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The Relevance of Visual Models in Linguistic Theory and Discourse Analysis.

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The relevance of visual models in linguistic theory and discourse analysis

Manning, Alan Dee, Ph.D.
The Louisiana State University and Agricultural and Mechanical Col., 1988
The Relevance of Visual Models
in Linguistic Theory and Discourse Analysis

A Dissertation

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Alan D. Manning
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August 1988
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The contents of chapters 1-4 in this dissertation have previously been published or accepted for publication in the following journals:

1. The SOV->...>OSV Frequency Hierarchy, (Frank Parker, second author), in Language Sciences (forthcoming), International Christian University Language Sciences Summer Institute.


I thank the various publishers for their permission to use the above articles again here. That any of this work has been deemed publishable I attribute to Dr. Frank Parker, co-author of the first article and director of this dissertation. Readers may yet find some of my writings to be opaque or difficult to follow, but at least Dr. Parker has, through nearly four years of patient mentoring, made of me a better scholar and a better writer than I otherwise would have been.
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ABSTRACT

Five articles explain distinct types of linguistic phenomena with visual perception analogies. Together they give indications of similar cognitive systems underlying language and vision. First, relative numbers of languages with different basic-sentence orders for Subject, Verb, and Object fall in a hierarchy: #SOV > #SVO > #VSO > #VOS > #OVS > #OSV. If syntactic interpretation parallels figure/ground interpretation and semantic form parallels enclosed visual forms then that hierarchy falls out more elegantly than in generative or functionalist explanations. Second, semantic interpretation of English syntactic form (subject NP-tense Aux-predicate VP), is modeled with the Penrose & Penrose "fork". Generative root and embedded clause filters in English are thereby motivated with one principle. Third, the significance of words is modeled with forms like Jastrow's duck/rabbit. Wittgenstein's objections to semantic theory are avoided; several meanings of individual words like game and play are accounted for. The last two articles apply visual models to the analysis of texts. Like icons or words, texts may substitute for different object-meanings (literary discourse) or be analyzed as one standard form (technical discourse) depending on types of detail in the text and the disposition of readers. Like the subject and predicate of a sentence, expository texts are organized as specific information (conclusions) relative to general information (topics). Hence, there are polar abstract types, summary-specific and descriptive-general. Summary abstracts are usually at the beginning of texts, just as subjects usually appear sentence-initially.
INTRODUCTION

The body of this dissertation will consist of five articles with a common theme, the comparison of visual and linguistic interpretation. Although language and vision represent clearly distinct cognitive faculties, each article provides independent evidence that similar processes are operating in both. As the title suggests, these articles fall into two categories, (1) those which argue for certain elaborations or modifications of linguistic theory and (2) those which demonstrate how linguistic theory, buttressed by certain visual models, can be applied to the analysis of written discourse. Both of these categories can be further divided into two subdivisions, (a) discussions of form and (b) discussions of content.

Here I use the term form specifically to refer to hierarchical, ordered relationships between different language elements, in particular the ordered relationship between subject NP and predicate VP in sentence structure and also the ordered relationship between the introduction, body, and summary in an expository text. Here the term content specifically refers to the interpretive relationships between language elements and the things they represent, in particular the things represented by words, by sentences, or by entire texts.

The form and content relationships of language elements have very precise and instructive analogues in visual perception. These can enable
us to first explain previously opaque linguistic phenomena and subsequently identify useful applications of abstract linguistic theory to concrete problems in writing.

**Visual models of language form and content**

I divide the visual perception models to be used into three types:

A. Ordered relationships perceived between different visual forms, i.e., illustrations of form relationships,

B. Different objects perceived to be represented by the same visual form, i.e., illustrations of content relationships,

C. Illustrations of both form and content relationships.

![Figure A](image)

A Necker cube, a face/vase figure, and a Venn diagram all represent the first type of visual model; these are exemplified in Figure A. The three drawings in Figure A all can be used to illustrate figure/ground perception.
Each drawing consists of at least two regions a and b which are in fact of equal distance from the viewer; yet when depth is imputed to any of the drawings, one region must be perceived as being closer to the viewer than the other, a before b or b before a. Thus one of the square cube-surfaces seems closer than the other; one circle overlaps the other, and is thus closer; we perceive a faces-figure before a background or a vase-figure before a background. So, depth perception imposes an order upon visual regions. This phenomenon will be compared with the syntactic order imposed upon language elements, to explain, for example, why a subject NP normally occurs before a VP in most languages but not in all.

W.E. Hill's wife/mother-in-law figure, Joseph Jastrow's rabbit/duck, and "droodles" represent the second type of visual model; these are exemplified in Figure B.

A viewer may impute different organizational schemes to the forms in Figure B, which in turn help determine their referents. Thus, the
left-most drawing is of a young woman or a hag, depending on whether its central dot-feature is construed as an ear or an eye, etc. A rabbit or a duck appears in the central drawing, depending on whether we place the "face" of the form to the left or to the right. Like all "droodles", the right-most drawing represents nothing clearly, until someone overtly supplies an organizational scheme, e.g. "a Mexican on a bicycle" or "a fish-eye on a pin".

Each of the forms in Figure B can represent more than one object or class of objects, while the forms themselves remain constant. This phenomenon will be compared to the flexible interpretation of language forms, to explain, for example, how the lexical significance of a word like game can remain constant even though the word may refer to different kinds of objects. Such a comparison will also help explain how entire texts may be construed as communicating essentially one meaning or several.

The Penrose & Penrose "fork" represents the third type of visual model, illustrating a complex interaction of form and content, as shown in Figure C.

Figure C.

This drawing represents the union of two incompatible visual forms,
which accounts for its bizarre character. The left-most portions of the
drawing organize six lines into two groups of three (the two prongs of a
U-shaped structure) while the right-most portions of the drawing organize
the same six lines into three groups of two (the three cylindrical prongs of
the "fork. The figure can be understood as a three-part organization: the
six lines in the middle of the drawing can be seen either way and thus
mediate between the two peripheral forms. This phenomenon will be
compared to the NP-Aux-VP organization of sentences and the basic text
organization of introduction, body, and conclusion. This will explain
formal syntactic behavior of English sentences and also the semantic
content relationship of subjects and predicates. In turn it will explain both
form and content relationships between general introductory information
and specific conclusions in an expository text.

Organization of chapters

Each article constitutes one of the five chapters of the dissertation,
which are supplemented with introductory and concluding discussion.
The order and theme of each chapter is given below.

Chapter one—The SOV >...>OSV Frequency Hierarchy.

This article addresses the language-specific syntactic interpretation of
presumably universal semantic form. Among different languages of the
world, subject (S), verb (V), and object (O) elements evidently occur in each
of the six logically possible orders, but the number of languages utilizing a
given order (in basic sentences) follows a definite preference hierarchy:
SOV > SVO > VSO > VOS > OVS > OSV.

The assumption that semantic form parallels visual form and that syntactic interpretation parallels figure/ground interpretation (see Figure A) provides a more elegant explanation of this preference hierarchy than is typically offered by generative or functionalist approaches.

Chapter two--Tense and the Structure of Clause Types.

This article addresses the semantic interpretation of English syntactic form (subject NP-tense Aux-predicate VP), which is modeled with a visual form (Figure C). This leads to an explanation of the acceptability or unacceptability of root and embedded clause forms in English, e.g.

What did the butler see?

*Whether did the br'tler see?

which is more general than the usual clause-filter approach used in generative grammar.

Chapter three--The Invariant Code-Significance of Lexical Items.

This article addresses the problem of lexical meaning. It is assumed that the immediate interpretation of a word is something which can be modeled with a visual form (Figure B). It is then possible to avoid difficulties in traditional semantic theory and explain the several meanings of individual words like *game* and *play* and yet conserve the notion of an efficient and intelligible lexical code, in which nearly all words have a unique, invariant significance.
Chapter four—Literary vs. Technical Writing:

Substitutes vs. Standards for Reality.

This article addresses the perception of a text as either technical or literary discourse. It is proposed that the perception of a text, like the interpretation of lexical items, can be modeled visually (Figure B). This provides a more effective means of distinguishing technical and literary discourse than has been offered previously. A text may apparently represent one standard of evaluation (technical discourse) or potentially substitute for many different object-meanings (literary discourse) depending partly on the type of detail in the text and partly on the perceptual disposition of the reader.

Chapter five—Counterparts of the Abstract in Sentential and Syllogistic Structure.

This article relates the content of summary and descriptive abstracts with the content of the introduction, body, and conclusion of an expository text. These text components can be modeled with the same forms applied to sentential structure (Figures A & C). It is thereby possible to explain why there are two polar types of abstract, why novice students can readily compose descriptive abstracts but are often unable to compose informative, summary abstracts, and why the informative abstract naturally appears first in the text even though it must actually be written last.
Conclusions

Visual models in linguistic theory provide a means of reconciling generative and functional perspectives. They also provide a useful bridge between "abstract" linguistic theory and the "practical" analysis of written discourse. This, in addition to their explanatory power, certainly justifies their use.

The conclusion of this dissertation will review the topics discussed and the linguistic phenomena explained by the visual models illustrated in Figures A, B, and C. Finally, the three types of visual model will be integrated in a single theoretical overview of language structure.
1. THE SOV>...>OSV FREQUENCY HIERARCHY
(co-author Dr. Frank Parker)

ABSTRACT

Typologists tend to agree that the numerical distribution of the six logically possible orderings of S, O, and V across the world’s languages is SOV > SVO > VSO > VOS > OVS > OSV. Starting with Peirce’s proposal that semantic form is diagrammatic (iconic) in nature, we then argue that the semantic relations of S, O, and V are best characterized as three concentric regions: S contained in O and O contained in V. Word order functions as a linear interpretation of this semantic diagram according to the ordering principles of figure/ground interpretation. These principles interact in such a way that all six ordering interpretations fall on a preference scale which conforms exactly to the SOV>...>OSV frequency hierarchy.

INTRODUCTION: THE PROBLEM

Ever since Greenberg’s (1966) seminal treatment of the topic, language typologists have been interested in the relative ordering of subject (S), object (O), and verb (V) in basic sentences across languages. (Basic sentences can be loosely defined as simple, active, declarative, positive sentences with nominal subject and object, and free of discourse context or emphasis. For elaboration see Jakobson 1963, Keenan 1978, and Hawkins 1983.) In particular, a number of recent comparative studies reveal that the six logically possible orderings of S, O, and V are not equally frequent. (If each type were equally frequent, each would represent approximately 1/6 or 16.6% of the world’s languages.) In fact, each word order type can be arranged into the following frequency hierarchy.

SOV > SVO > VSO > VOS > OVS > OSV
This hierarchy (hereafter SOV>...>OSV) captures the fact that there are more SOV languages than SVO; more SVO than VSO; more VSO than VOS; more VOS than OVS; and more OVS than OSV.

From one study to another, the actual number of languages in each category may vary, but there is general agreement on their relative frequency of occurrence. For example, Ultan (1969) categorizes 44% of the world’s languages as SOV; 35% as SVO; 19% as VSO; and 2% as VOS (cited in Clark and Clark 1977: 546). Likewise, in Ruhlen’s (1975) catalogue of languages, approximately 51% are listed as SOV; 35% as SVO; 11% as VSO; 2% as VOS; .5% as OVS; and .25% (one language) as OSV. Similarly, Pullum’s (1981) treatment of rare word order types (those with O before S) includes 18 VOS languages, 8 OVS languages, and four OSV languages.

From extensive language lists, Mallinson and Blake (1981) take a representative 100-language sample, indentifying 41 as SOV, 35 as SVO, 9 as VSO, and two as VOS. The sample includes one OVS language and one OSV language (1981:148). Finally, in Hawkins’ Expanded Sample (1983: 288), which is an extension of Greenberg’s (1966) survey, he catalogues 52% of his corpus as SOV; 32% as SVO; 13% as VSO; and 2% as VOS. The results of these studies are summarized in Table 1-1.

These facts constitute evidence of some universal principle operating across languages. Comrie, for example, notes:

In a representative sample of languages, if no universal were involved, i.e., if the distribution of types along some parameter were purely random, then we would expect each type to have roughly an equal number of representatives. To the extent that the
<table>
<thead>
<tr>
<th>WORD ORDER</th>
<th>ULTAN</th>
<th>RUHLEN</th>
<th>PULLUM</th>
<th>HAWKINS</th>
<th>MALLINSON &amp; BLAKE</th>
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<tr>
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<td>222</td>
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<td>174</td>
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<td>155</td>
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<td>109</td>
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<tr>
<td>VSO</td>
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<td>19</td>
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<td>11</td>
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<tr>
<td>YOS</td>
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<td>8</td>
<td>2</td>
<td>18</td>
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<tr>
<td>OYS</td>
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<td>.5</td>
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<td>OSY</td>
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<td>1</td>
<td>.25</td>
<td>4</td>
</tr>
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</table>

**TABLE 1-1. Distribution of word-order types by author.**
actual distribution departs from this random distribution, the linguist is obliged to state and, if possible, account for the discrepancy (1981: 19).

Since the frequency of each of the six word order types is clearly not random (i.e., not 16.6%), any adequate theory of word order should include a principled account of the SOV>...>OSV frequency hierarchy.

To this end, we have organized our discussion as follows. First, we will survey previous solutions to this problem and show how and why each one fails to account for particular facets of the frequency hierarchy. Second, we will review the principles of figure/ground interpretation of drawings (e.g., the face/vase illusion) and show that the phenomenon of depth is essentially the imposition of order among items depicted in a two-dimensional plane. Third, we will argue that the basic semantic relations holding among S, O, and V are best characterized by a two-dimensional diagram consisting of three concentric circles: S contained in O and O contained in V. Fourth, we will argue that when this diagram is interpreted according to the principles of figure/ground interpretation (i.e. when its components are ordered), it yields a hierarchy of preference which corresponds exactly to the SOV>...>OSV frequency hierarchy. That is, the most favored interpretation of the diagram corresponds to the most frequent word order; and so on. Finally, we discuss the acquisition and survival of grammars generating rare word orders as analogous to the evolution and survival of rare biological species.

PREVIOUS ANALYSES

In this section we will consider five recent theories proposed to account
for the SOV>...>OSV frequency hierarchy. We will show, first, how each one fails to account for particular facets of the hierarchy and, second, that each one succumbs to reasoning identified with one of two now-discarded theories of biological form: creationism and Lamarckianism. Creationism holds that environment and function are irrelevant to the form of a species. Likewise, purely formal accounts of word order variation consider external semantic and functional influence to be irrelevant to autonomous syntactic mechanisms. On the other hand, Lamarckianism holds that environment and function have a direct, causal influence on the form of a species. Likewise, purely functional accounts of word order variation consider external semantic and functional factors to be the primary determinant of syntactic ordering.

Given the common assumption in modern linguistics that language form is a type of biological form (see Chomsky 1980: 226-231 or Lightfoot 1984: 12-13, for example), identification of formal and functionalist explanations of word order with generally untenable theories of biological form constitutes a valid criticism of these two approaches.

Consider first the creationist/formalist approach. Emonds (1980), for example, proposes a purely formal explanation for the relative frequency of one word order type over another. Subject is defined as that NP occurring outside of the verb phrase (VP); object is defined as that NP within the VP. A hierarchy of base rules is proposed, in which unmarked rules (1) are preferred over marked rules (2).
The rules in (a) define the position of the subject with respect to the VP and the rules in (b) define the position of the object with respect to the V. Thus, the two unmarked rules (1a and 1b) generate SVO languages; one marked and one unmarked rule (1a and 2b or 2a and 1b) generate SOV and VOS languages, respectively; and the two marked rules (2a and 2b) generate OVS languages (1980: 35-38). It follows that SVO languages should be most common; SOV and VOS languages somewhat less common; and OVS languages least common.

There are, however, two problems with this analysis. First, Emond’s predictions (SVO > SOV/VOS > OVS) do not match the attested frequency hierarchy (SOV > SVO > VSO > VOS > OVS > OSV). Second, the analysis is essentially circular: Those rules that generate the relatively common languages are simply defined as being unmarked and those that generate the relatively rare languages are defined as being marked. A zoologist working within the creationist framework would likewise characterize the rarity of certain biological forms in terms of "markedness" in his or her particular taxonomic system (e.g., Linnaeus’ original system of botanical and zoological classification). Those species with the most unusual features, such as birds-of-paradise with exotic colors and plumage, would be the most marked in the classification system. Since unusual features
are necessarily the least common features, the association of markedness
with species rarity is a fact by definition. No deeper explanation is thought
to be required in the creationist framework. 3

Now consider the Lamarckian/functionalist approach. In the early
nineteenth century, Lamarck proposed a deeper explanation of biological
form and variation, the first well-known theory of evolution. Put simply,
the theory states that biological forms are directly shaped by environment.
For example, long-necked birds like the flamingo or the crane might have
resulted from the long-term stretching effect of dipping their heads in and
out of the water. Close examination of Lamarckian theory, however,
reveals difficulties which motivate its dismissal. For example, the theory
predicts that form-changes imposed upon an organism by the environment
will become inherent traits of the species. Observation, however,
disconfirms this; shepherds have been cutting the wool off sheep for
millenia, as well as bobbing their tails. These actions have never produced
a short-tailed, short-haired breed of sheep.

Functional theories of word order likewise predict that functional or
semantic factors will impose certain characteristics upon linguistic form.
Observation likewise disconfirms many such predictions. For example,
Maxwell (1984) argues that word order across languages is determined by
the semantic relationships of the ordered elements. Maxwell's basic claim
is that "an element which serves as a semantic link between two other
elements is likely to occur in linear order between them" (1984: 252). Thus,
the theory predicts that SVO and OVS would be equally likely syntactic
orders, since the verb is presumed to link the subject and object semantically. Unfortunately, however, Maxwell's theory fails in that it cannot explain the observed numerical predominance of SOV languages and it incorrectly predicts the comparable frequency of SVO and OVS languages.

In support of his approach, Maxwell cites the work of Keenan (1980) who also asserts that syntactic order is directly influenced by semantic relationships, though his concern is the ordering relation between functions (verbs and verb phrases) and arguments (noun phrases) in propositions. The claim is that if the object argument follows the verb function (i.e., if the language is VO), then in a consistent or preferred language, the subject argument should also follow the verb phrase function: (VO)S. Conversely, if the object argument precedes the verb function (i.e., if the language is OV), then the subject argument should also precede the verb phrase function: S(OV). Keenan's theory correctly predicts that the preferred OV language is SOV, but incorrectly designates VOS as the preferred VO language. In fact, VOS is the least common VO language, behind both SVO and VSO in numerical distribution.

Hawkin's (1983) theory of word order frequency, Cross-Category Harmony (CCH), makes predictions comparable to Keenan's theory. CCH predicts that the most 'harmonic' language types should be the most numerous (1983: 154); and, all other considerations being equal, language types with subject and object both on the same side of the verb are most harmonic. Thus, VOS languages are designated as harmonic and
incorrectly predicted to be common, while SVO languages are designated as disharmonic and are incorrectly predicted to be relatively rare. Both Hawkins and Keenan attribute the discrepancy between their theories and the actual data to the fact that subject elements commonly occupy the sentence-initial position across languages (hence, Keenan's 1979 Subjects Front principle [cited in Hawkins 1983: 156-157]). This principle, however, comes to little more than the basic observation, still to be explained, that SVO and SOV types constitute the vast majority of the world's languages (84% of Hawkins' sample).

In an attempt to solve the same problem, Mallinson and Blake (1981) formulate a principle stating that the topic constituent (usually the subject) tends toward sentence-initial position; in addition they note that structurally complex constituents (usually the object and verb) tend toward sentence-final position (1981: 151). While these tendencies may account for the observation that SOV and SVO languages predominate, Mallinson and Blake's theory fails to account for any frequency data more fine-grained than that which shows S-initial languages are more frequent than non-S-initial languages. Moreover, Mallinson and Blake ignore the consequences of the inexact correlation between subject and topic. For example, since the object of a sentence can frequently be construed as its topic, there should be a correspondingly frequent number of OVS or OSV languages. This, however, is disconfirmed by Mallinson and Blake's own language sample (1981: 148).

Krupa (1982) suggests that word order is a function of at least three
interacting factors: (a) actual sentence processing; (b) the intrinsic logical or cognitive character of S, O, and V; and (c) the relative structural independence of each of these elements. Each factor defines one or more ideal orderings of S, O, and V.

Krupa's first factor follows from the assumption that actual sentence processing parallels abstract sentential phrase markers. Consequently, Krupa considers SOV and SVO ideal orderings, since these are purely right-branching structures and, consequently, make the least demand on short-term memory during processing (1982: 640). All other orders, having either left-branching structures or discontinuous constituents, are less favored by this first factor.

Krupa's second factor follows from the assumption that there is a natural cognitive order of agent before patient, topic before comment. Krupa considers SVO to parallel this natural cognitive order most directly and thus is ideal with respect to the second factor. OVS, as the mirror image of the ideal cognitive order, is least favored. Other orders are intermediately favored (1982: 641).

Krupa's third factor follows from the assumption that the more independent an element is, the further to the left it will occur in sentential order. Krupa cites various arguments to support the claim that "V is the most central and independent constituent of the sentence" and that "O has inferior status to S" (1982: 642). Consequently, this factor favors VSO order; OSV is disfavored; and other types are intermediate.

When all six word orders are ranked according to their relative
conformity to Krupa's three factors, his theory predicts the following frequency hierarchy: SVO > SOV > VSO > VOS > OSV/OVS. As with the other theories we have discussed, Krupa's predictions depart from the actually attested frequency hierarchy: SOV > SVO > VSO > VOS > OVS > OSV. In particular, Krupa's theory incorrectly predicts that SVO languages will outnumber SOV and that OVS and OSV will be equally frequent. To account for this discrepancy, Krupa retreats to the position that "we do not yet know all the factors which are relevant for the linearization process" (1982: 644). His findings, however, may just as well demonstrate that none of the kinds of factors that he has considered, singly or in combination yield the correct explanation of the SOV>...>OSV frequency hierarchy.

Finally, functional explanations per se are entangled in a dilemma. For example, if they construe functional or semantic criteria to the motivate the predominant SOV word order, they are immediately at a loss to explain any of the conflicting word orders, which presumably must be subject to the same functional or semantic influences. Either universal causes do not have the same cross-linguistic effects (e.g., the Subjects Front Principle, which is presumably universal, does not affect all languages). Or each language type is affected by a different set of universal factors (e.g., Krupa's cognitive factor--agent before patient, topic before comment--applies to SVO languages but apparently not to OVS languages). Both horns of the dilemma act to raise more questions than to provide answers.
Likewise, the Lamarckian theory of biological form is hindered by a similar dilemma. If it is said that the giraffe has developed a long neck through generations of stretching it to reach high branches, it becomes difficult to explain why the elephant, subject to the same functional demands, lengthened its nose instead of its neck. The answer, according to modern biology, is that elephants have different genes than giraffes, which cause different adaptations to the environment. In short, we have replaced Lamarckian "functionalism" with theories of genetics and natural selection: the elephant's trunk is directly determined (i.e. generated) by its genes; the giraffe's neck is generated by its genes—different genes generate different biological forms, regardless of any common function. However, the functional requirements imposed by the environment (e.g., high branches) do work to eliminate dysfunctional forms (e.g., short-necked giraffes, short-nosed elephants), along with the genes responsible for them.

Let us summarize this section. First, none of the theories we have just reviewed accounts for all the facts of the attested SOV>...>OSV frequency hierarchy. Moreover, each theory can be identified with either the creationist position (environment has no effect of form; semantics or function has no effect on ordering) or the Lamarckian position (environment has a direct causal effect on form; semantics or function has a direct causal effect on ordering). We will instead adopt a position avoiding either problematic alternative, just as theories of genetics and natural selection avoid the untenable alternatives offered by creationism and Lamarckianism.
In our view, semantic form is neither irrelevant to nor the direct cause of any basic word order; rather word order is a linear interpretation of semantic form. Specifically, we assume that semantic representations are composed minimally of the unordered components: S, O, and V. These components are in turn ordered when the semantic representation is interpreted by a human language learner. Once the learner imputes a particular order to the components of the semantic representation (i.e., SOV, SVO, etc.), he constructs a grammar to generate that basic word order. Thus, semantic form is relevant to the determination of basic word order but does not cause it directly. This view of the relation between semantics and syntax is compatible with the fact that the words of a sentence must be uttered or written in some order or another; yet there is no reason to believe that the elements of meaning expressed by that sentence have any intrinsic order whatsoever. (Note that all possible orders of S, O, and V are attested.) In short, then, an explanation for the SOV>...>OSV frequency hierarchy lies within the interpretive relation between semantics and syntactic form.

**VISUAL PERCEPTION: A PARALLEL**

The relationship we are proposing between semantic form and its syntactic interpretation is comparable to that between the drawing in Figure 1-1 and its (A) face/(B) vase interpretations.

[See Figure 1-1 next page]

The drawing is entirely composed in a single plane, defined by the X
FIGURE 1-1. Figure/ground interpretation.
and Y axes. Even though the drawing itself has no depth, the interpretations of the drawing do have apparent depth. By definition, figure/ground interpretation consists of perceiving an object (i.e. figure) in front of a background (i.e. ground) region. Thus, under the face interpretation, region A appears in front of region B; i.e., A is closer to the viewer than B. Under the vase interpretation B appears in front of A. In constructing these two interpretations, the viewer must necessarily specify an ordered relation between regions A and B. This can be illustrated by positing a Z axis (perpendicular to the X-Y plane), representing the viewer's depth perspective. Figure 1-2 differentiates the two interpretations of the drawing by ordering A and B with respect to each other along the Z axis.

[See Figure 1-2 next page]

Under the face interpretation, A is ordered before B; under the vase interpretation, B is ordered before A. Note that the illusion of depth (or, alternatively, ordering) is obligatorily imposed by the process of visual perception.

We want to claim that a language's basic word order, as specified by its grammar, is essentially a particular ordered interpretation of semantic form, just as the perception of a vase in Figure 1-1 is essentially a particular ordered interpretation of a visual form. Alternative syntactic orders are thus defined on a line perpendicular as it were, to the plane on which semantic form is defined, just as the face and vase interpretations in Figure 1-2 constitute alternative orderings of A and B on the Z axis,
A.D. MANNING  
RELEVANCE OF VISUAL MODELS

FIGURE 1-2. Figure/ground ordering on the Z axis.

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perpendicular to the X-Y plane of Figure 1-1.

Hence, to explain the SOV>...>OSV hierarchy, we postulate that semantic form is cognitively similar to visual form; that is to say that semantic form can be modeled with visual forms and that semantic form is subject to the same interpretive processes as visual form. Support for this assumption, independent of our concerns about word order is found in the writings of C.S. Peirce:

Every indirect method of communicating an idea must depend for its establishment upon the use of an icon. Hence every assertion must contain an icon or a set of icons, or must contain signs whose only meaning is explicable by icons (2.278, cited in Fitzgerald, 1966: 168).

An icon is here understood as a picture-like or digrammatic representation (Jakobson 1971: 353-351). Jakobson reiterates Peirce's basic claims, stating that the syntactic forms of every language express "logical icons of mimetic kind" (1980: 34). Furthermore, Kuno (1987) explicitly asserts that linguistic expressions and drawings like the Necker cube are subject to the same, general interpretive processes (1987: 7).

**The figure/ground hierarchy**

The critical link between the interpretation of a drawing and the interpretation of a semantic diagram is the figure/ground hierarchy. Neither the drawing nor the diagram embody an ordering relationship among the elements. Rather, order is imposed upon the drawing/diagram during the interpretive process. Order manifests itself as depth in the interpretation of a drawing and as word order in the interpretation of a
semantic diagram. It the figure/ground hierarchy that determines which element is first in both the drawing and the diagram.

The fundamental principle of figure/ground interpretation is explicitly stated by Attneave: "If one area encloses another, the enclosed area is likely to be seen as the figure. If a figure is divided into two areas, the smaller of the areas is favored as the figure" (1971: 64). In other words, the enclosed area (i.e., the smaller of the two areas) in a single diagram is favored as the figure, that is, as the closest to the perceiver or as the first in order. This principle is illustrated in Figure 1-3.

[See Figure 1-3 next page]

First, consider Figure 1-3(a), which is divided into two regions, U and M. Region U has the smaller area and is most commonly perceived as the figure; region M has the larger area and is generally perceived as the ground. That is, Figure 1-3(a) is most easily interpreted as a U. Conversely, in Figure 1-3(b), region M has the smaller area and is generally perceived as the figure; whereas region U has the larger area and is most commonly perceived as the ground. That is, Figure 1-3(b) is most easily interpreted as an M. Both diagrams illustrate that the smaller area is favored as the figure (i.e., closer to the viewer; ordered first along the Z axis).

Note, however, that it is possible to "flip" the interpretation of Figure 1-3(a) such that region M is the figure. Likewise, Figure 1-3(b) can be interpreted such that U is the figure. This illustrates that the figure/ground hierarchy constitutes a preference of interpretation rather
FIGURE 1-3. Figure/ground interpretation influenced by relative region size.
than an iron-clad rule. Note the relevance of this fact for the syntactic interpretation of semantic forms. We consider semantic forms to be diagrams composed of the elements S, O, and V. We also consider each of the six logically possible word orders to be a syntactic interpretation of a semantic diagram. Since all six orders are in fact attested, but attested in different frequencies, any descriptively adequate theory of the SOV>...>OSV frequency hierarchy must permit all six orders but it must also favor certain orders over others. The figure/ground hierarchy meets both of these criteria. It permits two interpretations of a diagram but favors one over the other, as is illustrated in Figure 1-3.

A second principle of figure/ground interpretation involves the relative areas of the enclosed and enclosing regions in a diagram. The smaller the area of the enclosing region with respect to the enclosed region, the easier it is to interpret the enclosing region as the figure. This principle is illustrated in Figure 1-4.

[See Figure 1-4 next page]

In Figure 1-4(a), the region designated by P is much larger than the region designated by S, and P encloses S; consequently, S is preferred as the figure (i.e., closer to the viewer; order first on the Z axis). We will call this the dime-on-a-plate interpretation of 4(a). In Figure 1-4(b), the region designated by P has an area comparable to that of region S. Yet, since P completely encloses S, S is still the preferred figure. We will call this the cake-on-a-plate interpretation of 4(b). Note, however, that it is easier to "flip" Figure 1-4(b) than 1-4(a). That is, it is easier to interpret P in 1-4(a) as
FIGURE 1-4. Figure/ground interpretation with S enclosed in P.
the figure (i.e., the donut interpretation). This is because the enclosing
region P is much smaller with respect to the enclosed region S in 1-4(b)
than it is in 1-4(a).

Let's summarize these two principles of figure/ground interpretation.
The first principle essentially states that in a two-region diagram the
smaller, enclosed area will be favored as the figure. Any interpretation
that conforms to the principle we will call a preferred interpretation. The
second principle essentially states that in a two-region diagram it is
increasingly easy to interpret the enclosing region as the figure (i.e.,
override the preferred interpretation) as the area of the enclosed region
increases. Any interpretation that conforms to this principle we will call a
possible interpretation. Any interpretation conforming to neither of these
principles we will call a disfavored interpretation.

So far we have considered the interpretation of diagrams having only
two regions. When a third region is introduced into a diagram the process
for determining the figure/ground interpretation becomes more complex.
Consider, for example, the effect of collapsing Figures 4(a) and (b) into a
single diagram. This is illustrated in Figure 1-5.

[See Figure 1-5 next page]

There are now three regions to be ordered on the Z axis: S, O, and
V—for the moment these should only be regarded as arbitrary, convenient
labels. The interpretive (i.e., ordering) process essentially involves two
steps.

1. Determine the figure for the entire diagram, the element first
FIGURE 1-5. Figure/ground interpretation with S enclosed in O enclosed in V.
2. Determine the figure for the two remaining regions, the element second in order. (This becomes the relative figure.)

Obviously, the first step is the more important of the two, since it determines the figure form the entire percept. Note, for example, that a vase (rather than a face) is perceived as soon as the B region of Figure 1-1 is interpreted as the figure.

The principles of figure/ground preference and the relative significance of the two ordering steps produce a definite hierarchy of preference for all six possible figure/ground ordering interpretations of Figure 1-5; the hierarchy is listed in Table 1-2.

Let's consider the interpretations of the diagram in Figure 1-5 in descending order of preference. The most preferred interpretation of Figure 1-5 is that in which region S is the overall figure, and O is the relative figure in the overall OV ground; (the dime-on-a-cake-on-a-plate interpretation). Both ordering steps take the preferred option, smaller/enclosed region before larger/enclosing region: (S before (O before V)). The second-most favored interpretation is that in which S is still the overall figure, but V is the relative figure in the overall OV ground (the ball-before-a-hoop-on-a-wall interpretation). The more significant step (1) takes the preferred option as before, but step (2) takes only the possible option, larger/enclosing before a smaller/enclosed area: (S before (V before O)).
FIGURE/GROUND INTERPRETATION

<table>
<thead>
<tr>
<th></th>
<th>STEP 1: OVERALL FIGURE</th>
<th>STEP 2: RELATIVE FIGURE</th>
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<tbody>
<tr>
<td>S before (O before V)</td>
<td>preferred</td>
<td>preferred</td>
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<tr>
<td>S before (V before O)</td>
<td>preferred</td>
<td>possible</td>
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<tr>
<td>V before (S before O)</td>
<td>possible</td>
<td>preferred</td>
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<tr>
<td>V before (O before S)</td>
<td>possible</td>
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<tr>
<td>(O before V) before S</td>
<td>disfavored</td>
<td>preferred</td>
</tr>
<tr>
<td>(O before S) before V</td>
<td>disfavored</td>
<td>possible</td>
</tr>
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</table>

TABLE 1-2. Figure/ground interpretation preference hierarchy.
The third-most favored interpretation takes the possible option in step (1), but the preferred option in step (2). V is the overall figure and S is the relative figure in the overall SO ground (the hoop-before-a-ball-on-a-wall interpretation): (V before (S before O)). It is worth pointing out that, although interpretations (S before (V before O)) and (V before (S before O)) both consist of one preferred and one possible option, the S-initial interpretation is the more favored of the two because in the more significant first step (i.e., determination of the overall figure), the preferred option is exercised.

The fourth-most favored interpretation takes the possible option in both steps (1) and (2). V is interpreted as the overall figure, and O is interpreted as the relative figure in the overall SO ground (the looking-down-a-well interpretation): (V before (O before S)).

Interpretations in which the O region is the overall figure in the diagram are disfavored because they introduce a complication into the figure/ground interpretation process. Specifically, it is not possible to select O as the overall figure in one step. Figure/ground interpretation is essentially dyadic in nature: the diagram being interpreted must be considered as exactly two areas, one potential figure and one potential ground. In S-figure interpretations, S is considered to be one area while regions O and V can be conflated into another single area. In V-figure interpretations, V is considered as one region, while the S and O regions are conflated into another single area. In O-figure interpretations, however, regions S and V cannot be conflated, since they are separated by
region O. Thus, to select O as the overall figure requires that it be compared with the enclosed/smaller S region and the enclosing/larger V region.

However, once O is interpreted as overall figure, with all of its attendant problems, the second step is to interpret S or V as the relative figure. V is preferred because, according to our first principle of figure/ground interpretation, V completely encloses the smaller figure O. This leaves S as the overall ground. This interpretation (the donut-on-a-plate-with-a-hole-in-it interpretation) corresponds to ((O before V) before S).

On the other hand, interpreting S as the relative figure is possible because, according to our second principle of figure/ground interpretation, it is possible to interpret an enclosing larger region as figure (O) and the enclosed smaller region as ground (S), if the areas of the two regions are similar. This leaves V as the overall ground. This interpretation corresponds to the least-favored interpretation ((O before S) before V). The unsuitability of S as relative figure with an overall O figure is supported by the observation that under such circumstances the S region tends to vanish altogether as a unique percept, leaving only the donut-on-a-plate interpretation (O before V).

It is no accident that we have labeled the three regions in the diagram in Figure 1-5 as S, O, and V. Table 1-2, which is the preference hierarchy for the interpretation of Figure 1-5, corresponds exactly to the SOV>...>OSV frequency hierarchy. The most preferred interpretation of Figure 1-5 (S
before (O before V)) corresponds to the most common word order (SOV); the most disfavored interpretation ((O before S) before V) corresponds to the least common word order (OSV); and so forth. All we have left to do is provide motivation for considering Figure 1-5 to be an accurate representation of the semantic relationship among S, O, and V.

**Semantic enclosures**

We originally proposed that semantic form is diagrammatic, and now subsequently propose that the relevant diagram consists of a series of enclosures. These proposals are in fact no more or less remarkable than the basic assumptions of modern syntactic theory. Syntactic form is modeled as a series of branching nodes or tree diagrams; tree diagrams are alternatively represented as a series of enclosed brackets, e.g., \([s[NP\text{the cat}]VP\text{sat}[PP\text{on the mat}]]\). Figure 1-5 might likewise be alternatively represented with enclosed brackets: \([V[O[S]]]\). Our use of enclosed circles merely serves to emphasize that semantic enclosures are not necessarily ordered and to facilitate our discussion of figure/ground interpretation.

Also, our use of enclosed circles is not far removed from a Venn diagram, overlapping circles which represent intersecting class sets of a proposition. Significantly, Copi (1982: 207) points out that the bare two-circle Venn figure diagrams no proposition by itself. Overlapping circles represent a proposition only when the subject-set circle is marked to indicate how much of the subject set is enclosed in the predicate set. Quantifiers determine how much of the subject set is enclosed in the
predicate set: All S is P; Not all S is P; Some S is P; No S is P. Thus, the diagrams in Figure 1-4 differ from a Venn diagram only in that the S circles implicitly represent only quantified elements of the subject set, enclosed in the predicate set. (Negative quantifiers of course indicate that the enclosed set is empty.)

There are several sources of support for considering Figure 1-5 (i.e., S contained in O and O contained in V) an accurate semantic diagram of a basic transitive sentence. First, as Venn diagrams of traditional logic indicate, an elemental proposition is essentially the quantification of members of the subject set (S) overlapping (i.e., enclosed in) the predicate set (P). Furthermore, in a transitive proposition, P is the quantified intersection of sets O and V. (Note that Montague's logical analysis restructures transitive S-V-O statements as intransitive S-P statements (Dowty et al. 1981: 217).)

Second, consider the relationship of S, O, and V in terms of generality of reference. Verb elements represent the largest domain of reference and consequently the largest circle in a diagram of generality. Consider, for example, all of the different activities which can be represented by the verb *run*: the running of children, the running of fish, the running of water, the running of watches, and so on. The kind of activity designated by the verb, however, is restricted by its object. For example, *running a race* differs in reference from running one's life; both in turn, differ from running a machine. Hence, the object designates a smaller domain within that designated by the verb. Consequently, the most accurate semantic
By the same token, the reference of a predicate (i.e., O+V) is further restricted by its subject. Consider, for example, the predicate run that machine; John runs that machine is a completely different kind of assertion from Electricity runs that machine (see Keenan 1978: 306-307). Consequently, the most accurate semantic diagram of a sentence is S enclosed in P. Thus, in terms of generality of reference, the most restricted domain is designated by S, the smallest circle. An intermediate domain is designated by O, a circle enclosing S. And the largest domain is designated by V, a circle enclosing O.

Third, this conception of S, O, and V as progressively larger enclosed circles is further supported by the morphological behavior of these elements. Krupa (1982: 642) cites various arguments for considering V to be the most structurally independent element in a sentence. He notes the frequent projection of S and O elements from the verb through morphological affixation and agreement. Moreover, he observes that tense, aspect, and mode markers are relevant to the whole sentence but are typically affixed only to the verb. Likewise, he notes that sentences occur which consist of a verb only, but rarely of an S or O alone. Such facts follow naturally from the conception of the V as the largest, most general element in the semantic representation of a sentence, with the S and O elements enclosed in it.

Fourth, the behavior of the S and O categories in ergative languages support the diagram of S, O, and V in Figure 1-5: S is the smallest region
and O is the intermediate region, relative to V. In ergative languages, the subject NP in an intransitive sentence is marked differently from the subject NP in a transitive sentence. Moreover, the object NP in a transitive sentence may receive the same morphological marking as the subject NP of an intransitive sentence. In Tongan, for example, both the intransitive subject and the transitive object are marked with absolutive case, whereas the transitive subject is marked with ergative case. Similarly in Avar the subject agrees with the verb in an intransitive sentence, but the object agrees with the verb in a transitive sentence (Anderson 1976: 3-4).

The Tongan and Avar data can be explained by reference to the diagrams in Figures 4(a) and 5. (Recall that Figure 1-4(a) depicts S contained in P and the Figure 1-5 depicts S contained in O and O contained in V.) Absolutive case (in Tongan) and verb agreement (in Avar) do not designate either subjecthood or objecthood; rather, they designate the region immediately enclosed by P in an intransitive sentence (Figure 1-4(a) or by V in a transitive sentence (Figure 1-5)). An intransitive sentence, as represented in Figure 1-4(a), contains no object region. Since S is the region immediately enclosed by P, S is marked by absolutive case in Tongan and verb agreement in Avar. On the other hand, a transitive sentence, as represented in Figure 1-5, does contain a distinct object region. Since O is the region immediately enclosed by V, O is marked with absolutive case in Tongan and verb agreement in Avar.

In short, the diagram of semantic relations depicted in Figure 1-5 receives support from traditional logical analysis, from generality of
reference, and from the morphological behavior of S, O, and V elements across languages. If this diagram is treated as a psychological reality, and is syntactically interpreted with essentially the same hierarchy of preference that governs figure/ground interpretation, then a coherent account of the SOV>...>OSV frequency hierarchy falls out.

**SELECTIONAL PREFERENCE: ACQUISITION AND SURVIVAL**

We have argued essentially that the SOV>...>OSV frequency hierarchy results from the syntactic interpretation of a semantic diagram in which S is contained in O and C is contained in V. The syntactic interpretation of the semantic diagram imposes an ordering of the elements S, O, and V. The actual ordering is determined by the principles of figure/ground interpretation. These principles interact in such a way that SOV is the most preferred ordering and OSV is the most disfavored; the other four orders fall on predictable points of preference in between the two extremes.

Let's now take a look at the relationship between the word order functioning as the syntactic interpretation of a semantic diagram and the acquisition and survival of grammars that generate these word orders. At the outset of our discussion, we stated that our theory is comparable to that of natural selection in biology; thus, it is fitting that we parallel our discussion of word order with a concommitant discussion of biological form.

First, biological reproduction and language acquisition both admit the potential for change. In biological reproduction, plants and animals
reproduce their forms more or less exactly. However, there is a reshuffling of genetic material in each biological act of reproduction, and thus arises the potential for the creation of a new form.

Likewise, in language acquisition, once a mature grammar generating one of the six occurring word orders is constructed by the language learner, that order is thought to endure as long as the individual lives and speaks that language; however, the grammar generating that word order is not necessarily passed unchanged from one generation of speakers to the next. Each generation must create a grammar anew and therein lies the potential for change. As Traugott (1972) states,

...the fact that each generation, or rather each child, learns the language anew and makes its own hypotheses about the patterns of that language is the main cause for language change. (1972: 9)

Or, as Halle (1962) has noted,

Since each child constructs his own optimal grammar by induction from the utterances to which he has been exposed, it is not necessary that the child and his parents have identical grammars... (1962: 65).

Second, the survival and proliferation of both a new biological form and of a grammar generating a particular word order depends upon its ability to survive the competition. In a particular environment, certain biological forms are more successful in the competition than others, and these are more likely to survive, reproduce, and predominate numerically. These successful biological forms are, in effect, preferred by their environment. For example, the ability to fly is a highly competitive characteristic. A
flying creature can escape ground-dwelling predators and reach otherwise inaccessible food sources. Creatures whose genetically determined form is such that they can fly (e.g. birds, bats, and insects) are preferred in most environments and consequently enjoy a wide numerical distribution throughout the world.

Likewise, the survival and proliferation of a grammar generating a particular order of S, O, and V depends upon its being constructed again and again by language learners. Of course, the language learner's hypotheses are biased by the antecedent word order he or she is exposed to; but, as we have tried to argue, there is also the biasing effect of the hierarchy of syntactic interpretations the learner can impose on the diagram of semantic form (i.e., S contained in O and O contained in V). A grammar generating SOV order, for example, happens to be more successful than one generating OSV order in surviving the language acquisition process because of the selectional preference of the former syntactic expression of semantic form over the latter.

Third, the survival of a rare biological form and of a grammar generating a rare word order is enhanced by relative isolation. It is possible, for example, for birds to lose the ability to fly, after having acquired this generally successful and preferred competitive trait. Consider the rail, a variety of marsh bird found throughout the world. Some rare tropical and isolated species of this bird have lost the ability to fly. These flightless rails were nonetheless able to survive by virtue of their isolation. Since there were no indigenous rodents in the isolated areas
where flightless rails evolved, they encountered none of the competition which would normally assure that only a species of flying birds would survive. Since the introduction of competitive and predatory rats to these isolated areas, however, the varieties of flightless rails have become endangered or extinct.

Likewise, especially since so little is known about the languages with rare word orders, an adequate theory must admit the possibility of a language with a common word order (e.g., SOV) changing to one with a rare word order (e.g., OSV). What is significant, however, is the fact that the rarest word orders (i.e., VOS, OVS, and OSV) seem to be associated with small and isolated populations of speakers. For example, in Pullum's (1981) catalogue of these rare types, the majority are spoken in isolated areas of Central and South America where, incidentally, numerous rare and exotic birds and animals are also found. The relative isolation of these populations has apparently allowed grammars generating disfavored word orders to develop competitive word orders in the SOV>...>OSV frequency hierarchy.

In short, these rare language types are probably not harder to acquire and process than their more common counterparts, just as the flightless bird is neither more primitive nor more complex than one which can fly. Rather, the nature of semantic form (i.e., $S$ contained in $O$ and $O$ contained in $V$) and the syntactic interpretation of that form (i.e., the ordering of $S$, $O$, and $V$ according to the principles of figure/ground interpretation) are such that these rare word order types are less likely to survive the language
acquisition process and, consequently, are less common in the world.

SUMMARY

Previous explanations of the SOV\textellipsis\textgreater OSV frequency hierarchy not only fail to account for all of the attested facts but also parallel theories of biological variation which have long been discarded. The formalist explanation is comparable to a creationist theory of biology by virtue of its arbitrary characterization of marked and unmarked syntactic rules and its position that external factors are of no relevance to syntactic form. Such accounts are essentially circular: rare language types are generated by marked rules because marked rules generate rare language types. The functionalist explanation, on the other hand, is comparable to the Lamarckian theory of biology by virtue of its position that syntactic form is caused directly by external factors. Such accounts result in a dilemma: either universal causes have different cross-linguistic effects or each individual language type is affected by different universal causes.

Our proposal attempts to reconcile these two positions. We assume that even though word order is directly determined (i.e., generated) by the base component of the grammar, the speaker's perception of what that grammar must generate is affected by the linear interpretation of a diagram of semantic form. In particular, we propose that semantic form is diagrammatic and takes the form of three concentric circles: $S$ contained in $O$ and $O$ contained in $V$. Word order functions as a linear interpretation of this semantic diagram according to the principles of
The preference hierarchy for interpreting the semantic diagram corresponds exactly to the SOV>...>OVS frequency hierarchy. Our analysis differs significantly from previous theories in that it predicts the occurrence of all six word order types, but at the same time predicts that the numerical distribution of these types at any given point in time will approximate the SOV>...>OSV frequency hierarchy.
ENDNOTES

1 Two early language samples diverge somewhat from the other studies we cite in support of the SOV→...→OSV hierarchy. Greenberg’s (1966) list of 131 entries includes 49 SOV, 60 SVO, and 22 VSO. Culicover and Wexler’s (1974) sample includes 75 SVO, 83 SVO, 25 VSO, 5 VOS, and 4 OSV languages. Both studies list slightly more SVO than SOV languages and Culicover and Wexler list OSV languages in the absence of the OVS type. Thus, the SOV→...→OSV frequency hierarchy does not receive unanimous support from every single available sample. However, since both of these studies are admitted to be incomplete and not necessarily representative, we feel that the majority of available evidence supports the frequency ranking we propose. In alternative terms, the available facts appear to argue for no other single formulation of the frequency hierarchy.

2 Mallinson and Blake also list seven languages as having "other" word orders (without specifying their nature) and four languages as having free word order, bringing the total sample to 100 languages. Mallinson and Blake also acknowledge Pullum’s claim that OVS languages outnumber OSV languages even though this is not evident in their sample (1981: 181). It should also be noted that in Pullum’s sample five of the VOS languages, two OVS languages, and one OSV language are only tentatively designated as such. None of these facts are inconsistent with our postulation of the SOV→...→OSV frequency hierarchy.
Other formal explanations of word order variation tend to avoid the question of relative frequency of types altogether. For example, Culicover and Wexler (1974) and Pullum (1977) deal primarily with how certain word orders might be generated at all, regardless of their frequency. Since relative frequency is the issue in this paper, those studies will not be discussed further here.

We would note that, unlike biological competition in general, competition among word orders (as we describe it) takes place wholly in the mind of the language learner, and involves only the basic word-order parameter of the grammar (the base component), not languages as a whole. In other words we would not claim, for example, that English, as an SVO language, might compete directly with Malagasay, a VOS language. The whole sociological question of competition among entire languages and cultures is outside the scope and intent of our discussion.
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2. TENSE AND THE STRUCTURE OF CLAUSE TYPES

ABSTRACT

Generative grammarians hypothesize that intuitively unacceptable syntactic forms violate rules and filters in the speaker/hearer’s language-generating mechanism. This article considers a case in point, the acceptability of root and embedded clause forms of English. Filters needed to explain the data multiply to the point of differentiating a single word whether. A theoretical alternative is offered in which a sentence is an entity signifying mediation between otherwise incommensurable domains: subject and predicate. The mediating link is tense. Consequently any syntactic form which for whatever reason does not constitute two internally consistent domains and a tense element does not constitute an acceptable sentence. Such a model gives a principled explanation of the behavior of English root and embedded clauses. It also allows a workable semantic characterization of subject-auxiliary inversion and of sentence complementizers.

AN ARRANGEMENT OF CLAUSE TYPES

Within the framework of generative grammar, linguists use the asterix (*) to designate sentences which are syntactically ill-formed; that is to say sentences which do not conform with their postulated structuring rules of a language. The rules ideally are commensurate with judgements of competent speakers that such sentences are unacceptable. The present study shall be concerned with acceptable and unacceptable sentences similar to these:

(a) The dog had gone.
(b) He told me where the dog had gone.
(c) He told me whether the dog had gone.
(d) *Where the dog had gone.
(e) *Whether the dog had gone.
(f) *He told me where had the dog gone.
Current generative models generally account for the unacceptable quality of sentences like (d) and (e) by postulating an element in the speaker's English-language ability which filters out a certain kind of sentence structure—in this case, a root clause (that is a clause which by itself is an independent sentence) in which a noun phrase immediately follows a sentence complementizer (that, where, whether, ...) does not pass the filter. Sentences (b) and (c) above indicate that this complementizer-noun phrase clause may however form an acceptable dependent clause internal to another sentence called an embedded clause. Sentence (a) above passes the filter just described since there is no complementizer in evidence before the noun phrase. Sentence (f) passes this filter even though it is readily judged unacceptable; this suggests the need for another filter which prevents a clause like (g) below from being used as an embedded clause.

(g) Where had the dog gone(?)

And although (g) makes a suitable root clause as a question, sentence (h) does not:

(h)*Whether had the dog gone.

A filter which differentiates between where and whether could also be suggested within this methodology, but at this point the process begins to manifest its ad hoc character, and although a very small number of filters can be used ingeniously to account for a broad spectrum of data, they are hardly self-explanatory. Consequently, more interesting theoretical
alternatives should be welcomed which give an accounting of the
acceptability or unacceptability of sentences like those above.

To clarify certain aspects of the issue, clauses like those just examined
shall be arranged in sets of clause types. The sets are according to how the
clauses in them can be appropriately used:

(R&E) clauses: acceptable as a root or embedded clause.

(E) clauses: acceptable as an embedded clause only.

(R) clauses: acceptable as a root clause only.

(0) clauses: not acceptable as a root nor as an embedded clause.

They are exemplified as follows:

(1a) He told me she had gone.
(1b) She had gone. (R&E)

(2a) He told me whether/that she had gone.
(2b)*Whether/*That she had gone. (E)

(3a)*He told me (where) had she gone.
(3b) (Where) Had she gone. (R)

(4a)*He told me that/whether had she gone.
(4b)*That/*Whether had she gone. (0)

Note that all the clause types given here elaborate somehow upon the
basic Noun Phrase-Aux-Verb Phrase form; three specific elaborations are
in evidence:
1. an initial-position wh-word
2. an initial-position that
3. transposition of the noun phrase and auxiliary (NP-Aux inversion).

The type of clause shown in (1) which has the least elaboration (none) has the broadest application potential (R&E). Any single elaboration restricts the use of the clause in some way.

Initial-position that, or initial-position wh-words exemplified in (2) restrict application to (E).

NP-Aux inversion alone restricts a clause to (R). Combination of any initial wh-word (except whether) with NP-Aux inversion also restricts a clause to (R), as shown in (3).

The other combination, initial position that or whether with NP-Aux inversion disallows (R) as well as (E), shown in (4).

This arrangement of sets may be represented in a Venn diagram, the (R) set of clauses and the (E) set of clauses shown as overlapping circles. Their intersection designates the (R&E) set (Figure 2-1). (0) clauses are outside the domain of either circle.

[See Figure 2-1 next page]

It follows that in order to explain the acceptability or unacceptability of these clause types as root and/or embedded clauses, it is necessary to specify the nature of (the set of) root clauses and embedded clauses and also to specify how any given clause-elaboration strategy modifies a clause, restricting it to one set or another.
FIGURE 2-1. Overlapping sets of clause types.
TENSE AND PREDICATION

It is certainly trivial to observe that the most basic declarative sentence, *ipso facto* a root clause, must consist of a "subject" and a "predicate". Yet a generally satisfactory definition of these primitives and their relationship is not self-evident in spite of extensive discussion; as Bradley's dilemma illustrates:

... and we seem unable to clear ourselves from the old dilemma. If you predicate what is different, you ascribe to the subject what it is not; and if you predicate what is not different, you say nothing at all (as quoted in Copi 1982: 274).

In the analytic sentence, "A is A", the ascription of A as a predicate to itself as subject is a tautology. Inasmuch as "judgement" is defined by Bradley as the union of differences, then "A is A" is not judgement. It says nothing. However the synthetic sentence, "A is B" is a contradiction; it asserts that A is "strictly the same as B" when these are by definition not the same. "A is B" cannot be a judgement since it provides no basis for uniting differences (Church 1942: 22-23).

If not to be evaded, this dilemma can be placated by showing that the inevitable conclusion--that a predicate ascribes to a subject a contradiction (or nothing)--is not an undesirable situation but rather it is essential to a **dynamic** view of language and thought.

[See Figure 2-2 next page]

Consider the classical paradoxical object in Figure 2-2. As it is perceived with the conventions of line drawing and perspective, the figure does present a contradiction precisely when we try to perceive it as a
FIGURE 2-2. A visual model of Bradley's dilemma.
unified whole. The left extreme of the drawing has three projections and right extreme only two. At some point in the drawing, something becomes nothing and nothing becomes something.

[Figure 2-3 next page]

But if the object is enclosed in a Venn diagram (Figure 2-3), A ∩ B is seen as part of both self-consistent wholes (A and B) which contradict each other, and yet at the same time A ∩ B is a non-contradictory, continuous whole. A ∩ B represents the transition between two "incommensurable modes of organization" (Merrel 1982: 21). From this model, Merrel suggests that "particular perspectives, self-sufficient and consistent from within, are, to a degree, inevitably contradictory with respect to other perspectives or to larger contexts" (pg. 21). Yet, the genius of communication and symbolic activity is the very ability to "leap" from one domain into another, incommensurable one, thereby traversing a multitude of perspectives and contexts. This is made possible by these transitional continuums (pg. 34).

I am convinced that the model of thought and symbolic structure proposed above has direct and critical import for the formulation and interpretation of sentences, that subject and predicate do represent at least partly contradictory domains which are joined by a mediating link to create the assertions of language. Given these two entities, what is the basis for linking them together? Heny (personal communication) has suggested, albeit tentatively, that in English at least, tense serves as the functional link between the subject and predicate.
FIGURE 2–3. Mediation between incompatible regions.
Tense appears to satisfy at least one criterion given the transitional continuum between otherwise incommensurable domains—that the mediating link must be part of both domains. Perceptually, tense may be a feature of both subject and predicate in that both things and properties attributed to things exist for a certain period of time; also, the form which the tense-morpheme takes may be determined by either the subject NP or the predicate verb, depending on whether tense is present or past:

- I drive it.  
- He drives it.  
- I/Bill drove it.  
- I/Bill parked it.

In present tense in English the only specific sign of tense is the s attached to the verb, but this sign is only indicative of third-person singular subjects; it may be said then that the subject determines the form which present-tense takes. Conversely in English past-tense there are a variety of forms which the sign of tense may take, depending on the verb, but none are formally linked to the subject. Though hardly conclusive, this minor curiosity of form could be indexical of the mediating character of tense by virtue of its intimate association with both subject and predicate.

**EMBEDDED ASSERTIONS**

Given this fundamental model of a simple sentential utterance: subject - tense - predicate = assertion; the qualities of an embedded clause versus those of a root clause can be specified, and the distinctive effects of the different clause-elaboration strategies can be made explicit.

A sentence requires one and only one tensed relation in order to be
acceptable as a sentence, demonstrated by (5) and (7), contrasted with (6) and (8) below.

(5) A martian has green fingers.
(6)*A martian to have green fingers.
(7) Fred wants a martian to have green fingers.
(8)*Fred wants a martian has green fingers.

Clearly, in order to accomplish this sentential tense relation, there must be two relatable domains in addition to tense; thus examples (9) and (10) are also unacceptable.

(9)*A martian is
(10)*Has green fingers.
(11)*That a martian has green fingers.
(12) That a martian has green fingers has interesting consequences.

Proceeding with an evaluation of clause-elaboration effects, (11) above shows that though it contains a subject, predicate and tense, with the addition of that it is not a "complete sentence". The fact that (11) can be related to another predicate in (12) to form an acceptable sentence suggests that (11) itself represents a single domain. Recall that (5) as an acceptable root clause represents two domains linked by tense. The only difference between (5) and (11) is the clause-initial that of (11). The suggested effect of this particular clause elaboration is to create a single domain containing an assertion. A single domain cannot satisfy the two-domain requirement of a root clause. The assertion contained by that in one domain constitutes
what was originally called an "embedded clause".

This effect might be expressed formally, where any element in parentheses (e) represents some domain; a lower-case letter such as s denotes a subject; an upper-case letter such as P denotes some property, a predicate following the general framework given by Barwise and Cooper (1981). Since tense is explicitly ignored by Barwise and Cooper, I introduce the symbol " $\$ " to indicate the tense relation. Thus, any assertion might be expressed as $(s) \$ (P)$, and the expression that $(s) \$ (P)$ is interpreted as (THAT $(s) \$ (P)$).

Comparison of examples (11) and (12) with (13) and (14) below shows that the effect of a clause-initial wh-word upon an assertion is in one respect identical with the effect of that just described: a clause-initial wh-word also contains the assertion which follows it in a single domain.

(13)*What the martian had.
(14) What the martian had was known by few.

Further data however indicates important differences between clause-initial that and wh-words.

(15a) What the martian had was known.
(15b)*What the martian had green fingers was known.
(16a) Who the martian liked was known.
(16b)*Who the martian liked Muffy was known.
(17a) Where the martian was from was known.
(17b)*Where the martian was from Detroit was known.
(18a) That the martian had green fingers was known.
(18b) That the martian liked Muffy was known.

(18c) That the martian was from Detroit was known.

For every initial-position wh-word, there must be a corresponding open position within the following assertion: In (15a), had has no object in the usual post-verbal position; in (16a), liked has no object in the usual post-verbal position; in (17a), from has no object in post-prepositional position. Where these positions are filled in (b) sentences of (15), (16), and (17), the wh-word sentences are unacceptable, but the that sentences of (18) are all acceptable where these positions are also filled.

This difference between that and wh-word clauses is comparable to the difference between the fact and the martian in (19), (20), and (21).

(19a) The fact Jack saw a martian doesn't help us.
(19b) That Jack saw a martian doesn't help us.
(20a) The martian Jack saw doesn't help us.
(20b) What Jack saw doesn't help us.
(21a)*The martian Jack saw a cow doesn't help us.
(21b)*What Jack saw a cow doesn't help us.

In (19a) the fact signifies no particular element within the assertion following it, just as that does not in (b).

In (20a) however, the martian does correspond with an open object position after saw; thus, it can signify the object of saw, just as what does
In (21a) the object position is not open; the cow occupies it and signifies the object of the verb. The martian therefore cannot serve to signify the object of the verb just as what cannot in (b).

But why must what or the martian correspond to an open position in the following assertion? Recall that what (s) § (P) is interpreted as (WHAT (s)§(P)), a single domain, and evidently the martian (s) § (P) is interpreted as (THE MARTIAN(s) § (P)). Domains were previously characterized as self-consistent wholes. In order to achieve that self-consistency, the clause-elaboration elements—that, wh-words, and apparently noun phrases like the fact and the martian, positioned clause-initially—must be linked somehow to the assertions which they contain in a single domain. In (21) there is no link because there is no open position allowing what or the martian to signify some component of the assertion.

In contrast, the fact can be linked to the assertion following it by signifying the entire assertion, due to its intrinsic lexical meaning ("facts" are assertions about reality) as in (22a), or it could be linked to one component of the assertion as in (22b) by virtue of the fact that knew has an open object position.

(22a) The fact Bill knew Fred was important.

(22b) The fact (which) John knew was important.

That is linked to a following assertion also because of its intrinsic ability to signify an entire assertion. For example, the entire assertion in (23a) can be signified by that in (23b).
(23a) Bill knew Fred.
(23b) It was important for John to know that.

**POTENTIAL ASSERTIONS**

The other clause-marking strategy originally considered was NP-Aux inversion, or more appropriately at this point, subject-aux inversion which shall hereafter be referred to simply as inversion. The usual effect of inversion is a question with two possible answers: affirmative or negative. This suggests that there is no directly asserted connection between subject and predicate, but that the assertion exists as a potential, something which may become **real** or remain **unreal**. An affirmative answer to a question real-izes the potential assertion. A negative answer specifies the potential assertion as unreal-ized. In English and many related languages, conveniently enough, this notion of potential assertion corresponds to apparent "removal" of tense (with the auxiliary) from between the subject and predicate--where it would denote a real assertion--to sentence-initial position where it remains a sort of "suggestion" rather than an imposition. Hence an inversion-induced question or potential assertion might be formally represented as \( \$ (s) ? (P) \).

As an example, **Do you like me?** is represented as \( \$ (you) ? (\text{LIKE ME}) \); this indicates that the assertion you like me exists as a potential (real or unreal eventually) which is made a part of reality by an affirmative and is permanently consigned to fantasy by a negative.

Because it contains two domains and a tense relation, albeit a potential
relation, the assertion subjected to inversion remains a satisfactory root clause, but can it be embedded?

(24)*That did the martian sleep here was known.

(25)*The fact did the martian sleep here was known.

That and the fact can be linked to following (real) assertions because they signify real assertions, but in (24) and (25) they must be linked to potential assertions, resulting in conflicting (unacceptable) interpretations.

A wh-word may signify a potential or a real element in a sentence depending on the potential or real nature of the assertion in the domain contained by it: the referent of where do you want to go is not real until someone supplies an answer, but where you want to go implies some location already known as real. Hence, if a wh-word precedes a real assertion, then it denotes a real domain, but if it precedes a potential assertion, it denotes a potential domain, which evidently cannot contain the two real domains of the following potential assertion, such as the martian and sleep of (26) which stands as a root clause, making a wholly unsatisfactory embedded clause.

(26) Where did the martian sleep?

(27)*Where did the martian sleep was known.

(28)*They wondered where did the martian sleep.

Note that a strategy for marking a single domain particular to written texts, known as quotation marks, can make (28) acceptable, containing the
two real domains when where could not.

(29) They wondered "Where did the martian sleep?"

The same situation applies to all wh-words except whether, which cannot under any circumstances precede a potential assertion.

(30)*They wondered whether did he leave.

(31)*Whether did the martian leave.

It has been noted that whether is the embedded version of a yes/no question (Hudson 1975:13). For example in (32) it is implied that either some individual left or he didn't, questioning the assertion following whether.

(32) They wondered whether he left.

It follows that the assertion following whether is interpreted as a potential assertion even though the tense morpheme is not displaced: whether (s) § (P) is interpreted as (whether(s) ? (P) ). This is the English strategy for embedding a potential assertion.

Whether is like other wh-words in that it can denote a potential domain, but different in that it always must do so: it imposes a potential interpretation upon the following assertion. Like that, it is able to encompass the tensed relation of two domains into a single domain.

I suggest that (30) and (31) are unacceptable for the same reason as the (b) sentences of (15), (16), and (17). Just as who, what and where have no role to play, nothing to signify, and cannot be linked in those subsequent assertions, whether cannot serve to potentialize what is already a potential assertion. Thus, in (30) and (31) there is no open position in the assertion
following whether as is required for an acceptable sentence.

**SUMMARY**

By an appeal to the semiotic notion that incommensurable domains may be linked by a transitional continuum, a model of the "basic sentence" is derived: subject and predicate domains are linked by tense. This model explains the difference between embedded and root clauses as the difference between a single self-consistent domain and two inconsistent domains reconciled by mediation. Also, the similarities and differences between different clause-elaboration strategies relative to the sentence model give insight into the interpretation of that, whether, and other wh-words, and NP-Aux inversion as signs- their semantic structure, if you prefer.
REFERENCES


3. THE INVARIANT CODE-SIGNIFICANCE OF LEXICAL ITEMS

ABSTRACT
It is assumed that words are efficient and intelligible linguistic code-expressions—that each word is ideally the unique code-expression for only one thing, its Code-Significance. Consequently, this paper proposes a distinction between Code-Significance and Sense, consonant with the familiar distinction between Sense and Reference. Each word is associated with several senses (ambiguity); most words share senses with other words (synonymy). Thus, invariant Code-Significance cannot be equated with variable Sense: concepts, object-sets or sets of features. Code-signification of English words, play, game, up, down, true, and right, can be modeled with line-drawings (icons). Various interpretations of a single icon-model correspond with the various senses of a word.

PART ONE: PRELIMINARY DISCUSSION.
In this paper I would make three points.

First, I will propose a distinction between the linguistic (code) significance of a word and its various sense-meanings.

Second, I wish to demonstrate that an apparently polysemous-ambiguous word like game may yet have a consistent code-significance. In other words, I might claim that such a word has an invariant semantic form, but my use of the term semantic would be so different from its customary logical, set-theoretical interpretation that I will deliberately avoid it in this discussion.

Third, I will illustrate a means of modeling the code-significance of words in terms of iconic forms rather than in terms of concepts, classes or sets of objects, or sets of necessary and sufficient conditions (i.e. the typical characteristics of sense-meaning).
The premises

In making the above points, I proceed from two assumptions. The primary assumption is that a language consists, in part, of a significant lexical code. That is, when we say someone has learned a word, that person has learned to associate by code-convention a particular sequence of "sounds" (phonemes, also manifest as written marks) with some particular thing. Different words are by code-convention associated with different things. The nature of these things is the upcoming subject of discussion, but let us first assume that words are code-expressions for them. Just as the various sequences of dots and dashes in Morse code are code-expressions for the various alphabetic characters, the various sound/graphic sequences which are words in a language are code-expressions for these various things (e.g. dot-dash-dot expresses R; the English word game likewise expresses a thing).

The secondary assumption is that a language's lexical code is efficient and also intelligible. By efficient, I mean that two or more words are rarely, if ever, code-expressions for the same thing. By intelligible, I mean that one word is rarely the code-expression for two or more different things. Imagine that Morse code used several dot-dash sequences, different code-expressions to represent one character. This would make the code much less efficient—it would take longer to learn, with more sequences to remember for each character; each time users signified a character with the code, they would have to choose among different code-expression options. Imagine, conversely, that Morse code used one dot-dash sequence
to represent several different characters (e.g. that dot-dash-dot expressed R, S, T, U, and V). This would make the code much less intelligible--the decoding would always be less certain than if the code-expression were unambiguous.

In short, an ideally efficient and intelligible code would match one code-expression uniquely with one thing. I assume that a language's lexical code does not diverge extensively from this ideal. The above assumptions constitute premises of this discussion. Their truth will simply be assumed rather than argued for. What I will argue is that a characterization of lexical code-significance which follows from these premises must be quite different from traditional sense-characterizations of word meaning.

**Synonymy and ambiguity**

Discussions of word-meaning typically focus on the fact that (1) different words may express the same concept, the same class of objects, or the same set of basic characteristic-features, and (2) one word may express different concepts, different classes of objects, or different sets of basic characteristic-features.

So, for example, much has been made of the fact that bachelor and unmarried man designate the same class of objects, single adult males or equivalently, the same object-features SINGLE, ADULT, and MALE. These features amount to necessary and sufficient conditions for using bachelor or unmarried man to represent an object. Words with the same
features or (truth) conditions of use are thus synonyms, said to have the same sense. On the other hand, much has been made of the fact that no single set of conditions, object-features, or coherent class of objects uniquely specifies all the objects, concrete or abstract, that a typical word can represent. Since Wittgenstein, game has been perhaps the paradigm example (Hallett, 1977: 46-47); poker is a game, chess is a game, but we also speak of game birds, game legs, and so forth. Such a word is ambiguous, having several different senses.

It is an inescapable fact that most if not all words represent concepts, object-classes or features that can also be represented with other words, as attested by a comprehensive thesaurus. It is also an inescapable fact that most if not all words can represent several different concepts, object-classes or features. The reader would be hard-pressed to find any words in a large dictionary with only one definition listed. It is no accident therefore that discussions of lexical sense-meaning turn upon discussions of synonymy and polysemous ambiguity. Synonymy and ambiguity seem to invalidate the premise that the lexical code is efficient and intelligible, i.e. that one word is uniquely associated with one and only one thing. Indeed, certain philosophers have called for language reform form this very reason, wishing to construct an ideal language in which each word was associated with only one empirically defined class of objects (Rorty, 1967). More recently, ambiguity or polysemy have been used to argue that there is not lexical code at all, that no thing or group of things is learned when a word is learned. Instead, all lexical significance results from variable
extra-linguistic knowledge or experience (Putnam, 1985) or a complex "game" of usage (Nunberg, 1978).

However, the impression that synonymy and ambiguity invalidate the premise of an efficient and intelligible lexical code stems from another assumption which I do not make: that the thing, the code-significance of a word, could be nothing but a concept, object-classes or sets of features (or whatever it is that words synonymously or ambiguously represent).

On the contrary, if it is a given that most words are code-expressions for only one thing each, and if it is a fact that most words are associated with many senses (concepts, etc.) each, then clearly that thing cannot be equated with Sense as it has been traditionally construed.

Separating significance, sense, and reference

Separation of the invariant code-significance of a word from the various senses represented by a word parallels the less controversial separation of the representation of an object from the object itself. That is, Sense is uncontroversially separated from Reference. As Frege pointed out, for example, morning star and evening star both designate the same object, Venus; yet those two expressions are said to have different senses, because they represent the same object in different ways, expressing different "thoughts" about the object:

...the thought in the sentence 'The morning star is a body illuminated by the Sun' differs from that in the sentence 'The evening star is a body illuminated by the Sun.' Anybody who did not know that the evening star is the morning star might hold one thought to be true, the other false. The thought, accordingly, cannot be what is referred to by the sentence, but must rather be considered as its sense (Frege, 1985: 203).
Thus, Sense (the representation of an object) differs from Reference (the object itself). I would only make the further claim that the representation of an object also differs from the representation itself. In other words, the means by which an expression designates an object is a three-part rather than a two-part relation. Instead of a two-part Sense-to-Reference relation sequence, there is a three-part relation sequence: representation itself, to the representation of an object, to the object itself.¹

I propose that the invariant code-significance of a word is a representation-in-itself, which bears the same flexible relationship to Sense that evidently exists between sense-representations of objects and objects-in-themselves. A single object, after all, can be related to different senses, different "thoughts"—this is essentially Frege's point, that two senses, expressed by morning star and evening star relate to one object, Venus.

This is possible because it is possible to perceive, to think about, to "sense" and thus to represent one object in different ways. Likewise I will claim that a single representation (corresponding to a single code-expression word) can be related to different senses, because it is possible to perceive, to "sense" a single representation in different ways.

It is also the case that different objects can be related to one sense. In strict astronomical parlance, morning star is a term applicable to any of the visible planets when they happen to be above the horizon at dawn. Thus, different objects, Mercury, Venus, Mars, etc. can be related to one
sense as expressed by the term. This is possible because it is possible to perceive, to "sense" different objects in the same way. It is possible to express the same sense with different code-significations.

Consequently, synonymy and ambiguity typically do not result from the structure of the linguistic code, which is efficient and intelligible. Synonymy and ambiguity are instead the emergent results of the flexible relation between Code-Significance and Sense, between a representation itself and the perceived representation of an object.

**Flexible representation with a single form**

Figures 3-1 and 3-2 illustrate the manner in which an unchanging representation-form may yet express different "senses", different concepts or object-features. Consideration of the form-in-itself effectively separates the representation from the two, distinct representations-of-objects, the distinct "senses" of the form.

[See Figure 3-1 next page]

Figure 3-1 represents a rabbit, sitting in a carrot patch, looking to the right of the picture. It is possible, however, to consider just the form apart from its rabbit-interpretation, noting only the regions formed by the curving, closed line, and the hollow dot on the page. The impression that the form represents a rabbit arises in part from the carrot-patch context, and in part from the viewer's disposition to perceive imagined rabbit-characteristics in the form-characteristics.

[See Figure 3-2 next page]
FIGURE 3-1. Rabbit/duck in carrot patch context.
FIGURE 3-2. Rabbit/duck in pond context.
The identical form can be placed in a different context however; the viewer may be persuaded to perceive duck-characteristics in the form, now facing left instead of right in Figure 3-2. Yet, with some imagination, Figure 3-2 may represent a rabbit floating in a pond, and then again Figure 3-1 might represent a duck in a carrot patch. The point here is that the line-drawing does not change from picture to picture; the perceived "sense" of the drawing may change dramatically, depending on the context and the disposition of the viewer.2

Hence, the ambiguity of the rabbit/duck figure is not an intrinsic property of the drawing-form; it is an emergent property, arising from the variable perception of the form as a representation of one kind of object or another.

A single sense-object representation with different forms

Drawings (a ) and (b) of Figure 3-3 illustrate how two different representation-forms may yet express one "sense", the same object features or concept. Consideration of the forms-in-themselves shows that they are clearly distinct: (a) consists of six triangles; (b) consists of four triangles and two trapezoids. Still both forms may be perceived as a representation of a cube, one type of object, one "sense".

[See Figure 3 next page]

The two drawing-forms can only be equated if both are perceived with depth-characteristics. Depth is not intrinsic to the (flat) forms-on-paper, but instead is an emergent property arising from the perception of the forms as representations of three-dimensional objects. Thus, the
FIGURE 3-3. Synonymous representations of a cube.
"synonymy" of the two drawings is not an intrinsic property of the drawing-forms; it is instead an emergent property of their perception as representations of depth (Attneave, 1971: 67).

**Conclusions of part I**

The observed synonymy and ambiguity of words concerns the relation of words to Sense, concepts, object-classes or features. Different words often have the same sense; one word often has several senses. Based on the premises, senses cannot be the things that words are code-expressions of.

Subsequently, I propose that Code-Significance should be separated from Sense for essentially the same reason that Reference is separated from Sense: different objects are represented with the same sense and the same object can be represented with different senses. Just as objects-themselves are separate from the sense-representation of objects, representations-themselves are separated from their perception as representations of objects.

Figures 3-1, -2, and -3 illustrate a type of representation-form that can be considered separately from its perception as a representation of an object. The same form in Figures 3-1 and 3-2 bears an "ambiguous" relation to the two senses, rabbit and duck. This ambiguity is not an intrinsic property of the form, which is invariant. Different forms in Figure 3-3 bear a "synonymous" relation to one sense, cube, yet this synonymy is not an intrinsic property of the two forms, distinct configurations of lines. If the code-significance of a word is comparable to
these iconic representation-forms, then we might explain the apparent polysemous ambiguity and synonymy of words in terms of flexible perceptual processes. We need not suppose that the efficiency and intelligibility of the lexical code is perpetually compromised.

The code-significance of words may be reliable and consistent. Still, the message directly signified by words must subsequently be interpreted, not in terms of a language-specific code, but in terms of a general cognitive process. This process is variously manifest in our flexible perception of objects (e.g. we may see Venus as the morning star or as the evening star), in our flexible perception of line-drawings (e.g. we may see Figure 3-3(b) as a cube or as a regular hexagon), and in our flexible interpretation of words (e.g. we may interpret game as a rule-system of play or as hunted animals).

The internal nature of this general cognitive process, hereafter designated as dynamic interpretation, is beyond the scope of this discussion. I propose, however, that dynamic interpretation operates on the invariant code-significance of a word in essentially the same way that it operates upon the invariant lines-on-paper in Figures 1, 2, and 3, as a function of context and the disposition of the interpreter. Consequently, the nature of the code-significance of a word can be characterized as a form which is compatible with various senses resulting from dynamic interpretation (regardless on its internal workings).
PART II: THE INVARIANT SIGNIFICANCE OF CERTAIN
ENGLISH WORDS.

In light of the previous discussion, the following statement by C.S. Peirce is rather suggestive:

The only way of directly communicating an idea is by means of an icon; and every indirect method of communicating an idea must depend for its establishment upon the use of an icon. Hence, every assertion must contain an icon or set of icons, or else must contain signs whose meaning is only explicable by icons... (2.278; see note 1).

If the dynamic interpretation of line-drawings and the dynamic interpretation of lexical code-significance are essentially similar, then it may at least be possible to model the code-significance of a word (with its various senses) as an iconic line-drawing (with its various senses).

The purpose of this section is to illustrate this modeling strategy with English words, particularly those which would resist traditional "semantic" analysis, e.g. game, play, up, down, true, and right. These tend to lack tangible referents and/or have many contrasting senses.

For clarity's sake, I hereby create a technical distinction between an icon and an image. Although I will be representing the significance of words with "pictures", I am by no means proposing any "image-theory of meaning", the easily demolished proposal that the meaning of a word is the image of an object. An image differs from an icon in the sense employed here because the relationship between an image and its object is not strictly a matter of interpretation: There is a point-to-point physical correspondence between an image and its object (e.g. a mirror reflection or a photographic image). It would be an error to mistake a duck-bill image
(in photograph or reflection for example) for the image of rabbit-ears. In
the duck/rabbit icon, on the contrary, each sense is a matter of
interpretational choice.

In short, an icon is a representation-in-itself, while an image is
necessarily a representation of an object.

Figure 3-4 illustrates the iconic form (p) and (g), proposed as models for
the code-significance of play and game. These two icons differ mainly in
that (g) presents an enclosed form, while (p) presents an open, linear form.
For purposes of discussion, I have labeled components of the forms:
FRAMEWORK designates the meander pattern, the border of (g) and the
base of (p). VECTOR designates any of the arrow-lines. Any form
represented in broken lines is a VIRTUAL form. Thus, a broken-line
vector is a virtual vector. Various senses of play and game correspond with
various ways of describing forms (p) and (g).

[See Figure 3-4 next page]

For example, (p) can be constructed as a detached component of (g).
This corresponds with the sense of play as some part or sequence of a
game:

John played his hand.

Five plays later, the Saints scored.

Yet, (p) is not an enclosed form as (g) is; this corresponds with the
sense of play for many things which are not also interpreted or described as
games. For example, to play a piano is not to play a game; rather, the
framework-base of (p) is interpreted as the instrument of play, but not as
FIGURE 3-4. Play and game.
the boundary of a game situation. The solid and virtual vectors might be described as flexible movement; the solid vector might represent one movement option while the virtual vector represents another. Such an interpretation of the vectors corresponds with flexible activity in a game situation; it also corresponds with a piano-player’s free manipulation of the keyboard.

Also, the interpretation of (p) as flexible movement upon a framework corresponds with the senses of **play** which involve freedom of movement, yet within certain limits; e.g. a loose part in a machine creates a **play** in the mechanism.

As well as movement on a framework, (p) may be described as a framework being moved upon. So, too, **play** may be designated the structure of an activity as well as the activity itself. For example, the script of **Hamlet**, may be called a **play**; a well-defined (i.e. structured) strategy in a game may also be called a **play**, such as the Statue-of-Liberty **play** in football.

**Play** is closely associated with **game**, just as the form of (p) is closely associated with **game**, but because (g) is enclosed and (p) is not, these forms also could be interpreted as opposites, which may model opposing senses of **play** and **game**. Compare the usual sense of **playboy**, as a free-wheeling character, with the use of the expression **game-leg**, designating lameness, a leg with definitely restricted use.

Other senses of **game** correspond with interpretation of the (g) form-enclosure as specification or special limitation. So, **game** animals or
game fish are specified classes of animals or fish which are "set apart" (often by law) for conservation or hunting purposes. Likewise a game ball is an object set apart for a specific playing event.

As a predicate adjective, game can be interpreted as a disposition to behave or act in a specified manner, e.g.:

Fred: Why don't we go out and get drunk?
Barney: O.K., I'm game.

In other words, Barney has assented to participate in the activity specified by Fred.

The enclosure in (g) may be interpreted as a sanctuary as well as a confined space; this corresponds with the common sense of game as an escape from the "outside-world", a diversion, but a diversion with well-defined boundaries or rules. (g) can be described either as activity within an enclosed framework, or as the enclosed framework in which activity occurs. This corresponds with use of game to designate the actions of participants:

Bill's game is getting better.
We played five games of checkers.

Or game may designate the type of activity, the rule-system:
Bill plays that game often.

Or game may even designate the board-and-pieces used for the activity:
Jill got out the Monopoly game.

Significantly, it would seem odd to refer to other kinds of game equipment, a baseball and bat or a deck of cards as "games" in themselves,
the same way we refer to a chess-set or Monopoly board as a game. This can be explained by the fact that game corresponds to a definite form like (g), which might readily be interpreted as a representation of a board-and-pieces (the actual framework in which the game-activity occurs), but not as just any article used in a game-activity.

In sum, although the words play and game have many different senses, it is possible to model an invariant code-significance for each of these words; the various interpretations of the words correspond with several interpretation-descriptions of a single iconic form.

**Up and down**

Figure 3-5 illustrates iconic forms which model the code-significance of up and down, (u) and (d). Again, form purposes of discussion, components are labeled. An arrow-line is a VECTOR, as before. A solid point is a PLOT. VIRTUAL PLOT designates a broken-line circle. The various ways of describing forms (u) and (d) correspond with various senses of up and down.

[See Figure 3-5 next page]

For example, (u) may be described as the movement or location of a plot away from other plots (as indicated by adjacent vectors, plots, and the virtual-plot location). This corresponds with the most usual sense of up as the direction counter to the influence of gravity, or as a location away from the surface of the earth, away from where most things are located because of gravity (e.g. up a tree, up a mountain). Movement counter to general
FIGURE 3-5. Up and down.
movement or location distinct from general location (because of general movement) also corresponds with the sense of \textit{up} as movement against a current, \textit{e.g.} upstream.

Given these particular senses of \textit{up}, \textit{down} is clearly the opposite term; (d) may be described as movement or location compatible with general movement or location. So, \textit{down} is usually interpreted as the direction or location commensurate with the pull of gravity or the flow of a current; \textit{down the mountain} or \textit{downstream}.

However, if the forms (u) and (d) are interpreted in a slightly different fashion, they may be seen as complementary rather than opposing representations. Both forms relate a virtual plot to a solid plot with a vector; both may be interpreted as some kind of movement from an "idea" of a thing (the virtual plot) to the actual thing (the solid plot). This corresponds with parallel senses of \textit{up} and \textit{down} in the following sentences:

- The bill-collector called \textit{up} the deadbeat.
- The bill-collector looked \textit{up} the deadbeat.
- The bill-collector tracked \textit{down} the deadbeat.
- The bill-collector ran \textit{down} the deadbeat.

Each sentence conveys the impression that the bill-collector succeeded in locating the hapless debtor; in other words, the collector moved from an "idea" of the debtor, perhaps a name on his list (the virtual plot) to the actual person (as represented by the solid plot). The concept of location or
discovery represented by up and down is far removed from the concepts of gravity or current-flow, but all of these may be represented by the same two forms, as modeled by (u) and (d).

Ultimately, I would suggest that all senses of up and down can be related to various interpretations of the same forms as well. For instance, up may convey a sense of removal or termination, just as (u) may be described as the removal of a plot from its "previous" position (indicated by the virtual plot in the sequence of plots). This explains the sense of up in the phrase used up, wherein some resource is drawn upon until it is exhausted, removed. The expression time's up likewise indicates that a certain period of time has been exhausted, removed from the sequence of time (the "sequence" of plots).

**True and right; right and left**

Figure 3-6 illustrates a system of forms which model the relationships between the terms true and false, true and right, between right and wrong, right and left. The component forms are POSIT (crossed lines), STANDARD (a bracketed posit), VECTOR (as before) and DIVECTOR (a diverging vector and virtual vector). As before, all forms represented in broken lines are VIRTUAL.

[See Figure 3-6 next page]

This system of forms primarily demonstrates that the word right may have a single code-significance and still be naturally opposed to two words (wrong and left) that typically have completely different senses. Thus,
FIGURE 3-6. True, false, right, wrong, and left.
there is no need to postulate two "words" right\textsubscript{1} and right\textsubscript{2} in English; one
signifying "correctness" and the other signifying "a side of the body". Both
senses of right may merely be diverse interpretations of one form.

The concept of truth, as it relates to problems of the nature of reality and
certain knowledge, is probably larger than Man himself. However, the
code-significance of the word true (which only serves as an interpreted
representation of truth) need not be so mysterious. Consider the popular
representation of an atom as a tiny "solar system"; the
representation-in-itself is useful and simple, even though the real nature of
atoms is far more mysterious and complex. The form (t) in Figure 3-6
models the code-significance of true. It is describable as the matching of a
position to a standard. This corresponds with the usual sense of true, as in
a true statement, as the matching of a proposition to "fact", i.e. the
standard perception of reality. Such a description of (t) also models the
sense of true in the phrase true gold, designating material which matches
the standard specification of gold.

Other descriptions of (t) correspond with other senses of true. For
instance, (t) might be seen as the constant association of one posit with
another (standard) posit, corresponding with the sense of true in the
phrase true friend, designating a constant associate. Form (t) may be seen
as the action of bringing a posit into a matching relation with a standard,
corresponding with the verbal sense of true--to true a wheel is to bring a
wheel into parallel alignment with others.

Given the form (t) for true, the code-significance for false may be simply
modeled as the interposition of a virtual posit on the vector between the solid-posit and the standard. This form is readily interpreted as an interruption or negation of the relation between the posit and the standard. Hence, a false statement does not match the standard of fact. The interposed, virtual posit in (f) may also be interpreted as a proposition, material characteristic, etc., which corresponds more closely to the standard than the actual proposition, etc. (represented by the solid posit).

This models the fact that designating something as false often presupposes a true or at least a more true proposition, characteristic, etc., which may or may not be known (hence, the virtual posit).

The difference between the words true and right is modeled with the introduction of a divector and a virtual posit in (r) in Figure 3-6. Consequently, (r) may be interpreted or described not just as the matching of a position to a standard, but as a choice between one position and another—the chosen position matches the standard while the unchosen (virtual) position does not. This corresponds with the sense of right (as in the right answer) as something true or correct, which is chosen over an alternative. This sense of right is opposed to the usual sense of wrong (as in the wrong answer) as something false or incorrect, which chosen over an alternative.

Accordingly, the code-significance of wrong, as modeled by form (w), differs from right in the same way that false differs from true; wrong differs from false in the same way that right differs from true (Figure 3-6).

However, just as true or (t) may represent constant association of one
thing with another (as in true friend), rather than correspondence with fact, so too right or (r) may represent a constant associational choice rather than a factual choice. Specifically, the sense of right in right hand designates the hand which is constantly associated with dominant or standard use. In other words, right hand designates the hand most often used by most people, the "standard" hand, chosen over the other (left) hand. Form (r) thus may represent both senses of right.

Form (l), modeling the code-significance of left, creates an opposition to form (r) distinct from the opposition created by (w). Whereas (w) interposes or interrupts the relation between the solid (chosen) posit and the standard, (l) simply renders the posit related to the standard as a virtual posit; the posit unrelated to the standard becomes a solid posit. Form (l) might consequently be described as the choice of one posit over another; the chosen posit is unrelated to the standard while the unchosen (virtual) posit is related to the standard. This description corresponds with the usual sense of left, as in left hand, as the non-standard hand, used least often by most people.

The same forms (r) and (l) can also be used to explicate the senses of right and left as designations of political persuasion, conservatism versus liberalism (anticonservatism). The right represents the conservative position, i.e. the position related to standard views and common practices. The left represents the liberal position, i.e. the position which turns away from standard (old) views and practices.
Synonymy

The forms (t) and (r), (f) and (w) in Figure 3-6 may also model the relationship of code-significance to sense-synonymy. In many contexts, true and right can be taken as synonyms, both representing the same sense of "correctness"; false and wrong both represent the same sense of "error". Yet, it is not necessary to postulate that true and right have an identical code-significance, just as it is not necessary to suppose that two drawings which represent the same concept of "cube" must have the same intrinsic form (Figure 3-3).

This may explain why no two words in English can actually be used interchangeably in all contexts, e.g.:

Jill hid in the bushes.

?Jill concealed in the bushes.

If two words actually expressed the same code-significance form, then each of those words should be able to designate exactly the same sense as the other in any given context; all senses would stem from one form, so how could there be any discrepancy? Therefore, it may be the case that no two words in English express the same code-significance. In other words, the lexical code may be ideally efficient.

Polysemy vs. homonymy

Early in this discussion, I stipulated that an intelligible lexical code would ideally have only one code-significance for each code-expression word. I was also careful to suggest that languages do diverge extensively
from this ideal. The above demonstration (that the polysemous senses of 
play, game, up, down, true and right may all be linked to one form for each 
word) suggests that most of the perceived ambiguity in language may 
result from dynamic interpretation processes and not from any deficit in 
the lexical code itself. However, there are a relatively small but substantial 
number of words in English which may have two code-significations 
(though, I would think, rarely more than two). Words like bank, duck, 
pen, and fan, for example, would each probably require two quite distinct 
icon-forms in order to model their distinct sense-interpretations.

These words are generally recognized as constituting a type of 
ambiguity called homonymy, which is thought to be distinct from 
polysemous ambiguity. Homonymy can often be characterized as the 
collision of historically distinct sound/graphic sequences (words), formerly 
distinct code-expressions which still conserve distinct code-significations 

I have only proposed that polysemous ambiguity (attribution of several 
"related" senses to one word) results from dynamic interpretation of 
essentially one lexical-code form. On the other hand, homonymous 
ambiguity (the attribution of clearly distinct senses to two "words" which 
happen to sound or look the same) may indeed result from real ambiguity 
in the lexical code. Yet, these isolated cases of homonymy do little to detract 
from my central point: the lexical code of natural languages like English 
may be less ambiguous, much more intelligible than lexicographers have 
often supposed.
ENDNOTES

1 My three-part characterization of word-meaning, as a Code-Significance, to Sense, to Reference-object, compares with Peirce's three-part interpretation-sequence:

In regard to the Interpretant we have equally to distinguish, in the first place, the Immediate Interpretant, which is the interpretant as it is revealed in the right understanding of the Sign itself and is ordinarily called the meaning of the sign; while in the second place, we have to take note of the Dynamical Interpretant which is the actual effect which the Sign, as a Sign, really determines. Finally there is what I provisionally term the Final Interpretant, which refers to the manner in which the Sign itself tends to represent itself to be related to its Object (4.536).

2 My rabbit/duck figure is a full-body variation of the rabbit/duck (head) drawing used by Joseph Jastrow in 1900 to demonstrate perceptual ambiguity (see Attneave, 1971). Wittgenstein attempts to explain away Jastrow's rabbit/duck as an exceptional type of perception (Hallett, 1977: 662-680).

3 Rosch's prototype theory (1977) is perhaps the most recent example of an image-theory of meaning. Though there may be prototypical interpretations of words, a prototype could not serve as the code-significance of a word; different prototypes would be required for each distinct sense of a word. Also, different individuals with diverse experiences may have different prototypes for the same "sense" of the same word. For example, Bobby Fischer's prototypical game-image might be that of chess, while Jimmy Connor's prototypical game-image
might be tennis.

To simplify this discussion, it will be assumed that the role of a word as a noun, a verb, an adjective, etc. is also a matter of interpretation (based on syntactic context) and not relevant to the invariant code-significance of a word. Morphological variation probably affects code-significance, but will be neglected here for simplicity’s sake.
REFERENCES


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4. LITERARY VS. TECHNICAL WRITING: SUBSTITUTES VS. STANDARDS FOR REALITY

ABSTRACT

This essay proposes a means of characterizing the difference between technical and literary writing, involving a theory of representation in which these distinct writing types are comparable to distinct types of visual representation. Any difference is only intelligible relative to a background of similarity, but recent discussions of technical writing emphasize its similarity to literature and ignore significant differences. Distinct types of line drawings replicate the literary/technical contrast in a visual medium, which arises from two factors: (1) the way in which the drawing/text is perceived by the viewer/reader, as a SUBSTITUTE or as a STANDARD, and (2) the predominant type of detail in the drawing/text, ITERATIVE or CONTRASTIVE. Literature is most effective if perceived as a substitute for reality, predominated by iterative detail. Technical writing is most effective if perceived as a standard for evaluating reality, predominated by contrastive detail.

INTRODUCTION

Recent articles about technical writing tend to criticize the traditional objectivity criterion which would contrast technical writing with the subjectivity of literature in general. Various authors have noted that technical discourse commonly employs principles of rhetoric, such as metaphor (Joumet 1986) or persuasive argumentation (Bazerman 1981), which are now considered subjective and typically associated with the humanities rather than with science (Rubens 1985). These articles are well-taken in one sense, for technical writing is not especially objective in its methods, but such discussions have failed to account for the general feeling that technical writing is distinctively associated with objective reality, other than to dismiss this feeling as a holdover from bygone days of
positivism (Miller 1979; Dobrin 1985). Consequently, these critics of objectivity have been unable to supply a generally satisfactory criterion to distinguish technical and literary writing.

The Art of Effective Signification

To explicitly characterize technical writing and literature, I suggest that we require a broader theory of "effective representation" (i.e., communication or rhetoric) in which writing can be compared to other forms of signification. A similar proposal was made by C.S. Peirce, who noted numerous discussions in the scientific journals of his era (1904) concerning

...the best vocabulary for one or another branch of knowledge, and the best types of titles for scientific papers. Both are plainly questions of rhetoric. To a good many persons of literary culture...to talk of the style of a scientific communication was somewhat like talking about the moral character of a fish....Evidently, our conception of rhetoric has got to be generalized; and while we are about it, why not remove the restriction of rhetoric to speech? What is the principle virtue ascribed to algebraic notation, if it be not the rhetorical virtue of perspicuity? Has not many a picture, many a sculpture the very same fault which in a poem we analyze as being 'too rhetorical'. Let us cut short such objections by acknowledging at once, as an ens en posse, a universal art of rhetoric, which shall be the general secret of rendering signs effective, including under the term 'sign' every picture, diagram, natural cry, pointing finger...numeral, word, sentence, chapter, book...(reprinted in 1978: 148-149).

Accordingly, the discussion here will postulate principles of effective representation that are applicable to pictures and diagrams as well as written texts. Therefore, the distinction to be made between technical and literary writing should have a direct correspondence with a readily apparent distinction of types in pictorial representation. In visual art,
representations that seem to have a single, concrete interpretation contrast with those that clearly have a variety of interpretations. This same contrast is simply manifest in another representational medium (writing) as the technical/literary distinction.

**Organization of the discussion**

To develop this claim, I will first argue that a non-trivial understanding of the difference between any two phenomena presupposes the identification of similarity between them. Hence, a sophisticated observation that writing and drawing are different must implicitly acknowledge that they are also similar in some sense. Also, a sophisticated technical/literary distinction must presuppose that these writing types are somehow comparable, and yet maintain and explain the difference. However, previous treatments of the technical/literary distinction either deny that any similarity exists between these types, or else they assert that these types are so similar that differences may remain unanalyzed.

Second, technical writing will be characterized as writing which fosters an illusion of having a single interpretation. A work of literature, as art, is composed to encourage several interpretations. Examination of this same distinction in visual representation leads to these main points:

A) All representation-forms (writing, speech, drawings, etc.) can be interpreted in several different ways.

B) The illusion, created by technical writers, that their work has
one interpretation (their own), is nevertheless what makes technical writing effective as a representation of knowledge.

C) The creation of the illusion, the perception of one interpretation in a drawing, is evidently a matter of detail.

Third, examination of different styles in visual art indicates two types of detail, contrastive and iterative, and two ways of perceiving a representation, (1) as a standard for evaluating the object of representation or (2) as a substitute for the object itself. These same types of detail and perception will be identified in writing. Contrastive detail promotes the illusion of a single interpretation by promoting the perception of a drawing or a text as a standard. Iterative detail promotes flexibility of interpretation by promoting the perception of the representation as a substitute for the actual object.

Finally, technical writing will be identified as the representation of a standard for evaluating reality; works of literature are presented as substitutes for reality. Thus, effective technical writing is typically associated with a wealth of contrastive detail.

SIMILARITY AND DIFFERENCE: THE PROGRESS OF UNDERSTANDING

Initially, the comparison between writing and drawing might seem merely metaphorical and of questionable value, but theoretical unification of apparently disparate phenomena is a productive commonplace in the progress of understanding. Issac Newton, as tradition claims,
recognized the possibility of similarity in the falling of an apple and the orbital motion of the moon; the theory of motion and gravity which articulates the basis of that similarity is uncontroversially a benchmark of progress. Likewise, Charles Darwin recognized a common process (natural selection) operating to produce the diversity of animal species. Maxwell's equations link magnetism, electricity and light, and Mendel's experiments in genetics found a common ground for explaining the varicolored offspring of both peas and guinea pigs. Though paradoxical, each apparently diverse phenomena (e.g., the falling of an apple and the lunar orbit) is better understood, seen more clearly and distinctly, by virtue of its identification with others.

**An intelligible standard of comparison**

One might have expected such mixing of separate phenomena to blur their distinctions rather than sharpen them, but as it turns out, a clear perception of differences demands a common background of similarity against which differences may stand out. The evaluation of a difference between any two entities requires that these share a common standard against which differences can be measured.

Before Newton, the question, "What's the difference between an apple falling and the moon in orbit?" would probably have been taken as an obscure riddle, comparable to "What's the difference between a rat and a college freshman?" These riddles of the what's the difference variety depend on the naive hearer's lack of even a frivolous standard of
comparison, which the riddle withholds for comic effect. Thus, a pre-Newtonian discussion of the difference between falling apples and lunar motion would have seemed as trivial as a dialogue contrasting freshman and rats (rats have hair on their chests and fewer pimples). But given a unifying theory of gravity and motion, the difference between the apple and the moon becomes both intelligible and non-trivial: if the apple were given a lateral velocity of five miles per second, it would circle the earth as the moon does; deprived of such velocity, the moon would fall.

Consequently, the justification for my claim that visual and written representations are comparable rests on two points: First, any non-trivial claim that writing and drawing are distinct presupposes that these are comparable on some "higher" level; second, the initial assumption that writing and drawing are similar, like Newton's initial assumption that falling apples and lunar motion are similar, allows the development of explanations for phenomena which go beyond the original comparison. Thus, a convincing explication of the technical/literary distinction by means of a writing-drawing comparison helps to justify the comparison, just as Newton's convincing theory of gravitation justifies his original comparison of the moon with an apple.

**Previous Analyses of the Technical/Literary Distinction**

Aside from the issue of comparing writing and drawing, the examples from science given above also suggest that any sophisticated analysis of technical and literary writing must provide a background of fundamental
similarity against which to judge the distinction. However, previous discussions typically have used two ineffective methods of analysis: (1) to deny any similarity exists between these types or (2) to deny that any real difference exists.

The traditional objective/subjective dichotomy represents the first approach. Any representation of (real) tangible objects, facts, etc., is supposed to be irrevocably distinct from any representation of (unreal) intangible objects or fictions. But since more recent analyses of technical writing (op. cit. above) have identified various "subjective" devices such as metaphor in supposedly "objective" technical discourse, it appears that the representation of tangible fact and the representation of intangibles or fictions are not completely different in kind.

Difficulty with the claim that technical and literary writing are different gives rise to the second, ineffective approach to the problem—the proposal that these types are essentially the same. For example, in defending technical writing instruction in departments of English and literature, Russel Rutter notes that the writing of poetry and scientific inquiry both require the exercise of imagination (Rutter, 1985). Following the work of David Dobrin, Rutter argues against objectivity as a hallmark of technical writing, but he offers no other criterion to distinguish it from literature; the implication is that professors can effectively teach technical writing just as they teach poetic composition. Unless we allow that dubious conclusion, a distinction still needs to be made.

Dobrin distinguishes technical writing's emphasis on usefulness but
claims that

Judgements of the usability of technical documents seem closer to judgements about
the latest novel....So in order to get an objective judgement about the general utility of a
document, one would have to be able to make all that background knowledge explicit,
and holism tells us that's impossible...(1985: 246).

Thus, Rutter makes no distinction between literary and technical
writing, and Dobrin feels that the distinctive usability of technical writing
is a matter of subjective opinion which cannot be analyzed. In sum, the
definitive distinctions between these two types of writing have remained
vague and poorly understood, because of the general inability to recognize
both similarity and difference. The methodology exemplified by Newton,
Darwin, Maxwell, and Mendel suggests that any useful identification of
similarity between technical writing and literary art would provide a
ground for clarifying the apparent differences. I propose that the
similarity between "objective" and "subjective" representations in writing
can be more clearly identified by examining the same apparent contrast in
certain line drawings.

In drawing (a) of Figure 4-1, concentric circles and various straight
line segments can be taken to represent a variety of objects, e.g., a fish-eye
on a pin, a button, an airplane coming head-on, or a sombrero-wearer on a
bicycle. None of these is determined exclusively by the drawing itself, but
rather they all arise from interpretation by a perceiver. By contrast,
drawing (b) seems to be a concrete and unambiguous rendition of a coffee
cup; more details are given, and the image is aspected clearly, from the
side, with the handle to the right.

[See Figure 4-1 next page]
FIGURE 4-1. A visual model of literary/technical contrast.
With its various interpretations, drawing (a) recalls Paul Hunter's characterization of subjective, literary writing as communication representing a "pulsating array of possibilities" (1986: 287). His contrasting statement that objective communication is "obvious or univocal" seems also to apply to the obvious interpretation of (b), which in turn may recall Earl Britton's assertion that technical writing conveys one and only one meaning (1965). These statements support the claim that drawings (a) and (b) effectively recreate the subjective/objective or literary/technical distinction in a visual medium.

**Background Similarity and the Effective Difference**

Presented in terms of visual representation, the traditional subjective/objective dichotomy becomes difficult to maintain. Drawings (a) and (b) are quite similar, drawn by a single artist in a single medium; both can be interpreted as representing something. The difference lies only in the apparent flexibility of interpretation: while drawing (a) clearly has several interpretations, the first impression of drawing (b) is that it represents only a coffee cup. Yet, with conscious inspection we might interpret (b) as a tea cup or even a flower pot supporting a pair of young beanstalks. The actual flexibility of (b) suggests that objective communication does not exist in the traditional sense--no representation, sketched or written, can actually have one and only one obvious, verifiable meaning.

However, recent proposals that technical and literary discourse are
thus indistinct miss this crucial point: the merely apparent difference in flexibility between the two types of representation is nevertheless the effective difference. In other words, for literature to be effective as an art form, it must allow and promote several possible interpretations; for technical writing to effectively communicate knowledge, all but one potential interpretation of the text should be hidden from the reader.

**Flexibility for Art's Sake**

Works of literature typically allow a variety of interpretations, but like those possible readings of Figure 4-1(a), some literary interpretations are more appealing than others. Literary criticism survives as a discipline by virtue of the flexible range of interpretations that can be argued for in a given text. To be worth making, each literary analysis must be original, in some sense unobvious and unexpected, yet consistent with details of the text. For a routine example, John Selzer disputes previous readings of Faulkner's character Gavin Stevens (Go Down Moses) as an educated and idealistic southern gentleman trying to aid the "Negro in his plight" (1985). Selzer's own view is that Stevens represents the unfeeling paternalism which perpetuates racial inequality. Selzer argues that his interpretation is more consistent with the tone of other stories in Faulkner's Go Down Moses collection. For comparison, the most compelling interpretation of Figure 4-2 is also unexpected, and even unappealing, yet consistent with its details.

[See Figure 4-2 next page]
FIGURE 4-2. A visual model of literary interpretation.
A circle containing two wedges opposite on its perimeter can be viewed as two slices of pie left on a plate, or the open top of a beer can. These are relatively positive views, involving sustenance, not unlike former interpretations of the Steven's character's benevolence, but the most striking interpretation of this "droodle" is also one of oppression—being thrown down a well by the K.K.K.

This comparison illuminates the oft-debated relationship between an author's intent and the actual text. The lack of determinate detail in drawings such as 4-1(a) and 4-2 is not their flaw but is instead the essence of their appeal. Viewers are perhaps frustrated but clearly also entertained by the variety of interpretations which can be matched to a single drawing, even after a more striking, more compatible interpretation is discovered. The droodle is thus a fairly popular "art form". Enough is drawn to suggest that something is being portrayed, that these are not merely random line collections, but providing the final interpretation in the drawing itself would defeat its purpose. So too, an author's purpose in literature is to compose a story or verse which is meaningful—again, to suggest that something is being said—but it would disturb and defeat the integrity of the narrative or poem as such to provide such meaning explicitly within the text. Readers are perhaps frustrated, but also fascinated by the act of searching for meaning. If Faulkner would have had his character Stevens remark somewhere in the story, "You know, I embody the unfeeling paternalism which perpetuates racial inequality," this would probably mar the effect which Go Down Moses has otherwise in
having the reader supply this interpretation.

From this vantage point, "art for art's sake" is a phrase with practical sense: the entertainment value of art, whether literary or visual depends on the fact that the form, though meaningful, is not irrevocably tied to a single meaning or even a finite set of meanings. As E.S. Dallas has noted, if the purpose of art were to make a particular meaning known, "it would not be Art but Science" (1866: xviii).

**Technical Writing in Contrast**

If, through literary research, scholars should come upon an author's actual interpretation of his own work, so much the better. But while it is possible to enjoy a novel or a poem without knowing any "true" interpretation, it is quite impossible to utilize a technical document without at least some idea of what the author meant by it. Although literature thrives on interpretive flexibility, technical writers try to evoke a single, clear interpretation of their text. They seem to succeed, as Figure 4-1(b) succeeds, if enough relevant detail is supplied. Nevertheless, the singular objective of 4-1(b) is quite illusory--coffee cup, tea cup, and flower pot are all possible readings. Likewise, anyone who has followed factory-issue assembly instructions with difficulty has found that a technical document can represent a number of unworkable procedures as well as the correct one.

In literature such flexibility is entertaining and therefore desirable. In technical writing the inherent interpretive flexibility of all representation
must somehow be subdued; the illusion that one interpretation (presumably the writer's) is the only interpretation must be created for the reader.¹ This is imperative because the technical writer knows, for example, how to put together a bicycle and the reader does not, or the scientist knows an explanation for some phenomenon and the reader does not. Their interpretation of what they have written is essentially what they know, and if the reader doesn't achieve the same interpretation (more or less) then he doesn't come to know what the writer knows. In literature this may hardly matter but in technical matters it is everything.

To summarize, the distinctive feature of technical writing is not that it is objective or that it embodies only one, unmistakable meaning; technical writing contrasts with literature in terms of conditions that make technical communication effective: first, the reader should perceive only one interpretation out of many, and second, the perceived interpretation should approximate the author's own interpretation/understanding of the text. Unless these conditions are met, communication will fail; the text will be ineffective. Therefore, an effective technical writer must somehow shape the general perception of his text such that these two conditions are met. The remainder of this paper will explore how this may be accomplished by considering the shaping of perception in visual representations.

**DETAIL AND PERCEPTION**

Since even a clearly detailed representation like Figure 4-1(b) can have a variety of interpretations, the technical writing problem can be recast in
terms of getting the text-reader or drawing-viewer to stop searching out the various possible readings. Instead the reader/viewer must be led to perceive the text/drawing in an inflexible relationship with its subject, such that any more than one interpretation would be deemed irrelevant. This accomplished not only with the amount of detail used, but also with the type of detail, which promotes a type of perception distinct from flexible artistic or literary perception.

**Two Types of Detail and Perception**

Fairly realistic images are often perceived in cloud formations or spilled ink, but the gods probably aren't occupied in crafting clouds to physically resemble dragons, dogs, faces or whatever is seen. The realistic appearance of clouds as well as the art produced intentionally results from the general psychological process of projection, wherein some quality is perceived "out there" which actually originates in the mind of the viewer. Thus, what a patient sees in an inkblot will make the workings of his mind explicit for the psychologist.

The artist must guide rather than replace projected perceptions of the viewer, for it would be impossible to render in ink all that an observer can see in a representation. For example, with a few strokes of a pen, an artist suggests the plumage of a bird in the mind of the viewer, who perceives a multitude of feathers in the image which no pen could have been fine enough to render one by one (Figure 4-3).

[See Figure 4-3 next page]
FIGURE 4-3. Iterative visual detail.
This line-to-feather effect is an example of **iterative detail**, the repetition or iteration of a specific feature. Here, several similar ink strokes evoke the perception of infinite, realistic detail.

The goals of representation are not always directed toward simulating appearances however (Gombrich, 1961). The highly schematic character of ancient Egyptian art indicates that in those days the intention was to represent contrastive conceptual relationships rather than physical detail: e.g. a pharaoh was typically drawn larger than his subjects, showing him not as a physical giant but as a conceptually prominent figure; arms and legs of figures were invariably set in distinctive but highly unnatural positions to symbolize authority, subservience, worship, etc. These features exemplify **contrastive detail**, the systematic presentation of explicitly distinctive features. Such contrasting elements evoke the perception of conceptual relationships rather than the impression of recreated physical appearance.

Cartography provides a modern example of visual representation predominated by contrastive detail. In representing their terrain, map makers demand clear distinctions above all. The blue lines which represent rivers are colored thus primarily to distinguish them from road lines, drawn in red. That is, although there remains a sense of similarity, the shades of blue that cartographers see when looking at real rivers is largely irrelevant to the shade of blue used to represent them. No map-maker believes real roads look red—the color instead represents knowledge that roads are distinct from rivers, fences, railways, etc.
**Substitutes and Standards**

The effect of contrastive detail is unlike the effect of iterative detail. Clearly distinct features (e.g., contrastive details of a map) promote the perception of conceptual comparisons while several similar features (e.g., iterative feather lines) promote the perception of physical appearances such as in Figure 4-3 above.

The perception of the sketch as an image of a bird amounts to a judgement that the sketch and the bird are similar and therefore interchangeable in one sense or another. The work of art is thus a substitute of the reality represented. Pygmalion's statue and the picture of Dorian Gray exemplify art's illusion of substitution taken to the extreme: the representation becomes the reality itself.

In contrast, the perception of conceptual relationships in the distinctive features of a map does not cause the map to seem interchangeable with its subject, the terrain it represents. Instead, the viewer perceives a comparative association between the map and the terrain, making of the map a standard against which the terrain can be compared and understood. Consider the standard a measuring tape or ruler provides for evaluating the length of objects: neither can replace the other; the ruler is placed alongside the object to associate the size of the object with the marks on the ruler. The marks on a map are likewise compared with physical landmarks in their relationships. For example, an intersection of lines alerts the motorist about an actual intersection on the road ahead.
**Effective and Problematic Perceptions**

A viewer might consciously decide whether to perceive physical appearances or conceptual relationships in the details of a given representation, deciding in effect whether to perceive that representation as the substitute for the sight of an object, or as a standard "yardstick" for evaluating an object. Nevertheless, the iterative details in a representation will promote the perception of a substitute for reality and frustrate the perception of the representation as a standard for evaluating reality. Contrastive detail promotes perception of a standard and frustrates perception of a substitute.

For example, the iterative lines in Figure 4-3 facilitate the impression of seeing feathers on a bird, substituting for the perception of real feathers; but it would be frustrating to try to evaluate or learn about the structure of a feather from that sketch. Figure 4-3 is thus a problematic "yardstick" to evaluate feathers; but it is an effective substitute for a feathered bird. Conversely, the contrastive border-lines on a map facilitate an understanding of geographical divisions, but it requires a stretch of imagination to picture an actual, mile-wide black stripe between the U.S. and Canada, for example. A typical map is thus a problematic substitute but an effective standard for evaluating the actual terrain.

Predominance of one type of detail over another in a representation determines its relative effectiveness as a substitute or standard. Drawing (a) of Figure 4-1 presents several iterations of circles and lines and contrast (circle vs. line). Drawing (b) also presents iterative detail (the shading...
lines, the various elliptic curves of the rim and base of the "cup", the twin wisps of "steam"), but (b) also contains numerous contrasts: the "handle" vs. the "body", the "body" vs. the "base", the "base" vs. the "rim", the "rim" vs. the "coffee", the "coffee" vs. the "steam". Consequently, (b) offers an effective standard for evaluating coffee cups, while (a) would represent a problematic standard for evaluating cyclists with large hats, but (a) provides a somewhat more reasonable substitute for the actual perception of such a cyclist (from an odd angle).

Substitution Flexibility and Standard Univocality

The iterative detail in (b) (e.g. the shading lines) lends an impression of depth to the drawing and promotes the perception of it as a substitute of the sight of a real cup, but the drawing also happens to be an adequate substitute for the sight of a real flower pot. Hence, the illusion that (b) represents only a coffee cup breaks down when alternatives not ruled out by the details are suggested, if the drawing is perceived as a substitute for some real object. Ultimately, even if the drawing unequivocally represented a single, real cup, as a substitute for that cup it could potentially evoke and thereby represent any feeling associated with the object (e.g. pleasure or distaste, memories of a late-night vigil, etc.).

The usual way to avoid such ambiguity in the interpretation of a drawing is to provide it with a caption or a verbal context, i.e., to use language to indicate the particular things that the drawing is meant to represent (Gombrich, 1972: 86). In introducing Figure 4-1, I specified
several interpretations for drawing (a)—button, airplane, cyclist, etc.—indicating that it represented something (besides circles and lines). For drawing (b) I first mentioned only the "coffee cup" interpretation to bolster the illusion that the drawing's interpretation was unambiguous; I then dispelled that illusion by mentioning other interpretations, providing other "captions" for the drawing.

By guiding the interpretation of a drawing, a caption or context can promote perception of the drawing as a standard; the drawing is then used to evaluate the meaning of a caption or text, just as the caption or text indicates the significance of the drawing. If drawing (b) is perceived as a standard of comparison, representing, for instance, a particular style of coffee cup, then literally or psychologically the drawing would be placed alongside real cups. A viewer would perceive a comparative association between the drawing and the objects indicated by a caption or context, thus "nailing down" its interpretation. With the right caption and context, even drawing (a) could be presented as a standard, a schematic representation of something like an electrical-circuit component (a torroidial capacitor perhaps). Its physical resemblance to a Mexican on a bicycle, a fish-eye or whatever would then become irrelevant; for it would instead be seen as a standard for evaluating particular objects, thus creating the perception that its interpretation is or should be unitary. Yet, its lack of clear, contrastive detail would make it problematic and obscure for anyone unfamiliar with such circuit components or their diagrams.

So, to summarize this section, contrastive detail (e.g., distinctive "cup"
features in Figure 4-1b) and the perception of a representation as a standard for evaluating its subject provide the principal criterion specified for effective technical writing: that a reader should perceive only one (relevant) interpretation in the representation. Iterative detail (e.g., shading lines in Figure 4-1, or feather lines in Figure 4-3) and the perception of a representation as a substitute for its subject produce the specified characteristic of literary writing: a perpetual flexibility of interpretation.

**EFFECTIVE DETAIL IN WRITING**

The following will complete this discussion: First, the equivalents of iterative and contrastive visual detail will be identified in writing. Second, an example of clear technical writing will be contrasted with an example of unclear expository writing. Both attempt to evaluate a topic, but in the clear writing, contrastive detail predominates. Iterative detail predominates in the opaque writing. Third, the predominance or the lack of iterative detail in literary writing will be shown to underlie Auerbach's foreground/background distinction (Auerbach, 1953). Homer's epic, full of iterative detail, is an effective substitute for reality. The Biblical epic, lacking iterative detail, is only problematically perceived as literature; instead it tends to be perceived as a standard for evaluating all of reality.

To summarize, the two ways of perceiving a representation and the two types of detail indicate four types of writing: Effective and problematic technical-evaluative writing, and effective and problematic literature.
**Iteration and Contrast in Writing**

Though similar in many respects, writing and drawings differ in their relative immediacy of interpretation; a drawing is the immediate antecedent of its interpretation, but words and sentences are mediated representations. The lines-on-paper of a drawing seem directly similar to the interpreted image in the mind of the viewer. Words and sentences, as symbols, do not directly resemble the mental images they finally evoke; instead they signify propositions, meanings which mediate between texts and final interpretations. Consequently details of propositions are more like details of drawings--both are direct antecedents of interpretation.

Each semantic proposition fundamentally consists of two parts: (1) a predicate, a general characteristic or action, and (2) a subject, a particular entity which possesses the predicate characteristic or participates in the predicate action. Semantic subjects and predicates may or may not directly correspond to the grammatical subjects and main verbs of actual text sentences:

A. Resistance to liquefaction occurs in this clay sample.

B. This clay sample resists liquefaction.

Both sentences A and B can signify the same proposition; in each a particular entity, the clay sample, is related to the general property or action of liquefaction resistance. In sentence B, semantic and grammatical subjects and predicates coincide. In sentence A, however, the semantic predicate is the grammatical object of a preposition (in).
Related propositions that make up the whole meaning of a text parallel the details that make up a visual representation. Each predication of a particular subject is like each occurrence of a particular detail-form. In drawings, iterative detail consists of several occurrences of a particular detail-form (e.g., several circles or several lines in Figure 4-1a, or several feather-lines in Figure 4-3). Such detail promotes an impression of depth and substitutes for real, infinite detail. The parallel strategy, iterative detail in writing, consists of several predications of one subject; this is typical in literary prose:

Once there was a dead man.
He had been waiting for two hundred years inside a coffin, suitably labeled, whose outer shell held liquid nitrogen. There were frozen clumps of cancer all through his frozen body. He had had it bad.
He was waiting for medical science to find him a cure...
(Niven, 1976: 1).

In the opening lines of Niven's *A World Out of Time*, above, one subject (a man) is related to several predicates (being dead, frozen in a cryonic coffin, having cancer, waiting for a cure, etc.). Significantly, the passage treats technically interesting topics (cryogenics, suspended animation) in literary terms. Niven details one man's experience with the technology and only hints at the complex process involved (just as Figure 4-3 only hints at the complex structure of feathers).

Contrastive detail in drawing consists of two or more distinct detail-forms (e.g. red vs. blue lines on a map, or the "handle" vs. the "body" of the "cup" in Figure 4-1b). Such detail promotes conceptual comparisons
and evaluation of the actual object represented. The parallel strategy, contrastive detail in writing, consists of two or more particular subjects related with the same predicate action or characteristic; a technical discussion of cryonics contains such detail:

Apparently, the first frozen, or cryonically suspended, human was Dr. Harold Greene....The greatest danger for Dr. Greene, as for any person undergoing cryonic suspension, is the need for as much care as possible to protect the brain and the cells. The brain remains intact from three to five minutes, at normal body temperatures, after death. Yet, as the body temperature is decreased, the brain can remain without oxygen for even longer periods of time down to -196° (C.). It is at this temperature that all change virtually stabilizes and the body may, for an indefinite time, remain in a near-perfect state of preservation... (Smith, 1983: 9).

In this passage, different subjects (the danger, Dr. Greene, and anyone being frozen) are all related to the same predicate action (protecting the brain and cells of the patient). Also, the brain, body temperature and time are all related to the same predicate characteristic--remaining intact "in a near-perfect state of preservation."

Like the earlier, literary passage, the technical discussion above mentions one man's experience, but the technical passage immediately uses Greene's treatment as a model or standard "for any person undergoing cryonic suspension." Furthermore, technical details like the temperature of liquid nitrogen (-196° C) are made explicit, rather than being only suggested, as in Niven's story.
Effective Technical Writing

George Gamow's *One Two Three ... Infinity* is a masterpiece of informative writing. Different subjects relate with the same few predicate properties; thus, the text is full of contrastive detail:

The metallic substances differ from all other materials by the fact that the outer shells of their atoms are bound rather loosely, and often let one of their electrons go free...unattached electrons that travel aimlessly around like a crowd of displaced persons. When a metal wire is subjected to electric force applied on its opposite ends, these free electrons rush in the direction of the force, thus forming what we call an electric current...(1947: 139).

Here, metals and non-metals are related positively and negatively to the property of having free electrons. Free electrons and displace persons are related to aimless travel. Metal wire, electric force, and free electrons are all related to the formation of electric current.

The propositions in the text recreate, in effect, the very process of understanding described earlier. Newton's gravitational equation, for example, constitutes a "general predicate" that is related to several subjects: the moon, a falling apple, etc. The common predicates provide a background of similarity against which the different subject elements can be understood.

Opaque Expository Writing

In contrast with Gamow's clear exposition, many scholarly investigations of a topic are opaque and difficult to follow. Too few subjects and too many general predicates (i.e., iterative details) typify such writing.
as a passage from the writings of Roman Jakobson illustrates:

Since 'in human speech different sounds have different meanings', Leonard Bloomfield's influential manual of 1933 concluded that 'to study this coordination of certain sounds with certain meanings is to study language.'...This connection and coordination have been an eternal crucial problem in the age-old science of language. How it was nonetheless temporarily forgotten by linguists of the recent past may be illustrated by repeated praises for the amazing novelty of Ferdinand de Sausurre's interpretation of the sign...although this conception jointly with its terminology was taken over entirely from the twenty-two-hundred-year-old Stoic theory... (1971: 345).

Here, a single subject, the connection of sound and meaning is variously predicated in its historical context, as the study of language, as a difficult but crucial problem, as having been considered by the Stoics but then forgotten.

The reality that the subject is poorly understood is also here recreated by the propositions in the text. The passage amounts to a listing of different facts; the relationships are unclear, difficult to organize and remember. However it is significant that one might appreciate this passage in literary terms, to admire the author's eloquent description of the topic as an "eternal crucial problem" and wonder at the breadth of scholarship evidenced in that single paragraph, so long as one is not required to extract a clear meaning from the text.

**Effective Literature**

Arguably the most successful work of literature in history, the Homeric epic is so full of iterative detail that the description of action events is constantly interrupted by detailed descriptions of the participants, where
they had come from and why they were there (Auerbach, 1953: 3-7). This created world of Illium and Odysseus is complete and effective; Eric Gombrich even speculates that classical sculptors and painters broke with the Egyptian tradition of schematic, contrastive representation when they discovered in Homer's written narrative the possibility of creating a substitute for actual perception of historical/mythical events (1961: 114).

Iterative detail is essential for the substantiation of a character. When this single subject is repeatedly presented in relation to several predicates (making up the flow of the narrative), this evokes a sense of depth in the character, just as the presentation of several similar lines in the drawing of a cup evokes a three-dimensional perception, a sense of recreated reality.

By the sheer magnitude of detail, everything in Homer is in the "foreground"—nothing is hidden or guessed at. Significantly, Auerbach equates this property with the utter independence of Homer's world from true reality; the epic poem contains "no teaching", no hidden moralistic interpretation (1953: 13). In other words, complete foregrounding through complete iterative detail creates a complete substitute but an utterly inadequate standard for evaluating reality.

**Problematic Literature**

The Biblical epic shows an extreme lack of iterative detail: very few predicates are used to describe participating characters. God speaks to Abraham, for example, and Abraham travels to an appointed spot to sacrifice his son; the scripture says nothing about the nature of God, His
reasons for testing Abraham, or why he would obey at all. The iterative
details needed to flesh out the Biblical events are all in the "background"
(Auerbach, 1953:14).

Like a modern map, the Biblical narrative largely ignores the
appearances or physical details of its components. The physiognomy of
God and the actual path of Abraham's journey, for example, are no more
an issue than are the actual colors of rivers or roads on a map. Yet the
contrastive relationships of God and man, of obedience and sacrifice are
clearly represented. Hence, attempts to perceive the Biblical text as a work
of literature, an obvious fiction, are quite problematic. The scripture is not
an adequate substitute for the observation of physical events. Instead there
is a definite tendency to perceive the Biblical text as a standard for
evaluating reality, not only the events spoken of, but also as Auerbach
notes, all events of human history, which "will be given their due place
within its frame..." (1953:15).

Summary

The relationships of these four types of writing, effective and
problematic technical-evaluative writing, effective and problematic
literature, are summarized in Figure 4-4.

[See Figure 4-4 next page]

It is possible in principle to perceive any text as either a substitute (i.e.
in literary, artistic terms) or as a standard (i.e. in technical-evaluative
terms), but each type of perception is clearly distinct, qualitatively different
a system of writing types

<table>
<thead>
<tr>
<th>Text perceived as a substitute</th>
<th>Text perceived as a standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less iterative detail</td>
<td>More contrastive detail</td>
</tr>
</tbody>
</table>

**Problematic literature**

Bible

Effective literature

**Homer**

**Jakobson text**

**Gamow text**

**Figure 4-4. A system of writing types.**
from the other (as indicated by the solid vertical boundary in Figure 4-4).

On either side of the boundary, the difference between effective and problematic writing is a matter of the relative quantity of either type of detail. Consequently there is actually a continuous gradation between problematic and effective writing in either type of perception (as indicated by the dotted horizontal boundary). Thus, Auerbach finds other literary works in the spectrum between extreme foregrounding and backgrounding; technical writing varies in clarity.

Iterative detail (i.e., few particular subjects with many general predicates) retards the effectiveness of a text intended to evaluate a subject. Such detail in an ostensibly evaluative text (e.g. the Jakobson passage) may tend to be perceived in literary terms (as indicated by the arrow crossing the standard/substitute boundary).

Effective technical writing is characterized by contrastive detail—several particular subjects related with a few predicates (e.g. the Gamow text). Even the Biblical narrative, which is often classified as a type of literature, tends to be perceived in evaluative terms, due to its lack of iterative detail and its contrastive presentation of the relationship between God and man (again, indicated by a boundary-crossing arrow).

CONCLUSION

A drawing may be perceived as a substitute for an object, or as a standard for evaluating an object, usually depending on the type of detail it presents. Likewise, I have claimed, a text may be perceived as a substitute
or as a standard. This can explain the general feeling that technical writing is distinctively associated with objective reality, while literary writing is essentially free from the concerns of truth or falsity.

Put simply, once we accept a substitute as such, the real object has been set aside, forgotten in a sense. For example, those who use saccharin as a sugar-substitute have deliberately set sugar aside. They do not consider saccharin true sugar, but it is not "false sugar" either, for sugar was not expected. A substitute is simply a substitute. A standard for evaluating some object, however, creates expectations about the object; the object is not set aside. From the marks on a map, we expect the road to turn this way or that. If the object meets the expectations created by the standard, the standard is "true" to the object. If however the expectations are disappointed, if the road does not turn as predicted by the standard, then the standard is "false" to the object.

Technical writing as a standard, is thus necessarily associated with reality; it is "objective" in that sense.

A work of literature, as a substitute, cannot be considered true or false. It may only be judged a more or less adequate or convincing substitute. This judgement is very much dependent on the reader and the situation, and so literature is indeed "subjective" in that sense.

A Review of the Discussion

I have reiterated Peirce's call for a more general theory of communication, a "universal art of rhetoric" applicable to all types of
signification, to gestures, to drawings, or to the written word. The explication of the technical/literary distinction provides a case in point for this larger perspective.

Technical writings appear to have only one, hopefully obvious interpretation. Literature clearly has a variety of interpretations. Analysts have usually insisted that the distinction is clear-cut and irrevocable, or they suggest that the distinction really doesn't exist, that judgements about technical writing are not distinct from judgements about a novel.

When this distinction is recreated with line drawings, it is proven to be illusory—both "types" of representation can be interpreted in many ways. However, the distinction is perceptually real, and the illusion serves an effective purpose. Technical writing is only effective if one interpretation is perceived.

Examples of visual detail and perception ultimately demonstrate that only one interpretation will be perceived if the drawing/text is perceived as a standard rather than a substitute. Contrastive detail makes a standard-perception of a drawing/text more likely. Iterative detail makes such perception less likely.

Consequently, technical writing should be predominated by contrastive detail, defined in writing as the relation of different particular subjects with relatively few general predicates, in propositions signified by the text. Iterative detail, the relation of few particular subjects with several predicates, should be avoided.
Different Manifestations of Contrastive Detail

The basic principle of contrastive detail may serve to explicate the use of many typical features of technical writing which have been heretofore adopted intuitively or through trial and error rather than for theoretical reasons. For brevity's sake, I will cite just four.

Passive voice—though often criticized, a passive construction can serve to remove a superfluous subject from the text, e.g. John washed the test tubes becomes The test tubes were washed. Thus, the passive voice provides a means of eliminating iterative detail, the repeated predication of one subject, which may interfere with the proper perception of the text, not as a recreation of a particular test-tube washing event, but as a standard for evaluating that event.

Headings—ideally, a heading can designate a common characteristic which relates to all or many subjects discussed in that particular section, thereby generating contrastive detail.

Enumeration—any use of number, either to quantify data or to simply enumerate a series of assertions in the text, is an implicit use of contrastive detail. To count several subject-items together is to assume that all share a common (predicate) characteristic, e.g. to count apples and oranges together is to count "fruit"; to assign different numerical scores to each test performance is to relate each performance in varying degrees to a common characteristic of intelligence, strength, agility, etc.

Diagrams and Graphs—we can understand the relationship of different subject-elements in a text (e.g. the parts of an electric motor, annual oil
production of various nations, etc.) if these are displayed together in a visual representation. As was noted earlier, a visual form with a caption or context can be perceived as a standard for evaluating the meaning of a text. The general characteristics of the diagram or graph are related to each of the subject elements represented, providing yet another form of contrastive detail.

My final point then, is that different features of technical writing are fundamentally similar in promoting contrastive detail. This should provide a useful background on which to develop further understanding of the technical writing enterprise.

ENDNOTE

1 Even recommendations or proposals, for which writers must anticipate several interpretations, court rejection for "ambiguity" if a reader actually detects alternate readings.
REFERENCES


5. COUNTERPARTS OF THE ABSTRACT IN SENTENTIAL AND SYLLOGISTIC STRUCTURE.

ABSTRACT

Writing textbooks commonly recognize two types of abstract, summary and descriptive. There is wide agreement about the nature of a descriptive abstract as an outline of topics in an article or report; there is disagreement about the nature of a summary abstract—whether it should be a "mini-paper" or a brief statement of an article's general topic and specific conclusions. Text structure is compared with sentential and syllogistic structure in which general and specific portions conserve the "shape" of information, even though mediate portions (corresponding with the body of a text) are mostly overlooked or deleted. Thus, a brief statement of topic and conclusions IS a miniature version of an article. Comparison of texts, sentences, and syllogisms also explains the two polar abstract types, student performance on abstracting assignments and the common placement of abstracts at the beginning of articles.

In this article, I will relate the two main types of abstract (i.e. summary and descriptive) with the subject and predicate of a sentence, and the minor term and major term of a logical syllogism. By doing this, I offer a possible explanation for (1) why we generally recognize just two polar types of abstract, even though in practice the distinction is not always clearly made, (2) why students often produce adequate descriptive abstracts, and short paraphrases of texts, but not adequate summary abstracts, and (3) why summary abstracts typically appear at the beginning of an article, even though they should only be written after the article is complete.

THE PROBLEM

Expository writing textbooks typically recognize two main types of
abstract, the summary abstract (often called an informative abstract) and
the descriptive abstract (often called an indicative abstract). While a
summary abstract typically condenses the specific message or main idea of
an article or report into a one-paragraph "mini-paper," a descriptive
abstract outlines the general purpose and topics addressed in the text. To
illustrate, I have composed a descriptive abstract (A) and a summary
abstract (B) of a short article on sore throat treatments (Consumers Union
1974).

A: Allergies and low humidity, and bacterial or viral infections are common causes of
throat irritation. This report reviews the effectiveness of over-the-counter medications
in curing, preventing, or relieving discomfort of sore throats. Alternative home
treatments are discussed.

B: Over-the-counter medications (OTCs) cannot cure or prevent sore throats caused by
bacterial or viral infections. Studies show antiseptic mouthwashes have no medicinal
advantage over water. This report recommends that sore-throat sufferers avoid
OTCs, use salt-water gargles and ordinary aspirin for discomfort, and consult a
physician if the sore throat persists.

Because they identify, describe, and exemplify both abstract types in
matter-of-fact fashion, textbook discussions of abstract composition (see
example) may imply that either type of abstract, though distinct in content,
is equally easy (or equally difficult) to compose, and that student-writers
can readily grasp the difference. However, it has been my experience that
students produce acceptable descriptive abstracts more often than they are
able to produce adequate summary abstracts. Also, the difference between
these types is apparently not obvious from the brief descriptions and
eamples usually given (Journet, personal communication). In fact,
Cremmins (1982), who also identifies these two types, also notes that "in
practice the differences between the two types often become blurred" (p. 5).

I will provide evidence in this section that the apparent difficulty in distinguishing descriptive and summary abstracts actually consists of difficulty in defining the summary abstract: difficulty in deciding what information elements should be included to create a miniature version of the article being abstracted, and also difficulty in understanding why and how those elements accomplish that effect.

**Textbook discussion**

There is not complete agreement among textbook authors as to the exact number of abstract types or what elements each type should contain. In spite of superficial differences, however, a few consistent elements do emerge. For example, Farr (1985) does not mention descriptive abstracts, but he identifies two types of summary abstract:

The Abstract is what many people (not always correctly) think of as a Summary....There are two views of how an abstract should be written. One says that it should just contain a précis of the introduction and the authors conclusions, while the other says that it should be a sort of mini-paper, outlining methods and results as well (pg. 30).

In contrast, Michaelson (1982) states with confidence that "there are three types of abstract":

The *indicative*, or descriptive, type states the general subject matter of the document that follows. It tells in a qualitative way what the report contains.

The *informative* ...[summary] abstract highlights the findings and results, briefly but quantitatively. It is a condensed version of the engineering work without discussion
or interpretation.

The informative-indicative abstract is a combined form that gives specific information about the principal findings and results and general information about the rest of the document (pg. 31).

First, the two diverse treatments above both recognize a type of abstract which is a "condensed version" of the original work, a "mini-paper". Second, both authors note the distinction between introductory ("general") text-information and ("specific") findings-results, the text-conclusions; both authors recognize a type of abstract which includes both kinds of information.

Both authors quoted above proceed to distinguish the former "miniature paper" abstract type from the latter introduction - conclusion (general - specific) type, but most others do not make this distinction. As was noted earlier, other authors such as Cremmins (1982) recognize only two types of abstract, summary (informative) and descriptive (indicative). Cremmins states that a descriptive abstract relates only the "purpose, scope, and methodology" of an article, but a summary abstract must have information on purpose, scope, and methodology, and also "results, conclusions or recommendations" (pg. 6). These are essentially the same definitions offered by Day (1983: 23).

Both Cremmins and Day further describe the summary abstract as they define it as a miniature or capsulized version of the corresponding article. Thus, what Michaelson calls an informative-indicative abstract is for Cremmins and Day a summary (informative) abstract by definition, since they claim that a summary abstract must contain the general information
on purpose and scope and methodology found in a descriptive (indicative) abstract, plus the specific results, findings and conclusions of the article.

Put another way, all the textbook discussions above that make the distinction appear to agree that (1) a descriptive abstract is an introductory description of the general purpose and topics in an article and (2) a summary abstract should essentially be a miniature rendition of the article. The key question raised among the four authors cited here is whether or not an abstract which contains the most general information from an article and the most specific information from an article is also legitimately considered a summary abstract: a miniature version of that article, even though nearly all of the intermediate material is left out, e.g., facts, figures, and discussion which link introductory information to an article's conclusions. That there is a common understanding of descriptive abstracts and yet indecision concerning the nature of summary abstracts is also evidenced in student performance on abstracting assignments.

**Some Student Examples**

Even if they apparently understand a text, students generally have difficulty with the idea of reducing the essential message of the text to a single paragraph, i.e. composing a summary abstract. In response to the injunction to create a "miniature version" of an article, students may try to paraphrase as briefly as possible everything that was said in the article. Example (C), a student's "summary abstract" illustrates this strategy.
C: Dryness of the mucous membranes may lead to infections and thus a sore throat. It may be viral or bacterial. Bacterial is much worse, especially if it is "strep throat" which can cause heart and kidney damage. The mouth has a large number of bacteria and germs called the "normal flora." Mouthwashes claim to eliminate disease-causing bacteria but in reality all they do is wash out the normal flora which is replaced in just a few seconds. Sore throat bacteria and viruses are embedded deep within the throat tissue and only by antibiotics can they be cured. Mouthwashes can't do it. The only value mouthwashes may appear to have is that they may ease the pain of sore throat. But in reality, it is the mechanical act of gargling that eases the pain. It is recommended by the Consumer's Union medical consultants to use warm salt water and the effect will be the same. Rather than use mouthwashes, you should use warm salt water to gargle, take aspirin for sore throat pain, and if it lasts for a couple of days you should check with a doctor.

Example (C) is not a bad paraphrase of the same article on sore throats abstracted in examples (A) and (B) above, but it is much longer than these 40-60 word abstracts which are adequate for that four-and-a-half page article; the student has apparently not been able to separate the major conclusion of the article (that medicated gargles, etc. be avoided) from a mass of background details and argument (concerning bacteria, viruses, normal flora, etc.). On the other hand, the same student on the same day composed (D), a "descriptive abstract".

D: This report describes sore throats and the inability of gargles and mouthwashes to prevent or cure them. It discusses different types of sore throats and what should be done to prevent and cure them. The problems of mouthwashes and their ineffectiveness are discussed in detail and recommendations are given on what should be used.

Though not entirely free of redundancy, the student example (D) more closely resembles my descriptive abstract example (A) in terms of both length and content:

A: Allergies and low humidity, and bacterial or viral infections are common causes of throat irritation. This report reviews the effectiveness of over-the-counter medications in curing, preventing, or relieving discomfort of sore throats. Alternative home treatments are discussed.

In other words the student was able to succinctly identify the topics...
addressed in the article (i.e. causes of sore throats and appropriate remedies) and thus compose an acceptable descriptive abstract. However the same student had to apply a brute-force approach to summarize the message of the article: by paraphrasing virtually every point made in the article, the student eventually comes across the point of the article (avoid over-the-counter remedies), but it remains buried in extraneous detail (example C). Other students assigned to write a summary abstract compose paraphrases of more appropriate length, but which still contain extraneous detail:

E: Bacterial and viral infections are the most common origins of the sore throat. A healthy person's mouth contains thousands of micro-organisms. These organisms are called the "normal flora." An organism invades the tissues of the throat of a susceptible individual and the area becomes infected. Medicated gargles, mouthwashes, or lozenges do little to prevent sore throats.

The result, exemplified by (E), is not an accurate summary abstract, because it barely touches on the conclusion-findings of the article (avoid over-the-counter remedies), but on the other hand it does indicate the topics addressed, (causes and treatments of sore throats). So, (E) might serve as a descriptive abstract, at least as they are often defined. In sum, students commonly can compose acceptable descriptive abstracts; "summary abstracts" written by those same students tend to be paraphrases of the whole article, full of extraneous detail. A short paraphrase might miss the point of an article and instead be classified as a descriptive abstract. This may give rise to the impression that such students don't understand the difference between summary and descriptive abstracts. However, I will suggest here that such a student might clearly understand the common
textbook distinction between summary and descriptive abstracts (i.e. the
distinction between a mini-article and a general description of the article)
and still he or she may be unable to construct distinct, original examples of
these. First, the student may not recognize the essential principles
underlying the distinction and second, the student may not have sufficient
acquaintance with the text topic to be able to implement those principles.

**Descriptive instruction**

In typical pedagogical discussions of abstracts (op. cit.), the practical
values of an abstract are cited (as a time-saving device, a guide to the
article, etc.); the common characteristics of abstracts are enumerated
(summary or descriptive 100-250 word paragraphs, appearing first in
articles, etc.). Usually a number of example abstracts are presented also.
What is lacking in such discussions is some means of characterizing the
essential nature of a summary abstract and the distinct essential nature of
a descriptive abstract. Instead, writing students are provided with a list of
properties that abstracts usually have, their practical purpose, and a few
concrete examples.

From these types of discussion it is hoped that students will intuitively
grasp the "essence" of a good summary or the "essence" of a good
topic-description and then be able to construct their own, original abstracts.
For comparison, we might imagine a situation where novice mechanics
students are given only a list of typical gasoline engine parts (cylinder,
camshaft, pistons, etc.), a list of uses for gasoline engines and some
concrete examples (an auto engine, a generator, a lawn mower motor, etc.).

Without some knowledge of the basic principles of internal combustion, mechanics would have difficulty building any original, working engine with only a parts list and example motors as guides. At best they might carefully copy an example motor, just as novice writers might resort to simple imitation. Only with knowledge of the essential principles which relate the various parts and examples can a student create original examples to serve the same function.

**Explanation by essential principle**

The essential principle underlying a gasoline engine is the conversion of the heat of burning gasoline into mechanical movement. This essential principle explains the parts of the engine and makes their relationships intelligible: gasoline burns in the cylinder; expanding gases from this combustion force the piston to move out of the cylinder; the moving piston rotates the camshaft, and this rotation can be used to move automobiles, cut grass, etc.

It is important to note the difference here, between practical uses of gasoline engines (to drive cars, cut grass, or generate electricity) and their essential function (to convert combustion energy into movement). I would likewise suggest that there is a distinction to be made between the use of an abstract as a shorter version of an article, etc., and the essential principles that allow an abstract to be used in that way. I propose here to characterize
the essential principles of text organization underlying summary abstracts and descriptive abstracts, and thereby explain and relate their distinct properties and practical uses. By analogy with the gasoline motor example, students need some knowledge of essential principles in order to construct original, workable examples.

THE ANALYSIS

In this section I propose to explain how a single-paragraph abstract which only introduces a topic and then states the article's conclusions can also be rightly considered a miniature version of the whole article.

The explanation is based on the premise that the organization of textual information has its counterparts in the organization of smaller units of information: specifically in sentences and minimum (syllogistic) logical arguments. In each of these smaller information structures, a relatively specific element is related to a relatively general element by means of a mediate element. The principles which relate a one-paragraph abstract (that seems to contain only general and specific components of an article) to the whole article are these:

1) the size and complexity of the mediate element is proportional to the size of the information structure;

2) once it establishes the link between general and specific information elements, the mediate element can be and often is ignored.

A whole article is a large and complex information structure with a large and complex mediate element, the BODY of the article, which links
the general topics of the article with its specific conclusions. Once this link is established, the body of the article can be set aside; the general and specific elements can be expressed in a one-paragraph abstract, a much smaller information structure with an uncomplicated mediate element that is easily overlooked.

The above principles emerge when the structure of sentences and syllogisms are examined in detail. Though perhaps not common, this type of analysis, the comparison of texts with more basic information structures, has some precedents. C. S. Peirce, one of the founders of semiotics, built this study on the premise that all meaningful objects or "signs" share properties in common, collecting with the term "sign" letters, numerals, words, sentences, chapters, books and whole libraries (Peirce, 1978: 149). Furthermore, T.A. van Dijk (1977) has characterized the topic or "macrostructure" of a text in terms of propositional structure, the same structure used to represent the meaning of an individual sentence:

The characterization of the notion of topic of (a part of) a discourse...is identical with what we intend MACRO-STRUCTURES to have. That is, a macro-structure of a sequence of sentences is a SEMANTIC REPRESENTATION of some kind, viz a proposition entailed by the sequence of propositions underlying the discourse (or part of it)....this assumption implies that the macro-structure of simple sentences may be identical with their underlying propositional structure (1977: 137).

Like van Dijk, I would claim that texts and sentences (and syllogisms as well) share a common semantic structure at some level. Like C.S. Peirce, I will model this common semantic structure in diagrammatic or "iconic" terms (Peirce, 1960: 2.278). This semantic diagram, common to
sentences, syllogisms and larger texts will serve to further explicate the relationship between a text and summary and descriptive abstracts. To develop this claim, the structure of sentences and syllogisms will now be examined in some detail.

**Sentence: predicate, subject, and mediate**

Traditional grammars recognize that every sentence must have a noun and a verb, i.e. a subject and predicate, but closer investigations of sentence structure suggest that three elements be recognized. Basic generative grammar recognizes three primary components in a sentence, a subject noun phrase (NP), a predicate verb phrase (VP), and between these an auxiliary (AUX) which minimally indicates tense; this is usually expressed as a formal rule (see Radford, 1983:41):

\[ S \rightarrow NP - AUX - VP \]

For example, in the sentence \( S \) the committee will meet tomorrow, the committee is analysed as the NP, will is analyzed as the AUX (which indicates "future" tense), and meet tomorrow is analyzed as the VP. However, because many sentences have no overt lexical auxiliary, e.g., the committee meets tomorrow, and because tense is thereby "transfered" to the verb (meets), generative grammars often simplify the sentence rule to S -> NP - VP; the AUX category is only implicitly recognized (Radford 1983:49).

Though overlooked by traditional grammars and often only implicitly recognized in generative grammars, this medial auxiliary is important for
semantic as well as formal syntactic reasons. Without some form of mediation between subject and predicate, their meaningful relationship is problematic, as Bradley's dilemma indicates:

...we seem unable to clear ourselves from the old dilemma. If you predicate what is different, you ascribe to the subject what it is not; and if you predicate what is not different, you say nothing at all (Copi, 1982: 274).

In other words, if the subject and predicate are different terms with different meanings, how are we justified in linking or equating them in a sentence? And if subject and predicate are different terms with the same meaning, what is the point of redundantly linking them in a sentence? For example, in the sentence this man is mortal, if the subject man and the predicate mortal have different meanings, then we must admit that "man" is not "mortal", and this contradicts the sentence. On the other hand, if we claim that "mortal" is part of the meaning of the term man, then the sentence is trivial, a tautology equivalent to the statement that "man is man".

This dilemma doesn't prove that we really can't make meaningful, non-trivial statements, but rather it shows that more must be involved in a statement than a subject and a predicate. If these have inherently contradictory meanings, there must be a mediating element between them. The paradoxical object shown in Figure 5-1 illustrates this relationship of contradiction and mediation (see Merrel, 1982: 21).

[See Figure 5-1 next page]

This drawing (from Penrose and Penrose, 1959) represents the union of...
FIGURE 5-1. A visual model of Bradley's dilemma.
two incompatible visual forms, which accounts for its "slippery" character. The left-most portions of the drawing organize six lines into two groups of three (the two prongs of a U-shaped structure) while the right-most portions of the drawing organize the same six lines into three groups of two (the three cylindrical prongs of the "fork"). The two contradictory forms, like the subject and predicate of a statement, present a dilemma. The visual dilemma is resolved when the figure is construed as a three-part organization (Figure 5-2): the six lines in the middle of the drawing form an independent region, compatible with each of the other two regions and thus mediating between them.

[See Figure 5-2 next page]

As has been suggested elsewhere (Manning 1985), this mediate region can be construed as a semantic correlate of the AUX constituent in the grammatical rule noted above, just as subject and predicate are construed as correlates of the NP and VP constituents. Hence AUX (representing tense) signifies mediation between otherwise incommensurable meanings of subject and predicate terms.

**Semantic enclosures**

It is with reason that regions corresponding to subject and mediate in Figure 5-2 are also represented as areas enclosed in the predicate region. This corresponds to the idea that the set of objects referred to by a predicate term in a sentence is more general, or "larger" in relation to the specific set of objects or object referred to by the subject in that sentence.
FIGURE 5-2. Mediation between subject and predicate.
In the original example sentence, this man is mortal, the predicate term mortal designates the set of all living things that eventually die; in the subject NP, the term man designates the set of things that are human males and the term this indicates that a specific man is referred to in the set of human males. The whole sentence (as diagrammed in Figure 5-3) indicates that a specific man belongs to the general set of living things that eventually die.

[See Figure 5-3 next page]

I have thus represented the meaning of a specific (subject) term as a circle within a circle (a set within a set). In semantic theory, a predicate is thought to represent a set containing all objects which share a common characteristic or action. So, a verbal predicate like run designates the set of "things that run" or "running things"; an adjectival predicate like foolish designates the set of "foolish things"; a verb-object predicate like shot JFK designates the set of "assassins of the 35th U.S. president". The subjects of the sentences, the burglar ran, bow-ties are foolish, and Oswald shot JFK are each designated as (sets of) objects contained in the respective predicate sets. Unlike a predicate, which simply designates a "whole" set of objects (even if the set has but one member), as the subject NP of a sentence a term designates a set of objects which is only "part of" the more general VP set: other things run besides burglars, many other things besides bowties are foolish, and Kennedy may have had other assassins. The purpose of the sentences, however, is to identify a particular runner, a particular foolish object or a particular assassin. In effect, a (specific) subject is also a
FIGURE 5-3. Enclosure and mediation in sentential structure.
(general) predicate designating a set of objects, but in the context of a sentence, a subject is a predicate within a predicate, designating a set within a set.

It is important to understand that the specificity of a term, such as man or mortal is relative to the information structure in which it is found and its placement in the structure. In the single phrase this man, for example, this is the specific term and man is the general term; in the sentence this man is mortal, man is a relatively specific term and mortal is the general term; in the sentence mortals are foolish, mortals is the subject and thus the relatively specific term.

**Syllogism: major, minor, and middle terms**

A syllogism is a deductive logical argument; in its standard, categorical form, a syllogism contains three terms which variously serve as subjects and predicates in three statements (see Copi, 1982: 210-212). The three terms are called the major term, the minor term, and the middle term; the three statements are referred to as the major premise, the minor premise, and the conclusion. The following is perhaps the most famous syllogism example:

1. All men\(^M\) are mortal\(^P\)
2. Socrates\(^S\) is a man\(^M\)
3. Socrates\(^S\) is mortal\(^P\).

Line 1 is the major premise; by definition it contains the major (P) and middle (M) terms. Line 2 is the minor premise; by definition it contains the
minor term (S) and the middle term (M). Line 3 is the conclusion, which contains only the major and minor terms.

**Logical enclosures**

The major term is designated with a "P" to indicate that it serves as the predicate term in the conclusion. Likewise the minor term is designated with an "S" to indicate that it serves as the subject term in the conclusion. Hence, the conclusion statement includes the specific object or set of objects designated by the minor term (here, Socrates) within the larger set of objects designated by the major term (here, the set of living things that eventually die; see Figure 5-3 above, substituting Socrates for the expression this man).

Not all syllogisms represent valid deductions, but in a valid logical argument of this form, the middle term justifies the conclusion statement. In the example above, the term man or men designates a set which is at once included in the set of mortals and also includes Socrates. This situation is represented in Figure 5-4; by virtue of the middle-term set (things which are men), we observe that the minor-term set (Socrates) is also included within the major-term set (things which are mortal).

[See Figure 5-4 next page]

The middle term mediates between contrasting major and minor terms in the premises, leading to the logical conclusion; the conclusion then omits the middle term and connects the major and minor terms in a sentence. Hence, the middle term of a syllogism and the sentential AUX
FIGURE 5-4. Enclosure and mediation in syllogistic structure.
constituent serve a parallel mediating function. Likewise the minor term and sentential subject both signify relatively specific information and the major term and sentential predicate both signify relatively general information (compare Figures 5-3 and 5-4).

Text: introduction, body, and conclusions

The (semantic) organization of an article can be represented with the same type of diagram used to illustrate the organization of sentences and syllogisms. Figure 5-5 below compares with Figures 3 and 4 above.

[See Figure 5-5 next page]

As illustrated in Figure 5-5 (a), the body of the article links the general topics of the article with its specific conclusions; the "sore-throat" article, for example, is diagrammed in 5 (b). Here, assertions (i) "sore throats are caused by viral and bacterial infections" and (ii) "OTC (over-the-counter) remedies are used to treat sore throats" define the topic of the article. The body of the article is represented by assertions (iii)-(viii), "a healthy mouth contains normal bacteria," "antiseptic gargles wash out normal bacteria...," etc.; the conclusion corresponds with (ix), "OTC remedies should be avoided."

The would-be author of an expository article initially faces a dilemma very like Bradley's subject/predicate dilemma: the subject and predicate of a sentence designate that same objects, or they designate different objects; if subject and predicate are different, the sentence is a contradiction; if subject and predicate are the same, the sentence is a trivial tautology.
Sore throats are caused by viral and bacterial infections. OTC remedies are used to treat sore throats. (Topic)

A healthy mouth contains normal bacteria. Infectious bacteria embedded in throat tissues cause swelling and soreness. Antiseptic gargles wash out normal bacteria but cannot reach the infection. Studies show antiseptic mouthwashes have no medicinal advantage over plain water. People using OTCs for pain relief may delay proper medical treatment. Untreated bacterial infections can lead to heart and kidney damage. OTCs should be avoided. (Conclusion)

FIGURE 5-5. Enclosure and mediation in text structure.
Likewise, an author has on one hand an insight, an idea or a position to promote, some research findings, etc.; this is the author's "point" which generally corresponds with the conclusions of his or her article. On the other hand, the author has access to a set of general information, consisting of previous articles on the topic, also premises and assumptions shared by the academic community, etc.

Now, if the author's point is different from what is already written and known about the topic, then either the author is wrong or everyone else is—a contradiction. But, on the contrary, if the author's point is already contained in previous writings and general knowledge of the topic, then the author's contribution would be utterly trivial, a "pointless" exercise. (At the very least, a non-trivial text must re-organize general knowledge in a new way, and this takes us back to the first horn of the dilemma: the author's contribution is somehow different, and how is the difference to be justified?)

The body of a text is like a sentence auxiliary or the middle term of a syllogism; it resolves the above dilemma by mediating between general background information on the topic and the specific conclusions of the text. As illustrated in Figure 5-5, the author's specific assertions (e.g. "avoid OTCs"), by virtue of arguments in the body of the article (e.g. "OTCs don't work and delay proper medical treatment") are included (by virtue of their publication) in the set of general information on the topic (e.g. "causes and treatments of sore throats"). Likewise, the subject of a sentence or logical conclusion is included in the set of objects represented by the predicate.
**Principles of Information-Structure**

To summarize to this point, the following properties of sentential and syllogistic structure support the principles I will use to relate texts and abstracts in this discussion:

1) In the single phrase *this man*, the specific article *this* is linked to the general (predicate) term *man* implicitly, any mediating relation is not grammatically marked at all.

2) In the sentence, *this man is mortal*, the relatively specific subject NP *this man* is linked to the general predicate VP *is mortal* by a mediating element *AUX*, an underlying grammatical category which typically (but not always) has some overt marker in a sentence (minimally tense, as indicated by *is*).

3) In a syllogism, the mediating element is a whole term (a word or phrase), appropriately called "the middle term": *Socrates is a MAN: any MAN is mortal*. To reach the conclusion of this syllogism, *Socrates is mortal*, the middle term links the specific (subject) term *Socrates* with the general (predicate) term *mortal*, and the middle term drops out.

**Principle 1:** As the size of the information structure increases, from phrase, to sentence, to syllogism, the mediate element becomes larger in relation to general and specific elements; in a syllogism the mediate term is equal in size to the major and minor terms. Projecting this trend forward to a much larger text, such as an expository article, it follows that the mediate element would correspond to the largest portion of the text, i.e.
the body of the text, as illustrated in Figure 5-5.

Principle 2: Like the mediate elements in smaller information structures, however, the mediate body of an article may be "set aside" once it has established the link between general topic information and the article's specific conclusions. Thus, just as the conclusion of a syllogism essentially reduces information in the logical argument to a sentence, trading the middle term for a mere grammatical marker (tense), so too, the information in an article may be reduced to a single-paragraph abstract, trading the body of the text for a sentence or less as in example B:

B: Over-the-counter medications (OTCs) cannot cure or prevent sore throats caused by bacterial or viral infections. Studies show antiseptic mouthwashes have no medicinal advantage over water. This report recommends that sore-throat sufferers avoid OTCs, use salt-water gargles and ordinary aspirin for discomfort, and consult a physician if the sore throat persists.

The principles above serve to answer the question posed at the outset of this analysis: in what sense can a summary (informative) abstract "just contain a précis of the introduction and the authors conclusions" (Farr 1985: 30) and still be considered a miniature version of an entire article? Based on those principles, it would seem that such an abstract is a miniature version of a larger article in the same sense that a small triangle need only contain the same three angles of a larger triangle in order to be considered a "mini-version" of the larger triangle, as illustrated in Figure 5-6.

[See Figure 5-6 next page]

Both the sides of any triangle and the mediate portion of an information structure (sentence, paragraph, article, etc.) increase in length as the size
FIGURE 5-6. Triangle analogy relating texts and miniature texts (summary abstracts).
of the triangle or information structure increases (principle 1). Nevertheless, the definitive shape of a triangle is given by its angles, and so the actual length of the sides may be considered unimportant; a smaller triangle with the same angles is thus interchangeable with the larger triangle (principle 2). By analogy I would say that the definitive "shape" of an article is given by its most general information (the topic-introduction) and by its most specific information (the conclusions); an abstract (a smaller information structure) with this definitive information would likewise be interchangeable with the larger article, at least in terms of its "shape".

And so, to conclude this section, I have proposed principles, motivated by an analysis of sentential and syllogistic structure, which explain how a summary abstract can condense the information in an article. With reference to the same analysis I will proceed with explanations for (1) why textbooks generally recognize two polar types of abstract and why the distinction is sometimes difficult to maintain in practice, (2) why students often can produce adequate descriptive abstracts, and short paraphrases of texts, but the same students often do not produce adequate summary abstracts, and (3) why summary abstracts typically (but not always) appear at the beginning of an article, even though they should only be written after the article is complete.

**PROPERTIES OF ABSTRACTS EXPLAINED**

I have proposed that sentences, syllogisms, and larger texts are
information structures with properties in common: each relates general information to specific information by means of some kind of mediate information. This proposal-hypothesis is justified by the explanations it provides for phenomena otherwise poorly understood. First, the two polar types of abstract follow naturally from this hypothesis.

**Text structure and Abstract types**

Because a text is organized along the same lines as a sentence or syllogism, there is a natural opposition in an article between general and specific information. This explains the two types of abstract; descriptive abstracts represent general information, language which designates a collection of several similar entities. This contrasts with a summary abstract's essential expression of specific information, language which designates one or a relatively few entities, unique in relation to other entities in a more general set to which the specific entities belong. The two opposing types of abstract relate to the two naturally opposed components of an information structure, one general and one specific. (As we have seen, the mediate component is readily ignored and thus evokes no abstract type). Where sentential predicates and major terms of syllogisms designate general classes of objects, a descriptive abstract designates a body of general text information. Where sentential subjects and minor syllogistic terms designate a specific class of objects, a summary abstract designates a body of specific text information.

By indicating the topics to be addressed in a text, the purpose, scope and
methodology, a descriptive abstract designates an article as a type, a member of a group of similar articles, those which treat the same topics, etc. Note that significantly different articles could be written from the descriptive abstract (A) provided earlier.

A: Allergies and low humidity, and bacterial or viral infections are common causes of throat irritation. This report reviews the effectiveness of over-the-counter medications in curing, preventing, or relieving discomfort of sore throats. Alternative home treatments are discussed.

Potentially, the descriptive abstract above might have corresponded with a positive rather than a negative review of over-the-counter medications; another potential article may have reviewed different home treatments, and so forth. This is equivalent in principle to the fact that a sentential predicate, e.g. are foolish as in bowties are foolish, potentially designates other objects associated with foolishness (feathered hats, fuzzy dashboard dice, etc.) In contrast, by introducing the general topic and also relating the particular findings of an article, a summary abstract designates an article as a particular argument from the general premises, leading to unique conclusions, as exemplified by (B).

B: Over-the-counter medications (OTCs) cannot cure or prevent sore throats caused by bacterial or viral infections. Studies show antiseptic mouthwashes have no medicinal advantage over water. This report recommends that sore-throat sufferers avoid OTCs, use salt-water gargles and ordinary aspirin for discomfort, and consult a physician if the sore throat persists.

Abstract (B) indicates that this particular article is a negative review of OTCs and it lists the specific alternative remedies discussed. Ideally a summary abstract should correspond to only one article. This is equivalent in principle to a sentence like bowties are foolish, which links a subject to a
predicate and thereby asserts that bowties are one specific class of foolish objects.

A summary abstract should contain general topical information (in example B above, causes of sore throats, for example) as well as specific conclusions of the article (that OTCs be avoided). This is because specificity is only a relative condition; in order to represent the conclusions of an article as specific information, a summary abstract presents the conclusions relative to a general topic. This is equivalent in principle to the fact that, in a sentence or syllogism, an object or a class of objects is only specific in relation to another general class of objects. In the single phrase this man, for example, this is the specific term and man is the general term; in the sentence this man is mortal, man is a relatively specific term and mortal is the general term; in the sentence mortals are foolish, mortals is the subject and thus the relatively specific term.

As was noted by Cremmins (1982: 5), in practice, the difference between summary and descriptive abstracts is sometimes unclear. I would suggest that this is equivalent in principle to the unclear status of a term like man or mortal as a general or a specific term, due to the relative status of specific information. The definitive character of a summary abstract is the specific information it relates; that information is only specific relative to the general topic of a particular article, just as man or mortal is only a specific term relative to the predicate of a particular sentence. For example, the assertion that over-the-counter medications should be avoided is a specific conclusion of the article abstracted in (B) above, but in another
article that same statement might be used as a topical premise (i.e. general information) which might thus appear in a descriptive abstract (F) of such an article:

F: Because they may delay proper medical treatment, over-the-counter remedies for sore throats should be avoided. This report examines dangerous complications associated with sore throats and proper treatments offered by a trained physician.

Hence, information only appropriate for a summary abstract (B) in one context is appropriate for a descriptive abstract (F) in another context. The distinction between the two types of abstract might seem blurred, unless it is recognized that the information common to both types of abstract has changed in status, from a specific conclusion to a general premise, relative to the particular article.

**Student performance**

The student abstracts examined earlier indicated that "summary abstracts" written by students tend to be paraphrases of the whole article, full of extraneous detail; yet those same students may compose acceptable descriptive abstracts. Based on this analysis, student performance on abstracting assignments can be traced to two sources: first, improper understanding of what constitutes a miniature version of an article, and second, difficulty in distinguishing general, specific, and mediate information relative to a particular article. As indicated by example (C) a detailed paraphrase of even a short article is much longer than an adequate abstract.

C: Dryness of the mucous membranes may lead to infections and thus a sore throat. It may be viral or bacterial. . . .Mouthwashes claim to eliminate disease-causing
bacteria but in reality all they do is wash out the normal flora which is replaced in just a few seconds. . . . The only value mouthwashes may appear to have is that they may ease the pain of sore throat. But in reality, it is the mechanical act of gargling that eases the pain. . . . Rather than use mouthwashes, you should use warm salt water to gargle. . . .

To avoid over-long abstracts, writers are commonly told to eliminate "extraneous" information and to include only "essential" information (e.g., in Michaelson 1982: 32, or Day 1983: 24). The problem is that at no definition of "essential" or "extraneous" is commonly offered. Consequently a student may submit a shorter paraphrase (E) which has eliminated the specific findings of the article (here, to avoid OTCs):

E: Bacterial and viral infections are the most common origins of the sore throat. . . . An organism invades the tissues of the throat of a susceptible individual and the area becomes infected. Medicated gargles, mouthwashes, or lozenges do little to prevent sore throats.

By the analysis offered here, the difference between a paraphrase and a summary abstract of an article is that a paraphrase abbreviates components of the article (sentences, paragraphs, sections, etc.) while an abstract abbreviates the article as a whole. Thus, a paraphrase mostly contains mediate information, which occupies the largest portion (the body) of an article's components. A summary abstract, however, all but eliminates mediate information, focusing instead on general topic information and specific conclusions, much smaller portions of an article's components. This is illustrated by Figure 5-5(b): most of the information in paraphrases (C) and (E) above is drawn from the mediate portion of the diagram; most of the information in the summary abstract (B) is drawn from the general and specific portions of the diagram (i.e. the largest and the smallest squares).
On one hand a student may compose a paraphrase instead of a summary abstract because he or she may not understand the difference between an abstract as a "miniature version" of an article, abbreviating the whole article, and a paraphrase as a "miniature version" abbreviating components of an article. On the other hand, even if this conceptual distinction is understood, composition of a summary abstract still requires that general, mediate, and specific information be separately identified. Mediate information must be separately identified and eliminated; specific information must be included relative to the general topic of the article. Unless students are able to do this, a paraphrase may result by default: a random inclusion and exclusion of information from all parts of the article.

Lower-division students in particular tend to perceive any given text as a homogenous collection of "facts" rather than as an argument linking premises and conclusions; they tend not to critically evaluate an author's particular claims with reference to background knowledge. In other words, they do not tend to separately identify general, mediate, and specific information; the list of assertions in Figure 5-5 (b) would, in the mind of such students, be contained in a box without internal divisions. The reasons for this may have to do with a lack of extensive knowledge of any given topic—not having read any other article on sore throats, a student would not know the assertion "sore throats are caused by bacteria" is an assertion found in most articles on sore throats and is thus general information, while the assertion "OTC remedies for sore throats should be
avoided" is a less common assertion, specific to one article.

In any case, even without the ability to distinguish premises, arguments and conclusions, a student can probably still construct an acceptable descriptive abstract. This is because a descriptive abstract, as defined here, only identifies the general topics in an article, represented by the most general (largest) square in Figure 5-5; a descriptive abstract thus need only represent "a box without internal divisions." As illustrated in 5(b) all of the assertions in the article are contained in this largest "box", so any statement from the body of an article might also represent the general topic. For example, "viral and bacterial sore-throat infections are difficult to distinguish" or "infectious bacteria embedded deep in throat tissues cause swelling and soreness" can indicate that the article is about sore throats even though these are not the most general statements.

**Ordering of abstracts**

Finally, the proposed parallel between text and sentential structure accounts for the common placement of abstracts at the beginning of an article, even though summary abstracts should be written only after the article is complete, as is pointed out by Sherlock (1985):

Because the abstract appears before the body of the report, some writers try to prepare it before writing the report. Avoid this temptation. Now matter how firmly the report seems to be set in your mind, you probably will need to make changes that must be reflected in the abstract...the abstract is therefore generally postponed until last (pg. 112).

A summary abstract, representing the most specific text information,
parallels the behavior of a subject term representing the most specific sentential information. The majority of languages in the world, including English have mainly subject-initial sentences; this indicates a general formal principle favoring presentation of subjects before (verb-object) predicates and thus specific information before general information. (A detailed explanation of this principle is offered in Manning and Parker, 1988). On occasion however, summary abstracts do appear at the end of an article or report (Dumont and Lannon, 1985: 270), just as a small but significant percentage of the world's languages have subject-final sentences.

SUMMARY

It seems appropriate to conclude with a review of the summary abstract appearing at the beginning of this article; the abstract is repeated here, with the portion corresponding to the body of this article in boldface type:

Writing textbooks commonly recognize two types of abstract, summary and descriptive. There is wide agreement about the nature of a descriptive abstract as an outline of topics in an article or report; there is disagreement about the nature of a summary abstract—whether it should be a "mini-paper" or a brief statement of an article's general topic and specific conclusions. Text structure is compared with sentential and syllogistic structure in which general and specific portions conserve the "shape" of information, even though mediate portions (corresponding with the body of a text) are mostly overlooked or deleted. Thus, a brief statement of topic and conclusions IS a miniature version of an article. Comparison of texts, sentences, and syllogisms also explains the two polar abstract types, student performance on abstracting assignments and the common placement of abstracts at the beginning of articles.
As with the summary abstract of the sore-throat article (B), a single sentence in the abstract above corresponds with the body of this article (i.e. the detailed analysis of sentential and syllogistic structure in relation to text structure, involving a comparison of semantic diagrams (Figures 1-5), etc.) A larger portion of the abstract above, which precedes the smaller boldface portion, corresponds with an outline of the general topic treated in this article (problems encountered in defining and teaching summary and descriptive abstracts). Another larger portion which follows the smaller boldface portion corresponds with a statement of the specific "point" of this article (problematic properties of abstracts can be explained if text structure is related to sentential and syllogistic structure). Nevertheless, the boldface sentence represents the link between the general problem outlined and the specific solution to the problem proposed in this article. The boldface sentence simultaneously illustrates the claim it makes: when the information in an article is reduced to much smaller structure, a single-paragraph abstract, the mediate information is mostly eliminated while general and specific points in the article are conserved, evidently because texts, sentences, and syllogisms share a common semantic structure.
REFERENCES


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CONCLUSION

To conclude, I will first briefly review the topics discussed in each of the articles presented here. I will then relate the different visual models used in these articles in a single theoretical overview of language structure.

A REVIEW OF THE DISSERTATION

This dissertation consisted of five chapters (articles). The first three chapters model aspects of sentential structure and sentential and lexical meaning with types of visual perception in order to explain some aspect of language otherwise poorly understood.

First, relative numbers of languages with different basic-sentence orders for Subject, Verb, and Object fall in a hierarchy: #SOV > #SVO > #VSO > #VOS > #OVS > #OSV. The assumption that syntactic interpretation parallels figure/ground interpretation and that semantic form parallels a diagram of enclosed visual regions (Figure 1-5: S enclosed in O enclosed in V) explains this hierarchy more elegantly than do generative or functionalist approaches.

Second, semantic interpretation of English syntactic form (subject NP - tense Aux - predicate VP), is modeled with the Penrose & Penrose "fork" (Figures 2-2 & 2-3). A sentence is thereby defined as the representation of two contrasting semantic regions mediated by tense. Acceptability or unacceptability of root and embedded clause forms in English are explained relative to this definition.

Third, the code-significance of words is modeled with forms like Jastrow's duck/rabbit (Figures 3-1 & 3-2). A word may encode a single
significant form and yet have several meanings; the several meanings of individual words like *game* and *play* are accounted for.

The last two chapters apply these same visual models of word meaning and sentence structure to the analysis of larger texts. Like visual icons or individual words, a whole text may potentially substitute for many different object-meanings (literary discourse) or be analyzed as one standard of evaluation (technical discourse) depending partly on the type of detail in the text and partly on the perceptual disposition of the reader (chapter four). Like the specific subject and general predicate of a sentence, an expository text is organized as specific information (conclusions) relative to general information (the topic-background). Hence, there are two polar types of abstract, one summary-specific and one descriptive-general (chapter five).

Being analogous to a sentential subject in terms of specificity, a summary abstract is usually placed at the beginning of a text even though the abstract is written last, just as subjects usually appear at the beginning of sentences (see again chapter one).

**Theoretical overview**

As was noted in the introduction, three types of visual phenomena were used to model three types of linguistic phenomena. Figure/ground ordering (Figure A) was used to model (syntactic) ordering of language elements, i.e. language form. Visual ambiguity (Figure B) was used to model the often ambiguous meaning of language elements, i.e. language content. A visual dilemma (Figure C) was used to model the inherent
contradiction encountered in ordering together language elements with different meanings, i.e. relating form and content, for example relating subject-predicate ordering to sentential meaning.

Figure D illustrates how the three visual models, figure/ground interpretation, visual ambiguity, and the "fork" dilemma may be integrated to create an overall model of language organization.

The key element in Figure D is the diagram of enclosed circles, S enclosed in M enclosed in P; this represents a relatively specific subject (here, the game) enclosed within a larger mediate and predicate set (here, is up). On one hand (left), an ordered interpretation is imposed on the diagram, analogous to figure/ground interpretation, which corresponds to the syntactic order of the sentence as discussed in chapter one. On the other hand (right), the circle S and the circle P represent sets. The content of each set is determined by the individual lexical items (game and up). The meaning-interpretation of each lexical item is analogous to interpretation of an iconic form, as discussed in chapter three.
For S to be enclosed in P, the lexical meaning of the subject must be reconciled with the lexical meaning of the predicate. The meaning of each corresponds with a different iconic form, but as illustrated by the Penrose & Penrose "fork", two distinct iconic forms can be linked by virtue a middle region (M) as discussed in chapters two and five. The middle portion of the "fork" allows the bottom U-shaped portion to be reinterpreted, from the "two prong" to the "three prong" form of the top portion. Likewise the game icon can be reinterpreted as representing a part of the up icon, the virtual plot being removed from the sequence of plots. This would give rise to the usual sense of the expression the game is up, i.e. "this (often illicit) activity is now over" or in other words, "this activity is hereby removed from the sequence of activities."

As outlined in chapter five, I suggest that the overall organization of larger texts duplicates the organization of basic sentential forms; consequently the integrated model in D serves as a common template for both kinds of language, both the larger and the more basic forms. Literary texts however, are more like individual words in that a work of literature, like an isolated word, evokes a form which can be interpreted in many ways (chapter four). As fictions, works of literature, like individual words, can have no truth value (being neither true or false) which is to say they make no direct assertion about reality. In contrast, expository technical writing, like a whole sentence, tends to be less ambiguous than a literary text or an individual word. An expository text, like a sentence, can have a truth value and will typically be interpreted as an assertion about reality.
FURTHER INQUIRY

There are at least two possible reasons why the visual model illustrated in Figure D has proven useful in explaining language form and content. The connection between vision and language may be coincidental and thus superficial, or the connection may point to actual and significant psychological similarities between the two cognitive faculties.

It could be mere coincidence that a visual process like figure/ground interpretation closely parallels a linguistic process like subject-predicate ordering. In that case I have only succeeded in constructing an elaborate "parable" about the structure of language, like the Biblical parable of the sower (Matthew 13: 3-23) which illustrates the fact that some people become dedicated converts to a cause upon "hearing the word" and some do not. We know of no factual connection between a seed sprouting in the earth and the psychological process of conversion; the apparent similarity is only a coincidence and/or a tribute to the ingenuity of the author who succeeded in juxtaposing two things otherwise dissimilar.

However, since parables only reveal superficial similarities, they typically have only a limited application. In other words you can easily overwork or "strain" the metaphor by trying to apply it beyond the original context. Thus, if further development of the models I have proposed instead continues to yield more detailed and useful explanations of language phenomena, it becomes more likely that this analysis indicates real and significant similarities between the two cognitive faculties.
APPENDIX

Letters: publisher authorizations
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Approval sheets
March 7, 1988

Dr. Fred C. C. Peng, Editor
Language Sciences
Department of Linguistics
International Christian University
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Osawa, Mitaka, Tokyo, 181
JAPAN

Dear Dr. Peng:

I would like to request permission to incorporate a paper of mine, which you recently accepted for publication, into my doctoral dissertation, which I am preparing at Louisiana State University: "The SOV>...>OSV Frequency Hierarchy" (co-author, Dr. Frank Parker), accepted for publication in Language Sciences, vol. 10, no. 1 or 2.

Sincerely,

Alan D. Manning

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March 7, 1988

Mrs. A. de Haas
Editorial Office, Lingua
(Elsvier Science Publishers B. V.)
P.O. Box 1991
1000 BZ
Amsterdam
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Dear Mrs. de Haas:

I would like to request permission to incorporate my paper, "Tense and the Structure of Clause Types", Lingua 67 (1985) pp. 25-36, into my doctoral dissertation, which I am preparing at Louisiana State University.

Sincerely,

Alan D. Manning

Permission granted subject to full acknowledgement of the source.
Amsterdam, date: 10/3/88

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21 April 1988

Mr. Alan D. Manning
Department of English
Louisiana State University
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Dear Mr. Manning:

This is in belated response to your letter of March 7th; I apologize for the delay, but it's my busy season right now.

There should be no problem with incorporating your Semiotica article into your dissertation, as long as the latter is not published. If your dissertation is published, there are two things you must keep in mind: (1) the Semiotica article must appear first, or must be substantially different from the corresponding sections of your dissertation; and (2) if the two are similar and the Semiotica version appears first, you must obtain permission to republish from our publisher in Berlin (for this you should contact Dr. Marie-Louise Liebe-Harkort, Editor-in-Chief, Mouton de Gruyter Publishers, Genthiner Strasse 13, D-1000 Berlin 30, West Germany).

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Sincerely,

[Signature]

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Title of Dissertation: The Relevance of Visual Models in Linguistic Theory and Discourse Analysis

Approved:

[Signatures]

Major Professor and Chairman
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Date of Examination: May 4, 1988