98)</th>
<th>List 3 (N = 79)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Scores</td>
<td>Error Scoresa</td>
</tr>
<tr>
<td>Recall &amp; Likeability</td>
<td>.302**</td>
<td>.275**</td>
</tr>
<tr>
<td>Recall &amp; Comprehension</td>
<td>.135</td>
<td>.114</td>
</tr>
<tr>
<td>Comprehension &amp; Likeability</td>
<td>-.012</td>
<td>-.027</td>
</tr>
</tbody>
</table>

aEffect of grade levels removed

*p < .05

**p < .01
that for List 1 there was a significant positive correlation between recall and likeability scores, and for List 3 between recall and comprehension scores. No other pairs of scores were significantly correlated. Thus, for both lists, comprehension and likeability appeared as independent response factors.
CHAPTER V
DISCUSSION, CONCLUSIONS AND IMPLICATIONS

The preceding results have important bearings upon the three theories of figurative language elaborated in earlier chapters. These theories will be discussed sequentially in light of the findings.

A. The Structural Hypothesis

The psychological relevance of the structural hypothesis was particularly well substantiated by the findings in the present study. For comprehension especially, students discriminated amongst metonyms, synecdoches and metaphors. They did so in such a way as to show that the structural relations of contiguity, hierarchy, and similarity, which these types of figures respectively represent, are, in fact, familiar and functional aspects of thought that are operative during the interpretation of figurative language. Furthermore, the difficulty in understanding the types of figures increases as their complexity increases. Those figures in which only one relation occurred (namely, similarity) were easier to comprehend than those in which two relations were suggested—contiguity or hierarchy by the semantic features of the particular concepts, and similarity or equivalence by the copular verb uniting the concepts.

For recall, too, the response to metonyms, synecdoches, and metaphors followed the expected order. Those figures comprised of elements co-occurring with high frequency in natural language (i.e., associatively

76
related concepts) were easiest to recall; those composed of elements only infrequently juxtaposed in natural usage were the most difficult to recall.

The hypothesis that moderately similar concepts would combine to make the best liked figures was borne out for the high imagery metaphors used in List 2. In List 1 this effect, while nominally present, did not reach statistical significance, possibly because of the interference from the variety of structural relations involved in the figures. It would be of interest to determine whether moderate similarity amongst concepts in abstract metaphors would be equally efficacious in producing likeable figures.

Unexpectedly, both highly similar and frequently conjoined concepts produced the most likeable figures of speech. Apparently the unusualness of the juxtapositions in these types was sufficient to arouse interest, while further semantic deviance only made them less memorable, likeable and comprehensible.

Structural principles were operative in the comprehension of the more complex List 3 figures as well. Students not only chose those interpretations offering conceptual integration, but chose in a way that revealed the operation of a further cognitive principle based upon complementarity, a principle which might be labelled "imagery balance". Thus, abstract interpretations were more favored for concrete figures than for abstract figures, and concrete interpretations were more favored for abstract figures than for concrete figures (Table XIX).

The success of the structural hypothesis in predicting responses to figures of speech augurs well for generalization of the theory to non-verbal modalities. Since the constituents of the structural theory are concepts, rather than linguistic units, it seems reasonable to expect the
patterns of response observed in this inquiry to reappear in extra-linguistic symbolic figuration such as that which might exist in visual arts and communications media. The evidence here implies that the utilization of figures is a conceptual phenomenon and not merely a linguistic one.

For the more complex figures the markedly greater preference by grade ten students for the abstract integrated response options suggests a qualitative shift in conceptualization at this grade level. This shift is towards both integrated responses (78.8% for grade ten compared to 75.4% and 75.3% for grades nine and eight, respectively) and abstract responses (82.7% for grade ten compared to 71.0% and 69.8% for grades nine and eight, respectively) and substantiates the Piagetian view that abstract or formal operational thought emerges around this age (Inhelder & Piaget, 1958; Rohwer, 1972; Rohwer & Bean, 1973).

No significant grade differences appeared in responses to the structural dimensions in List 1 although trends suggested that students in lower grades processed all types of figures less well than those in higher grades, and that increasingly greater grade differences in recall existed for metonyms, synecdoches and metaphors. This pattern is in general agreement with several recent developmental studies of figurative language production and comprehension in younger children, as is the finding that preference for complex figures increases with grade. These developmental studies, which were reported after the data for this study were gathered, are worth discussing in some detail.

Billow (1975) proposed a distinction between similarity metaphor and proportional metaphor, the difference lying essentially in the number of elements involved in the figure, three in the former (two terms and a
shared attribute) and four or more in proportional relation in the latter. For example,

(50) A butterfly is a flying rainbow
and (51) Hours are leaves of life
represent similarity and proportional metaphor, respectively. It appears that proportional metaphor is what others have called analogy (Kirk, McCarthy & Kirk, 1968; Köngäs Maranda, 1971).

Studying children between five and thirteen years of age Billow observed that the presence of concrete operations was not necessary for the understanding of metaphor, but that increased use of concrete operations did coincide with increased metaphoric responding. In addition, a high positive correlation existed between comprehension of proportional metaphors and facility with formal operations. Thus, the earliest comprehension of figures, Billow suggests, occurs in an intuitive way and is later rationalized; this ability increases with age and permits the reasoned comprehension of increasingly complex figures.

Billow also observed what he called "synecdochic processes" in the incorrect responding of younger children. These were responses focussing upon insufficient elements of the total figure (hence a part of the whole figure, or a synecdochic process). The responses were frequently common contiguous associations. This metonymic responding was more frequent amongst younger and less developed individuals than amongst older and wiser ones, a trend which is in accord with the trends observed in this study.

Gardner, Kircher, Winner, & Perkins (1975) found that over the period from four to nineteen years, people increasingly preferred appropriate metaphorical endings over literal, conventional and inappropriate
metaphorical endings for suitable passages. Conventional metaphors predominated in production at every age level but the youngest individuals produced the largest number of both appropriate and inappropriate figures. The authors suggest that the high production by pre-schoolers reflects a willingness "to follow their sensory imagination" (p. 11) unfettered by critical analysis. As analytic capacity increases, individuals place first literal, then conventional, and finally appropriate constraints on their metaphorical productions.

The study considered brief contexts ending with a comparative structure using one of eighteen common or less common adjectives; for example:

(52) He looks as gigantic as . . .
(53) weather as boiling as . . .
(54) colours as bright as . . .

A response was judged metaphorically "appropriate" if the adjective was projected onto a sensory domain where it was not literally applicable, onto a psychological state, or given a radically different perspective in the usual domain. Although the study was thereby limited to a rather narrow range of figurative form and content, the developmental observations were consistent with the preferences observed in this study for a broader selection of figures.

Winner, Rosentiel, & Gardner (Note 8) reported on the performance of six- to fourteen-year-olds in providing or selecting interpretations for several types of metaphorical sentences such as

(55) After many years of working at the jail, the prison guard had become a hard rock that could not be moved.

and (56) Her fingernail polish was a loud splash of color.

For multiple choice questions four paraphrases based on different
principles were proffered as options, a technique similar to that employed in this study. The most primitive solution entailed the literal equation of the two elements being compared. Children choosing this option would presumably interpret example (55) literally as a magical transfiguration of the person into a rock and (56) as meaning "her fingernail polish made a loud noise". A more sophisticated response would result from relating the two elements of the metaphor in a narrative sequence or by some other associative link, so that example (55) might mean that the guard worked in a rocky prison. This response, which the authors terms "thematic", is essentially the same as the "metonymic" relation discussed in the present study, or the "synecdochic process" proposed by Billow.

A third and still more sophisticated choice entailed "the engulfing of one domain of the metaphor by the other" (p. 5), a response that Winner, et al. labeled "concrete". Example (55) might thereby be interpreted as meaning "that the guard, like the rock, is physically hard and muscular". The authors do not consider this response metaphorical, and although it is not a full interpretation (since it overlooks fundamental similarities between guard and rock at the psychological level) it is, nevertheless, grounded on a relationship of similarity and should be considered both as an acceptable meaning of the figure and as a metaphorically based meaning. What Winner, et al. consider to be the "mature" meaning of example (55) is the psychological meaning. They thus see abstract interpretation as the highest form of metaphoric understanding. Although it is reasonable to expect individuals capable of formal operations to perceive and prefer abstract interpretations, not all figures have such interpretations, nor do such interpretations always constitute the superior meaning. As the present study revealed, a principle of imagery balance is also operative
in determining suitable interpretations, with the consequence that concrete interpretations are commonly acceptable for abstract metaphors. The insistence upon the abstract interpretation as the most advanced introduces an unnecessary narrowness in defining good metaphor.

The sequence of options used by Winner and her associates bears a striking resemblance to that developed from the principles put forward in Chapter II for providing alternate interpretations of nominal-copula-nominal figures. Thus, their "thematic" interpretation corresponds to my "metonymic", and their "concrete" and "mature" correspond approximately to my options based respectively on minor and major similarities. The "concrete" and "mature" categories also correspond more or less to the concrete and abstract integrations proposed in this study for interpreting more complex figures.

Winner, et al. documented a steady increase over age in use of the metaphoric interpretations. These interpretations replaced the thematic and concrete interpretations more commonly used by younger subjects. In addition, cross-sensory items were more readily interpreted metaphorically than psychological-physical items, especially for the youngest children. This suggests that the increased abstractness of the latter type made them particularly difficult.

Examining the comprehension of a different group of pre-adolescents, Winner (Note 9) found that a half-hour of training for eight weeks could significantly improve production and selection of appropriate metaphorical endings to short vignettes. Moreover, individuals appeared to pass through the same stages before reaching a fully productive stage. Winner characterized these stages as (a) conventional, (b) embellishment of the conventional, (c) appeal of the inappropriate, (d) failure to cross
categories, (e) incomplete metaphor, and finally (f) clear comparisons across disparate domains. The credibility of these stages and the training process becomes suspect when the example Winner cites as representing an appropriate metaphorical ending is examined:

(57) Her voice was as thundering as the smell of gasoline.

Disparate domains are surely crossed here but the result is less an appropriate metaphor than a badly mixed one.

While valuable from a developmental view, the studies just considered were hampered by insufficient analysis of the materials in use. They provided mainly normative data on persons when both that and structural analysis of materials were necessary. The present study complemented these studies by providing a more thorough task analysis.

These four developmental studies were biased in another way. They examined comprehension of figurative language on the basis of multiple-choice selection tasks, explanations, and productions; the selection tasks were, in most cases, distorted by "demand characteristics", that is, the abstract metaphorical choice represented the preferred response. Kogan (Note 10) avoided this demand characteristic and concurrently widened the study from figurative language to figurative thought by examining preferred pairings made from amongst picture triads. Of the three pairings possible for each triad, one, according to the author, offered a metaphorical similarity, but respondents were asked if they could make other pairings and in each case were asked for the basis of their pairing. The method permitted crediting for metaphorical pairing on the basis of unanticipated or non-central attributes. Thus the meaning of metaphor was more liberally (and more correctly) understood than in the other studies. Full credit was given for recognition and satisfactory explanation of the metaphorical
linkage; partial credit for recognition accompanied by a less satisfactory explanation. Inter-judge reliability was high, and Kogan reports that the internal consistency reliability of the triad test was in the order of .77, implying that metaphorical preference was being reliably assessed.

Working with students in the seven- to thirteen-year age range and graduate students, Kogan observed a clear age trend in metaphorical sensitivity. Early data also suggested a possible female superiority. As in the present study, item difficulties varied widely but showed only slight variation with age. Whereas the present study related this differential difficulty to aspects of item conceptual structure, imagery and specific semantic variations, Kogan's report offered no rationale for the observed differences.

Correlation of triad task scores with other cognitive and creative measures revealed few consistent relationships. Only a specially developed quality scoring for the Divergent-thinking tasks (Wallach & Kogan, 1965) and teachers' ratings of students' "aesthetic sensitivity" related significantly and positively to the total metaphor score. Kogan reports ongoing work examining the relationship between metaphorical sensitivity and a variety of other measures—daydreaming, resourcefulness, originality, sense of humour, emotional expressiveness, empathy and preference for working alone.

Using the triad test, Kogan also found that training could significantly increase metaphorical responding. In fact, a simple request for exhaustive pairing within the triads "was sufficient to elicit a latent metaphoric capacity" (Kogan, Note 10, p. 15). This ease of training strengthens Winner's (Note 9) claim about training effects on metaphorical thinking. Kogan concludes that for the age levels examined (seven- and
nine-year-olds) performance did not adequately reflect competence in the metaphoric domain.

Although he does not link it to his observations of item difficulty, Kogan (after Kagan, Moss, & Sigel, 1963) does suggest two conceptualizing styles, one based on similarity and one on complementarity.

Complementarity implies a rejection of similarity as a basis for grouping, and utilization instead of functional or thematic relations. This principle for inter-concept relation is very close to the principle of contiguity as used in this study, a relationship which has been taken to include cause-effect relations and to form the basis for literary metonymy. Thus, complementarity, metonymy and contiguity form a semantic cluster.

Kogan distinguishes two types of similarity, analytic and categorical, analytic similarity being present when two concepts have common attributes, and categorical similarity being present when two concepts represent the same class. This distinction may not be tenable since class membership is ultimately determined on the basis of one or more attributes, but the distinction is similar to that made in this study between those figures based on the principle of hierarchy between components and those based on the principle of similarity. Kogan's analysis seems to confound the hierarchical distinction with that between central and non-central attributes.

In conceptualization, Kogan's work comes closest to the structural model employed in this study. In addition, he suggests that internal analyses of his triad items are required and that a conceptual-visual distinction amongst metaphors might be fruitful to explore. This distinction is comparable to that made in this study between abstract and
concrete items, a topic which is discussed below.

B. The Imagery Hypothesis

As has been the case for many other verbal materials, word imagery rating was a potent factor in determining the recallability of figurative expressions. Paivio's (1971) "conceptual peg" hypothesis, that is, that a high imagery cue word will facilitate recall better than a low imagery cue word by serving as a convenient mnemonic device to which to relate an associated word, gained clear support in these studies. Even when verbal materials became more complex, as they did in Study II, the superiority of the high imagery cue noun prevailed. Sheer number of high imagery components in a figure also improved its recallability, and high imagery nouns aided more than did high imagery verbs.

In terms of likeability, too, high imagery was important, as was grammatical form class of the high imagery constituents, but order of occurrence of those constituents was less important. Thus, no advantage was gained by explicit movement within a figure from the abstract to the concrete, and consequently, the predictions of Davidson (Note 3) and Thomas (1969) about the importance of hypostatization or concretization could not be supported. Since figures expressed in concrete terms were generally preferred in this study, it can be speculated that words which readily induce images are effective at producing optimal levels of cognitive arousal. Nouns are apparently more effective at this than are verbs.

Of considerable theoretical interest was the relative lack of effect of component imagery levels on comprehension scores. This clearly implied that concrete figures, while more memorable and likeable, were not
necessarily easier to understand. If this is true for non-figurative linguistic materials as well, it has important implications for the development of instructional materials. In Study II imagery did have some effect upon comprehension but the pattern of results seemed to suggest that something other than the mere magnitude of mean imagery level was operating. High noun imagery appeared to facilitate comprehension more than high verb imagery, but order of the high imagery elements had no consistent effects. Results of the pilot study (Wilkinson, Note 2) suggested that rated imagery of a whole sentence was an even better predictor of recall than the summed imagery ratings of the component words. In general, the processing of more complex linguistic structures may be a combined function of imagery and integration of the conceptual components.

C. Linguistic Hypotheses

Figures involving human semantic aspects, whether encoded as features or as case requirements, proved to be harder to recall than figures with no human reference, but violation of [-human] selectional restrictions or dative case restrictions had no other behavioral effects. The direction of this single observed difference is the same as that observed in the data of Howe and Hillman (1973), that is, dative case violations are more difficult to process cognitively than objective case violations. Furthermore, Howe and Hillman observed young children's ability to recognize violations whereas this study observed adolescents' ability to recollect figures embodying those violations. Thus, for at least two measures and two age levels, dative case violations appear to be more difficult than objective case violations. There is no ready explanation for this phenomenon unless, perhaps, cognitive dissonance
results from semantically violating the sanctity of that which is human or animate. In any case, the phenomenon is of somewhat dubious stability, since no comprehension or likeability differences appeared between these two types of case violations in this investigation.

Overall, and within the moderately similar figures of List 2 (i.e., the preferred figures), personifications were no more nor less preferred than other types of figures. It therefore appears that neither personification nor animation produce figures of speech which are inherently preferable to other types. Good figures of speech are apparently not restricted to any particular set of semantic domains.

Given that students preferred the metonyms and synecdoches of List 1 over the metaphors, it was somewhat surprising to see that they preferred and best comprehended those List 3 figures having the greater number of case violations. Presumably, insufficient cognitive arousal was provided by a single violation to produce likeability. Also, it is possible that a minimum level of arousal must be reached to induce conceptual exploration and subsequent comprehension. This level was apparently not reached for figures with single case violations.

D. **General Conclusions**

1. The structural relations of contiguity, hierarchy, similarity and integration are psychologically meaningful (both theoretically and empirically), having demonstrable effects upon recall, likeability and comprehension of verbal figurative expressions.

2. Whereas high imagery of figure constituents is strongly related to high recall and moderately related to likeability, it appears that there is only a weak relationship between high imagery and comprehension.
Expressions comprised predominantly of words that readily induce mental imagery are easier to recall and are better liked than expressions comprised predominantly of words which do not readily evoke images. By itself, abundance of high imagery words in a figurative expression has little effect upon the comprehension of that expression. Order of high imagery components is also differentially important. Expressions in which high imagery constituents occupy initial positions are easier to recall than expressions in which low imagery constituents occupy those positions, but the order of high and low imagery constituents in a figure has little effect upon the likeability or comprehension of that figure. Interaction of imagery level and grammatical form class is consistent: high noun imagery is superior to high verb imagery in predicting recall, likeability and comprehension of figurative expressions. Imagery levels of component words affects interpretations given to figures in such a way that adolescents show a slight tendency to choose concrete interpretations for abstract figures of speech and abstract interpretations for concrete figures of speech. This phenomenon can be viewed as an instance of a structural principle of balance or complementarity, and provides a point of convergence between the structural and imagery hypotheses.

3. Figures of speech employing human characteristics are more difficult to recall than those involving other characteristics, but they are no different on measures of likeability or comprehension. For the more complex figures of speech an optimal level of semantic violation apparently must be attained to maximize likeability and comprehension. Linguistic theories provide no ready explanation for these phenomena.
Thus, the hypotheses based upon semantic feature violations and case category violations are less useful as predictors of psychological responses to figurative language than are conceptual structure and imagery hypotheses.

4. Moderate similarity between elements of high imagery metaphors maximizes their likeability, while extreme similarity or dissimilarity produces unacceptable figures. For figures involving a variety of conceptual relations recall, likeability and comprehension are all enhanced by high inter-concept similarity.

5. Within the levels studied, grade trends in the processing of figurative expressions are slight, although students in higher grades show indications of understanding, liking and remembering figurative language better than those in lower grades. Within grades eight, nine and ten responses are not affected by variations in the conceptual structures of the expressions.

6. Metaphor and its congeners should be considered as conceptual rather than purely linguistic phenomena. Results of this research indicate that "metaphorical thinking" is a process that follows the same sorts of logical and psychological laws that other forms of thinking do.

7. The study provided evidence of a strong functional relation between conceptual structure and comprehension but only a weak relation between comprehension and imagery. Observation of these limits to imagery gives credence to the view that imagery is an operational modality just as language is, but that another modality, a quasi-logical, or structural one permeates both imagery and verbal processes.
E. Implications for Further Research

It is conceivable that the semantic complexities represented by the various categories within case grammar could be systematically analyzed in terms of the structural relations that they entail. This would require specification of more structural relations than were utilized in these studies. Simmons (1972) and Suppes (1974) both provide approaches to this task, but it is clearly a monumental one. Once such a logical analysis is available, systematic empirical validation can follow.

Of more immediate potential for investigation is the role of conceptual structure within abstract expressions, and the role of structural relations amongst components in non-verbal modalities, for example, an investigation of pictorial, sculptural or behavioral metaphor.

Further investigation could also be undertaken to assess the effects of conceptual structures in the processing of figurative language by younger children.

So as to strengthen the conclusions drawn here from artificially created figurative language it would also be useful to structurally assess figures of speech occurring in natural language and use that analysis to predict behavioral responses to those figures.

F. Implications for Practical Applications

The ubiquity of figurative expression in everyday language, adult's and children's literature, persuasive discourse, advertising and propaganda is unquestionable, and those who would use it effectively to influence or instruct can be guided by the principles put forward and substantiated here. For memorability, high imagery figures should be chosen; for appeal and comprehension, the semantic relations amongst the
concepts used in the figure must be considered; for simple metaphors the conceptual similarity involved must be moderate if the figure is to be appealing; for more complex figures conceptual integration must be achieved for comprehension.

For instruction about figurative language this investigation provides, in the structural theory, a coherent and empirically grounded account of the majority of figurative forms. This itself is a major improvement on the incomplete and inconsistent explanations that were its predecessors. For layman and for poet the study merely provides an explanation of a subtle and complex thought process normally taken for granted. What no study can do is to anticipate the immensely rich and varied contents that can be realized within the basic figurative forms.
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APPENDICES
Recall (lists 1 and 3)

(1) There are many strange expressions in our language, expressions which are unusual but still understood. We hear of "a sagging economy" but we know that an economy cannot sag quite like a clothesline can sag. We talk of a "sick society", but a society cannot have a cough or fever like a person can. Television advertisements for chewing gum tell us that "Spearmint is straight", but what does that really mean?

(2) You are now going to hear a list of 24 unusual expressions like these, and some that will be even more unusual. Your first job will be to try to remember as many of them as you can. After you have heard the expressions once you will be asked to count backwards out loud from fifty. Fifty, forty-nine, forty-eight, forty-seven, and so on. The reason for doing this will be explained afterwards. Next, you will hear the first part of each expression again and your job then will be to write down the rest of the expression if you can remember it. Your answer sheets will then be collected and you will be given a new answer sheet and the procedure will be repeated. You will hear the complete expressions, then count backwards out loud from fifty, hear the first part of each expression again, and when you hear each one, write down the rest of the expression if you can remember it. If you can only remember part of the expression write down that part.

(3) Each time you hear the list of expressions they will be in a different order. Don't worry about spelling. If you're not sure how to spell a word write it the way it sounds to you. Be sure to put your name and your grade on your answer sheet, and don't worry if you can't
Appendix A (continued)

remember some of the expressions because many of them are hard to remember. Are there any questions?

(4) Ready. Listen carefully. Do not write anything down. Here are the expressions:

(study trial 1)

Now count backwards, out loud, fifty, forty-nine, forty-eight ... twenty-six, twenty-five. OK, now, here is the first part of each expression again. As soon as you hear it, write down the rest of the expression if you can remember it.

(recall trial 1)

(5) All right. Be sure that your names are on the answer sheets and then pass them to the front of the room.

(collection and distribution of answer sheets)

Here are the complete expressions again. They should be a little easier this time. Listen carefully.

(study trial 2)

Now count backwards out loud. Fifty, forty-nine, forty-eight ... twenty-six, twenty-five. Now here is the first part of each expression again. As soon as you hear it write down the rest of the expression if you can remember it.

(recall trial 2)

All right, be sure that your names are on the answer sheets and pass them to the front of the room. Thank you very much.
Appendix A (continued)

Likeability (Lists 1 and 3)

(1) In the first session you were asked to try to remember some unusual expressions. In this session we want to find out how much you like or dislike each of those expressions. You'll be given a page now with each of the expressions printed on it and asked to rate each expression from 1 to 7 according to how much you like it.

(2) If you like an expression very much circle the number 7 on the line beside it. If you dislike the expression very much circle the 1; if you like it moderately circle the 6; if you dislike it moderately circle the 2; if you like it just a little circle the 5; if you dislike it just a little circle the 3; and if you really neither like nor dislike the expression circle the 4. When the list is given to you put your name and grade on it and go ahead. You'll have about 5 minutes to do the task. There are no right answers. Are there any questions?

(likeability task)

Comprehension (Lists 1 and 3)

All right, the next task will be the final one. This time you will be given a list of the expressions and some possible meanings for each of them. You are to study them carefully and choose the meaning that you think is the best one from amongst the four choices given. Circle the letter beside the meaning that you think is the most correct. There isn't always a right answer. Just choose the one that you think is the best of those given. If you aren't sure what some of the words mean, look them up in the separate glossary printed in red. Don't spend too much time on any one expression, but do make a choice for each of them, even if you have to guess. You will have about 25 minutes to do this task which
Appendix A (continued)

is about one minute for each expression, so work carefully but quickly.
Are there any questions?

(comprehension task)

Likeability (List 2)

(1) (Same instructions as paragraph 1 of the instructions for List 1 and 3 recall tasks).

(2) You are going to be given a list now of 24 unusual expressions. We want to find out how much you like or dislike each of these expressions. Besides each expression will be the numbers from 1 to 7 and your job will be to rate each expression according to how much you like it.

(3) (Same instructions as paragraph 2 of the instructions for List 1 and 3 likeability tasks).

Similarity rating (List 1)

For the next task you'll be given 24 pairs of words and asked to judge how similar the two concepts or ideas are. If the two concepts have very high similarity circle the 5 on the line beside the pair of words. If the two concepts have high similarity circle the 4. If the two concepts have moderate similarity circle the 3. If they have low similarity circle the 2, and if they have very low similarity, circle the 1. For example, "cord" and "rope" have much similarity and might be rated 4 or 5, while "justice" and "balloon" have very little similarity and might be rated only 1 or 2. The meanings of some of the harder words are given in the separate glossary printed in red. It will sometimes be hard to decide how similar two ideas are. In those cases just use your best judgement.
You'll have about 15 minutes to do the task. Are there any questions?
## APPENDIX B

### Likeability Scale - List 1

<table>
<thead>
<tr>
<th>Name</th>
<th>Grade</th>
<th>DISLIKE</th>
<th>LIKE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wisdom is a monk.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>A ship is an ocean.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>An owner is a wholesaler.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>An obsession is a franchise.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>A book is a reminder.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>A dollar is a banker.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Chance is an originator.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Winter is snow.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>An increment is a saloon.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Hatred is a glutton.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>A skillet is a magnitude.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>A horse is an eccentric.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>A thicket is a city.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>A minstrel is a musician.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>A wall is an entry.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Welfare is food.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>A building is a creator.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>An avalanche is an acrobat.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Evidence is a criminal.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Deceit is a charlatan.</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B (continued)

An answer is a problem.  
A cost is a patron.  
Negligence is poverty.  
A quantity is a bonus.

<table>
<thead>
<tr>
<th>DISLIKE</th>
<th>LIKE</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERY</td>
<td>MUCH</td>
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<tr>
<td>1</td>
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<td>5</td>
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<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>
APPENDIX C

Comprehension Scale - List 1

Name _________________________ Grade ____________

Circle the letter beside the best meaning for each of the following expressions.

FOR EXAMPLE:

"No man is an island" means that
a) men aren't surrounded by water.
b) human beings are land creatures.
c) no person is completely independent.
d) women are islands.

If you aren't sure of the meanings of some of the words use the glossary printed in red to help you.

1. "Evidence is a criminal" means that
   a) evidence is used to convict a criminal.
   b) evidence harms some people.
   c) both evidence and criminals are connected with the law.
   d) both evidence and criminals are brought into court.

2. "A thicket is a city" means that
   a) a thicket is one type of city.
   b) both thickets and cities have bushes.
   c) thickets are frequently found in cities.
   d) both thickets and cities are dense.

3. "A skillet is a magnitude" means that
   a) a skillet and a magnitude can both be round.
   b) both a skillet and a magnitude are sizeable.
   c) a skillet is an example of a magnitude.
   d) skillets and magnitudes are often found together.

4. "Negligence is poverty" means that
   a) both negligence and poverty are found in Vancouver.
   b) negligence causes poverty.
   c) negligence is a type of poverty.
   d) negligence and poverty both result from something being insufficient.

5. "Deceit is a charlatan" means that
   a) deceits and charlatans both pretend to be something that they aren't.
   b) deceits and charlatans are often found together.
   c) deceits and charlatans are types of injustice.
   d) both deceits and charlatans are unpleasant.
Appendix C (continued)

6. "An avalanche is an acrobat" means that
   a) avalanches and acrobats are frequently found together.
   b) an avalanche is one kind of acrobat.
   c) an avalanche tumbles and rolls like an acrobat.
   d) both avalanches and acrobats fall down.

7. "Winter is snow" means that
   a) snow is the most important feature of winter.
   b) winter and snow are both icy.
   c) winter and snow are both cold and damp.
   d) winter and snow often occur together.

8. "A ship is an ocean" means that
   a) both ships and oceans are aspects of sailing.
   b) a ship sails on the ocean.
   c) a ship is large and heavily populated like the ocean.
   d) both ships and oceans are often grey.

9. "An increment is a saloon" means that
   a) increments and saloons are both things.
   b) an increment, like a saloon, is usually small.
   c) a salary increment, like a saloon, can keep people happy.
   d) small cost increases are common in saloons.

10. "An answer is a problem" means that
    a) both are composed of ideas.
    b) an answer often produces further questions.
    c) an answer always has a problem.
    d) both are parts of tests.

11. "Chance is an originator" means that
    a) chances and originators both affect our lives.
    b) chance and originators both produce unexpected things.
    c) chance is one kind of originator.
    d) originators often take chances.

12. "Welfare is food" means that
    a) food and welfare are commonly given out together.
    b) food is a kind of welfare.
    c) both welfare and food are taken home.
    d) both food and welfare fulfill needs.
Appendix G (continued)

13. "An owner is a wholesaler" means that
   a) both owners and wholesalers are types of businessmen.
   b) both owners and wholesalers use money.
   c) only owners can be wholesalers.
   d) owners and wholesalers frequently meet together.

14. "Wisdom is a monk" means that
   a) wisdom and monks are both found in monasteries.
   b) monks possess wisdom.
   c) both wisdom and monks are concerned with truth.
   d) both wisdom and monks are quiet.

15. "Hatred is a glutton" means that
   a) hatred, like a glutton, is unpleasant.
   b) hatred and gluttons both consume and destroy too much.
   c) hatred and gluttony are both types of evil.
   d) gluttons are often hated.

16. "A quantity is a bonus" means that
   a) a quantity and a bonus often can be found together.
   b) a quantity and a bonus are both amounts.
   c) a bonus is an example of quantity.
   d) any amount of something is better than nothing.

17. "A cost is a patron" means that
   a) both a cost and a patron are aspects of monetary matters.
   b) a patron pays the cost.
   c) both 'cost' and 'patron' are words.
   d) both a cost and a patron can be connected with a product.

18. "A horse is an eccentric" means that
   a) eccentrics often have horses.
   b) both eccentrics and horses often walk strangely.
   c) a horse is one type of eccentric.
   d) both horses and eccentrics can do unusual things.

19. "A minstrel is a musician" means that
   a) both minstrels and musicians play music.
   b) minstrels and musicians work together.
   c) a minstrel is a type of musician.
   d) both minstrels and musicians like music.

20. "An obsession is a franchise" means that
   a) an obsession is a type of franchise.
   b) both obsessions and franchises are concerned with ideas.
   c) thinking about something enough makes it yours.
   d) people who have obsessions can have franchises.
Appendix C (continued)

21. "A building is a creator" means that
   a) each building makes its occupants feel like new people.
   b) both buildings and creators are aspects of architecture.
   c) buildings and creators are both strong.
   d) every building has a creator.

22. "A dollar is a banker" means that
   a) bankers have dollars.
   b) both dollars and bankers occupy banks.
   c) both dollars and bankers have faces.
   d) both dollars and bankers represent wealth.

23. "A book is a reminder" means that
   a) a book is a type of reminder.
   b) books and reminders are commonly printed on paper.
   c) books and reminders both bear useful information.
   d) both books and reminders are found on desks.

24. "A wall is an entry" means that
   a) a wall makes you stop and really "enter" where you are.
   b) both walls and entries are parts of buildings.
   c) most walls and entries are vertical.
   d) most walls have entries.
GLOSSARY

avalanche - a large mass of snow, ice, earth, rock, etc. in swift motion down a mountainside.

bonus - something given or received that is over and above what is expected.

charlatan - one making especially noisy or showy pretenses to knowledge or ability.

deceit - the act or practice of deceiving, as by falsification, concealment or cheating.

eccentric - a person that deviates from conventional or accepted conduct, especially in odd or whimsical ways.

entry - the place or point at which entry is made.

evidence - something that furnishes or tends to furnish proof.

franchise - a right or privilege granted to an individual or group by a government or company.

glutton - one that eats too much.

increment - something that is gained or added.

magnitude - greatness of size or extent.

minstrel - one of a class of medieval musical entertainers.

monk - a man who has retired from the world to devote himself to asceticism as a solitary.

negligence - a failure to exercise the care that a prudent person usually exercises.

obsession - a persistent and disturbing intrusion of or preoccupation with an idea or feeling.

originator - one that causes the beginning of something.

patron - one who uses his influence to help or benefit an individual; a regular or steady client.

poverty - a lack or relative lack of money or material possessions.

quantity - an indefinite amount or number.

reminder - something that prompts or aids the memory.

saloon - an elegant apartment; a room or public establishment in which alcoholic beverages are served.

skillet - frying pan

thicket - a dense and usually circumscribed growth of shrubbery or small trees.

welfare - a condition characterized by good fortune, happiness, well-being, or prosperity; assistance given to improve well-being.

wholesaler - a merchant who sells chiefly to retailers, other merchants or institutions.
### APPENDIX E

#### Similarity Scale - List 1

<table>
<thead>
<tr>
<th>Name</th>
<th>Grade</th>
<th>VERY LOW</th>
<th>LOW</th>
<th>MODERATE</th>
<th>HIGH</th>
<th>VERY HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>wisdom...monk</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>ship...ocean</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>owner...wholesaler</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
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<tr>
<td>obsession...franchise</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>book...reminder</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td></td>
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<tr>
<td>dollar...banker</td>
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<td>2</td>
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<td>5</td>
<td></td>
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<tr>
<td>chance...originator</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>winter...snow</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
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<tr>
<td>increment...saloon</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>hatred...glutton</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
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<tr>
<td>skillet...magnitude</td>
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<td>4</td>
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<td>4</td>
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<td>4</td>
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<td>minstrel...musician</td>
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<td>4</td>
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<td>avalanche...acrobat</td>
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<td>4</td>
<td>5</td>
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<tr>
<td>evidence...criminal</td>
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<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>deceit...charlatan</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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Appendix E (continued)

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<th>MODERATE</th>
<th>HIGH</th>
<th>VERY HIGH</th>
</tr>
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<tbody>
<tr>
<td>cost...patron</td>
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<td>negligence....poverty</td>
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<td>2</td>
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<td>4</td>
<td>5</td>
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<td>quantity....bonus</td>
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## APPENDIX F

### Random Orders of Items for List 1 Tasks

<table>
<thead>
<tr>
<th>Task</th>
<th>Item Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall Study Trial 1</td>
<td>6,17,23,9,13,19,24,12,21,7,5,2,10,16,22,1,8,3,20,15,18,14,4.</td>
</tr>
<tr>
<td>Test Trial 1</td>
<td>24,18,5,17,13,4,15,14,22,19,20,6,1,21,11,12,8,9,3,10,7,16,2,23.</td>
</tr>
<tr>
<td>Study Trial 2</td>
<td>8,13,18,2,23,24,1,19,11,12,3,15,17,10,5,21,4,14,22,20,6,9,16,7.</td>
</tr>
<tr>
<td>Test Trial 2</td>
<td>20,4,5,23,14,17,12,7,19,8,18,22,2,1,10,15,21,13,16,24,9,11,3,6.</td>
</tr>
<tr>
<td>Likeability Scale</td>
<td>12,7,14,17,13,8,18,15,19,20,21,22,23,16,5,11,6,14,10,1,2,3,9.</td>
</tr>
<tr>
<td>Comprehension and Similarity Scales</td>
<td>4,23,21,3,10,24,15,7,19,1,18,11,14,12,20,9,2,22,16,17,6,8,13,5.</td>
</tr>
<tr>
<td>Name</td>
<td>Grade</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>A tortoise is a tank.</td>
<td></td>
</tr>
<tr>
<td>A code is a henchman.</td>
<td></td>
</tr>
<tr>
<td>A nun is a monk.</td>
<td></td>
</tr>
<tr>
<td>An octopus is a busybody.</td>
<td></td>
</tr>
<tr>
<td>A soldier is a butcher.</td>
<td></td>
</tr>
<tr>
<td>A teacher is a professor.</td>
<td></td>
</tr>
<tr>
<td>An apple is a butler.</td>
<td></td>
</tr>
<tr>
<td>A typhoon is a hurricane.</td>
<td></td>
</tr>
<tr>
<td>A car is a truck.</td>
<td></td>
</tr>
<tr>
<td>A potato is a minstrel.</td>
<td></td>
</tr>
<tr>
<td>A cigar is a shoulder.</td>
<td></td>
</tr>
<tr>
<td>A flask is a tower.</td>
<td></td>
</tr>
<tr>
<td>A sultan is a baron.</td>
<td></td>
</tr>
<tr>
<td>A doctor is a nurse.</td>
<td></td>
</tr>
<tr>
<td>A lobster is a scorpion.</td>
<td></td>
</tr>
<tr>
<td>A mountain is a strawberry.</td>
<td></td>
</tr>
<tr>
<td>A ship is a grocer.</td>
<td></td>
</tr>
<tr>
<td>Fingers are tweezers.</td>
<td></td>
</tr>
<tr>
<td>An accordion is a singer.</td>
<td></td>
</tr>
<tr>
<td>A dog is a cat.</td>
<td></td>
</tr>
<tr>
<td>An avalanche is an acrobat.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix G (continued)

<table>
<thead>
<tr>
<th></th>
<th>DISLIKE</th>
<th>LIKE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A city is a thicket.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>An iceberg is a bagpipe.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>A horse is an engine.</td>
<td>1 2 3 4 5 6 7</td>
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</tbody>
</table>
**APPENDIX H**

**Likeability Scale - List 3**

<table>
<thead>
<tr>
<th>Name</th>
<th>Grade</th>
<th>DISLIKE</th>
<th>LIKE</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>VERY</td>
<td>MUCH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VERY</td>
<td>MUCH</td>
</tr>
</tbody>
</table>

The decoy encourages the position. 1  2  3  4  5  6  7
The item indicates the cheese. 1  2  3  4  5  6  7
The perception abandons the incident. 1  2  3  4  5  6  7
Truth folds the advantage. 1  2  3  4  5  6  7
Mastery establishes justice. 1  2  3  4  5  6  7
The jelly obtains the sugar. 1  2  3  4  5  6  7

The salt bans the trade. 1  2  3  4  5  6  7
The earth caresses the emotion. 1  2  3  4  5  6  7
The length cheers the origin. 1  2  3  4  5  6  7
The quality defeats the description. 1  2  3  4  5  6  7
The pebble ousts the river. 1  2  3  4  5  6  7
The prairie questions the distinction. 1  2  3  4  5  6  7

The piano condemns boredom. 1  2  3  4  5  6  7
The estimate flatters the cost. 1  2  3  4  5  6  7
The lantern attends the cellar. 1  2  3  4  5  6  7
The claim permits the sky. 1  2  3  4  5  6  7
The balloon crinkles the air. 1  2  3  4  5  6  7
The agreement speaks the deceit. 1  2  3  4  5  6  7

The daffodil cripples the shadow. 1  2  3  4  5  6  7
The basin whimpers the idea. 1  2  3  4  5  6  7
Appendix H (continued)

<table>
<thead>
<tr>
<th>DISLIKE</th>
<th>LIKE</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERY</td>
<td>VERY</td>
</tr>
<tr>
<td>MUCH</td>
<td>MUCH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ignorance interviews the jungle.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>The hammer sketches the lumber.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>The illusion tramples the mirage.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>The assumption climbs the tree.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
APPENDIX J

Comprehension Scale - List 3

Name ___________________________ Grade __________

Circle the letter beside the best meaning for each of the following expressions.

FOR EXAMPLE:

"No man is an island" means that
a) men aren't surrounded by water.
b) human beings are land creatures.
c) no person is completely independent.
d) women are islands.

If you aren't sure of the meanings of some of the words use the glossary printed in red to help you.

1. "Ignorance interviews the jungle" means that
a) jungle dwellers should talk to trees.
b) there's a lot to be learned about jungles.
c) a foolish person tries to do the impossible.
d) interviewers prefer tropical climates.

2. "The balloon crinkles the air" means that
a) containers affect their contents.
b) burning rubber pollutes the atmosphere.
c) a balloon compresses the air inside it.
d) a balloon makes crinkling noises as it floats.

3. "Mastery establishes justice" means that
a) good skills are found in democratic countries.
b) power produces the law.
c) the wolf kills the lamb.
d) union leaders build the courthouses.

4. "The length cheers the origin" means that
a) long lives have cheerful moments.
b) the beginning of a long trip is the most pleasant part.
c) long distance runners are cheered mostly at the start of the race.
d) long tasks require early starts.
5. "The claim permits the sky" means that
   a) There is no limit to the rights granted by the document.
   b) The clouds permit the sun to shine through.
   c) pilots are restricted to selected areas.
   d) Buying a ticket allows you to fly.

6. "The salt bans the trade" means that
   a) the Great Salt Desert can be crossed by camel.
   b) sodium chloride is subject to taxation.
   c) the ocean makes commerce difficult.
   d) salt in sugar might stop someone from buying it.

7. "The daffodil cripples the shadow" means that
   a) good things weaken evil things.
   b) crippled people need cheerful things.
   c) flowers can be dangerous.
   d) flowers brighten dark places.

8. "The quality defeats the description" means that
   a) the best things are beyond description.
   b) good teams can beat good-looking teams.
   c) well-made products are best in the long-run.
   d) things that are most easily described are the best.

9. "The perception abandons the incident" means that
   a) poor vision causes accidents.
   b) observation fails to confirm the event.
   c) no one sees what happens.
   d) someone loses their eyesight.

10. "The lantern attends the cellar" means that
    a) knowledge is discovered in high places.
    b) lamps can be used in basements.
    c) true help goes where it is needed most.
    d) gas lanterns are better than electric ones in cellars.

11. "The prairie questions the distinction" means that
    a) on the prairie hills are not much different from valleys.
    b) large things make small things seem less important.
    c) prairie people ask questions about each mountain.
    d) there is little difference between the prairie and the forest.

12. "The hammer sketches the lumber" means that
    a) the hammer hits the nail.
    b) the strongman draws a picture of the wood.
    c) the tools available determine the materials to be used.
    d) the tools destroy the materials.
Appendix J (continued)

13. "The estimate flatters the cost" means that
   a) we often expect things to turn out worse than they do.
   b) the estimated price makes the true price look good.
   c) high prices result in lost money.
   d) great expectations need encouragement.

14. "The decoy encourages the position" means that
   a) a decoy encourages hunters to come near.
   b) a decoy aids in hunting.
   c) a lure is usually attractive.
   d) a good example improves performance.

15. "The basin whimpers the idea" means that
   a) lowland areas produce bountiful harvests.
   b) the treasurer bravely makes a suggestion.
   c) sounds from a leaking container can give someone an idea.
   d) gurgling noises in the sink sound like words.

16. "Truth folds the advantage" means that
   a) having the correct analysis of a problem doubles up one's chances of solving it.
   b) folding the newspaper makes delivery easier.
   c) telling the truth turns good things your way.
   d) having the correct beliefs is an advantage in life.

17. "The piano condemns boredom" means that
   a) music can eliminate dissatisfaction.
   b) piano was developed for orchestral music.
   c) piano lessons are boring.
   d) playing the piano can get one excited.

18. "The earth caresses the emotion" means that
   a) everybody feels the earth.
   b) nature soothes feelings.
   c) feelings are a central part of nature.
   d) the earth feels good.

19. "The assumption climbs the tree" means that
   a) the wind blows the first page of the philosophy paper up the tree.
   b) the theory involves several tree-like diagrams.
   c) the dog chases the cat up the tree.
   d) the assumption has effects at each level of the theory.
20. "The jelly obtains the sugar" means that
   a) a smooth soft approach yields good results.
   b) the fat man takes the candy.
   c) weakness is easy to obtain.
   d) only water is added to jelly powder.

21. "The item indicates the cheese" means that
   a) the shopping list says "cheddar".
   b) the article suggest a particular dairy product.
   c) the sign points to the cow.
   d) something marks the spot.

22. "The pebble ousts the river" means that
   a) great things have small origins.
   b) pebbles are found at the bottom of rivers.
   c) small things can alter the course of events.
   d) pebbles can deflect water.

23. "The agreement speaks the deceit" means that
   a) armies only pretend to stop fighting.
   b) the letter tells the truth.
   c) the agreement is honest.
   d) the treaty indicates distrust.

24. "The illusion tramples the mirage" means that
   a) one scene always replaces another scene.
   b) mistaken ideas are often more forceful than unusual observations.
   c) seeing is believing.
   d) optical illusions and mirages are nearly identical.
APPENDIX K

GLOSSARY "B"

abandons - gives up by leaving, withdrawing, etc.; forsakes or deserts.
advantage - a more favorable or improved condition or position.
assumption - the act of taking for granted or supposing that a thing is true.
claim - a demand of a right or supposed right; an assertion, statement or implication.
cost - the amount paid for anything bought or for service rendered.
deceit - the act or practice of deceiving as by falsification, concealment or cheating.
decoy - something intended to allure or entice, especially into a trap.
distinction - the act of distinguishing a difference; something that distinguishes one thing from another.
decay - the affective aspect of consciousness; feeling.
establishes - brings into existence; creates; founds.
estimate - an evaluation or judgement, especially from incomplete data.
flatters - praises excessively, especially from motives of self-interest.
ignorance - the state of being unaware or uninformed.
illusion - a misleading image presented to the vision; something that deceives or misleads intellectually.
incident - an occurrence of an action or situation felt as a separate unit of experience.
indicates - points toward with more or less exactness.
item - an individual thing or detail singled out from a number of others; an object of attention or concern.
justice - the assignment of merited rewards or punishments; the quality of being impartial or fair.
mastery - the possession of skill or technique.
mirage - an optical phenomenon often observed on still days over deserts or hot pavement.
ousts - ejects or puts out from a position or place.
perception - awareness of the elements of environment through physical sensation.
quality - degree of excellence or conformance to a standard.
sketches - outlines, draws or describes the chief features of.
whimpers - makes a low whining plaintive or broken sound.
caresses - touches or strokes in a loving or endearing manner.
condemns - pronounces as ill-advised, wrong or evil; judges to be unfit for use or service.
### APPENDIX L

**Random Orders of Items for List 3 Tasks**

<table>
<thead>
<tr>
<th>Task</th>
<th>Item Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall Study Trial 1</td>
<td>12, 20, 21, 15, 6, 9, 23, 4, 11, 24, 10, 14, 18, 17, 2, 7, 13, 5, 8, 16, 1, 3, 19, 22.</td>
</tr>
<tr>
<td>Test Trial 1</td>
<td>16, 21, 2, 10, 7, 8, 9, 3, 19, 20, 11, 23, 1, 18, 13, 5, 12, 22, 6, 4, 14, 17, 24, 15.</td>
</tr>
<tr>
<td>Study Trial 2</td>
<td>13, 6, 17, 5, 1, 16, 3, 2, 10, 7, 8, 18, 12, 9, 23, 24, 20, 21, 15, 22, 19, 4, 14, 11.</td>
</tr>
<tr>
<td>Test Trial 2</td>
<td>3, 24, 21, 17, 19, 22, 12, 6, 12, 16, 15, 1, 5, 8, 11, 13, 4, 14, 10, 20, 9, 7, 2, 18.</td>
</tr>
<tr>
<td>Likeability Scale</td>
<td>20, 2, 9, 11, 1, 6, 4, 15, 19, 17, 22, 23, 12, 18, 14, 10, 16, 3, 24, 7, 21, 8, 13, 5.</td>
</tr>
<tr>
<td>Comprehension Scale</td>
<td>21, 16, 1, 19, 10, 4, 24, 17, 9, 14, 23, 8, 18, 20, 7, 11, 12, 15, 5, 6, 2, 22, 3, 13.</td>
</tr>
</tbody>
</table>