PAPERS FROM THE PARASESSION ON

FUNCTIONALISM

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EDITED BY:

ROBIN E. GROSSMAN
L. JAMES SAN
TIMOTHY J. VANCE

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World Order*

William E. Cooper and John Robert Ross

M. I. T.

We began the present study by asking, as some linguists have asked before us, why the ordering of certain conjoined elements is fixed. A few examples from English appear below:

(1) bigger and better/ *better and bigger
(2) fore and aft / *aft and fore
(3) kit and caboodle / *caboodle and kit

In each of these cases, and in numerous others, the ordering of the two conjuncts is rigidly fixed in normal speech. We will refer to such cases as "freezes". Abraham (1950) and Malkiel (1959) have treated various aspects of this phenomenon. Our own study in this area has focused on two related problems: (1) the problem of trying to specify the types of linguistic environments in which freezes are apt to occur; and (2) the problem of specifying the rules that determine the linear order of two or more fixed conjuncts in particular frozen environments. Although our goal of solving these problems seemed manageable enough at first glance, we have been continually smitten since our initial attempts to tackle these questions by the enormity of the freezing phenomenon itself. Currently, we believe that the study of freezing touches rather directly on matters that extend to a variety of both linguistic and psychological issues. We report below our preliminary progress on this seemingly endless journey, which we hope will eventually culminate in a fairly explicit theory of freezing and its relation to the variety of mental factors we explore here.

1. Background and Organization of the Paper

While the ordering of frozen conjuncts cannot be reversed in many instances, such as in (1)-(3) above, a number of other cases exist in which the ordering of conjoined elements is fixed only when the elements occur in idiomatic constructions. Some examples appear below:

(4) a. Both (cat and mouse / mouse and cat) were exhausted after the chase.
   b. Tip never plays (cat and mouse / *mouse and cat) with Teddy.
(5) a. (Now and then / Then and now), beer satisfies.
   b. (Now and then / *Then and now), it rains. [=occasionally].
(6) a. (Here and there / There and here), inequality exists.
   b. (Here and there / *There and here), kids were playing. [=in various places].
(7) a. (Long and short / Short and long) contributions are welcome.
   b. That's the (long and short / *short and long) of it.

It is not surprising that the order of conjoined elements should
be more fixed in idiomatic than in non-idiomatic constructions, since
idioms are generally characterized by a fixed linear ordering. However,
there do exist cases in which the linear ordering of elements in idioms
is not fixed. We know of two such cases: on and off / off and on
[=occasionally], and day and night / night and day [=continuously]. Some
speakers report subtle differences in meaning associated with the two
different orderings, but we find no such differences in our own speech.[1]

In addition to freezes in non-idiomatic and idiomatic constructions,
a third area in which freezing occurs is in compound words, particularly
compounds involving reduplication. Jespersen (1961) has described a
number of these cases, including namby-pamby, razzle-dazzle, and
hickory-dickory-dock, to name just a few.

Earlier attempts to formulate rules for fixed ordering included
both phonological and semantic constraints. We have found further
evidence for both types of constraint and have noted cases in which
the phonological and semantic constraints interact systematically with
one another.

The remainder of our paper is divided into five sections. In
Section 2, we present a number of semantic constraints on conjunct
ordering and attempt to specify some general principles that seem
to be at work in determining the fixed linear order of elements. In
Section 3, phonological constraints on linear order are presented,
and it is shown how certain of these constraints interact with the
semantic constraints noted in Section 2. Section 4 includes an in-depth
study of conjunct ordering for one particular semantic domain, consisting
of space-axis referents. This class was chosen because of its
well-defined semantic properties and because of its widespread use
in metaphor, characteristics that allow us to relate the ordering
constraints for this class of referents to other semantic domains
in a fairly systematic fashion. Aside from these linguistic
considerations, our interest in the space-axis referents stemmed
from a desire to test the degree to which linguistic constraints on
conjunct ordering are mirrored by constraints on the human processing
of information in other types of behavior, opening up the possibility
that the linguistic constraints observed here are special cases of
more general constraints on human information processing (cf. Bever,
1970). In Section 5, we present some psychological evidence related
to the constraints on conjunct ordering noted in Section 4. Finally,
in Section 6, we present our major conclusions and cite
further directions which our research is beginning to take. Such areas
include studying the relation of principles governing conjunct order
to principles governing the order of prenominal adjectives and
the ordering of terms in clauses.

2. Semantic Constraints on Conjunct Ordering (One if by Land)

Below, we list a number of semantic domains for which we have
found freezes. In each case, we underline the place 1 element of
the quintessential freeze of each domain (by "place 1", we mean the

first conjunct of a freeze):

(8) Here: here and there; this and that; this, that and the
other[2]; hither and thither; hither, thither, and
yon; be neither here nor there [=irrelevant]; come
and go; in and out; inhale and exhale

(9) Now: now and then; sooner or later, tomorrow and the day
after; yesterday and the day before; BUT: past and
present; past, present, and future

(10) Present Generation: father and grandfather; son and
grandson;

(11) Adult: man and boy; men, women, and children; father
and son; parent and child; mother and daughter;
cow and calf; cat and kitten; mare and foal

(12) Male: man and woman; husband and wife; king and queen;
brother and sister; boy and girl; Mr. and Mrs.;
boy scout and girl scout; boyfriend and girlfriend;
BUT: ladies and gentlemen[3]; goose and gander; duck
and drake; mother and father[4]; mom and dad; bride
and groom

(13) Positive: positive or negative; plus or minus; all or none;
now or never; more or less; A or Neg-A (e.g. happy
or unhappy; like or dislike; participant or
non-participant); many or few; assert or deny;
win or lose (NB: many of these require or)

(14) Singular: singular and plural; Mick Jagger and the Rolling
Stones; unidirectional and bidirectional;
monotheism and polytheism; monolingual and
bilingual; one or two; first and second;
once or twice

(15) Patriotic: cowboys and Indians; United States and Canada;
Italo-Austrian or Austro-Italian (depending, in
part, on which country the speaker identifies
with); Yale-Harvard game (said in New Haven) or
Harvard-Yale game (said in Cambridge)[5]

(16) Animate: people and things; person, place or thing;
men and machines; animal, vegetable, or mineral

(17) Friendly: friend or foe; pro- or anti-labor; for or
against; support or oppose; accept or refuse;
pro and con (NB: this constraint seems closely
allied with (13) semantically, and because or
is the preferred conjunction; further work will
be needed to determine whether (13) and (17) should
be collapsed into a single constraint)

(18) Solid: land and sea; Army and Navy; field and stream; earth,
air, fire, and water (apparently, liquids and gases
are not ordered strictly with respect to one another,
as evidenced by: land, sea, and air: BUT earth, air,
fire, and water)

(19) Front: front and back; front and rear; fore and aft; bow
and stern

Important.

(20) <u>Agentive</u>: agent and patient; speaker and hearer; actor and action; subject and object; hunter and hunted; cat and mouse; employer and employee

(21) <u>Power Source</u>: bow and arrow; sun and moon; car and driver; horse and carriage; bourbon and Coke; gin and tonic[6]

(22) <u>Living</u>: living or dead; the quick and the dead; life and death; live or die; BUT dead or alive (this apparent counterexample is, however, not strictly irreversible, and may exist in the unpredicted order because of phonological constraints to be discussed in Section 3)

(23) <u>At Home</u>: Aeronautics and Astronautics; Earth and Planetary Science; at home and abroad; home and away

(24) <u>General</u>: form and substance; general and particular; general and special relativity; abstract and concrete; word and deed; knowledge and action; medium and message

(25) <u>Nominal</u>: nouns and verbs

(26) <u>Count</u>: count and mass nouns

The classification employed above serves primarily as an aid to exposition, and in some cases it can be argued that two or more of our categories should be collapsed into one. In actuality, we will argue below that virtually all of the categories can be collapsed into a single semantic factor.

In some cases, a semantic constraint must be viewed as a scalar relation not restricted to binary choices (cf. Ross, 1972). This situation applies especially to the semantic constraint on ordering of food and drink referents below:

(27) The Food and Drink Hierarchy (approximate)--<u>Fish</u> > <u>Meat</u> > <u>Drink</u> > <u>Fruit</u> > <u>Vegetables</u> > <u>Baked Goods</u> > <u>Dairy Products</u> > <u>Spices</u>
Examples: fish and game; meat and drink; meat and potatoes; food and drink; surf and turf (a combination dish of fish and steak); ham and eggs; corned beef and cabbage; ham and cheese; bacon and eggs; fish and chips; Steak and Brew, Steak and Stein (restaurants); meat and gravy; fruit and nuts; fruits and vegetables; coffee and donuts; milk and cookies; tea and scones; beer and pretzels; bread and butter; bread and cheese; peaches and cream; milk and honey; apple and spice; sugar and spice; oil and vinegar; wine and cheese; neither fish nor fowl; BUT: bull and oyster; bread and water (a phonological account of such exceptions will be presented in Section 3 below).[7]

We now ask what (8)-(27) might have in common. Various possibilities suggest themselves, including the possibility that the first conjuncts are linguistically "unmarked", or easier to understand (Clark, Carpenter,

and Just, 1973). However, this and similar possibilities seem deficient to us because they do not provide any natural or predictively adequate way of stating the following generalization-- that the underlined terms which head (8)-(27) conspire to provide an approximate portrait of a current American hero, Archie Bunker. Archie, by his own admission, is Here, Now, Adult, Male, Positive, Singular, Living, (Friendly,) Solid, Agentive, Powerful, At Home, and Patriotic, among other things. In addition, he is General because he is a stereotype, and he is a count noun. Accordingly, we can offer as a first-order approximation that the semantic constraints on conjunct ordering of (8)-(27) are special cases of a more general constraint on ordering:

(28) <u>Me First</u>: First conjuncts refer to those *properties* factors which describe the prototypical speaker (whom we will sometimes refer to as "Me")

We believe that the Me First principle is responsible for a number of ordering relations among conjuncts, but it is by no means the only general semantic constraint at work. Some semantic principles which take precedence over the Me First constraint are illustrated below:

(29) <u>Divine</u>: God and man, church and state; religious and lay; heaven and hell; lord and devil

(30) <u>Plant</u>: plant and animal; flora and fauna

The semantic constraints on conjunct ordering mentioned in (8)-(27) interact with each other in systematic fashion in the formulation of idioms and certain proverbs. One example of this situation involves two conditional clauses, uttered 199 years and 364 days ago, just prior to the battle of Lexington and Concord:

(31) One if by land, two if by sea.[8]

Based on the ordering relations noted above, we can begin to understand why the signaling system referred to in this example was in the form of (31), as opposed to any of the following:

(32) a. One if by sea, two if by land.
b. Two if by sea, one if by land.
c. Two if by land, one if by sea.

Our list of constraints on conjunct ordering in (8)-(27) includes constraints for Singular-Plural relations as well as Solid-Liquid. The constraints show that Singulars precede Plurals and that Solids precede Liquids, other factors being equal. Combining the two constraints we predict that a Singular signal is likely to be associated with a Solid referent, whereas a Plural signal is more likely to be associated with a Liquid. This prediction is confirmed by the use of (31) or (32b) as opposed to (32a) or (32c). In addition, the constraints that determine the linear ordering of conjuncts account for the superiority of (31) over

(32b).

Based on this and other examples to be discussed, we can venture the following general principles governing the formation of proverbs and similar constructions:

(33) Complex constructions, such as proverbs, are more likely to be retained in the general usage of a language if they are constructed such that place 1 elements are grouped together with other place 1 elements (similarly for place 2 elements) and such that the place 1 part of the construction precedes the place 2 part.

Thus, since we have the freezes one and two and land and sea, the most natural complex construction involving these referents will group one and land together and group two and sea together. In addition, the grouping of one and land will precede that of two and sea in the linear order of the resulting construction, as in (31).

A similar example is the proverb given in (34):

(34) March comes in like a lion, and goes out like a lamb.

Here, the degree of underlining indicates the pairings of the elements for three separate freezes: come and go, in and out, and lion and lamb. Our principle (33) stipulates that (34) is the expected order, rather than (35):

(35) March goes out like a lamb, and comes in like a lion.

Similarly, principle (33) looks more benignly on (34) than it would on a putative proverb like (36), which on semantic grounds is no less plausible than (34) for some weather regions:

(36) November comes in like a lamb and goes out like a lion.

The title of a well-known song provides a third example of the operation of principle (33):

(37) You take the high road, and I'll take the low road.

The individual freezes that are relevant here are given in (38):

(38) a. you and I[9]
     b. high and low

Yet another proverb which seems to follow from principle (33) is given in (39):

(39) A bird in the hand is worth two in the bush.

Perlmutter (1970) has argued that the English indefinite article a(n) is an unstressed variant of one, which would reduce the sequence

a...two to another instance of the freeze one and two. We have indicated by doubly underlining hand and bush that we believe these two terms are supposed to provide a second set of parallel terms, even though there is no freeze hand and bush. Clearly, however, the metaphorical interpretation follows the semantic pattern 'close to Me – far from Me', and in addition, as we will argue in Section 3, there are many phonological constraints that would operate to produce the ordering hand...bush, as opposed to bush...hand.

If we are correct in interpreting hand-bush as a freeze-like sequence, then (33) in part explains the superiority of (39) over (40):

(40) Two birds in the bush are worth less than one in the hand.

Thus far, the four examples provided above exhaust our evidence in support of principle (33). However, there exists a far more extensive class of proverbs, fixed phrases, and idioms of roughly the form shown in (41):

(41) X A Y...X' B Y'

where X and X' are identical or nearly identical, as are Y and Y', and where A and B are elements of a freeze.

We list a selection of such bipartite constructions in the a-sentences of (42)-(46), with the relevant freezes cited in the respective b-sentences.

(42) a. Win a few, lose a few.
     b. win or lose
(43) a. Like father, like son.
     b. father and son
(44) a. Easy come, easy go.
     b. come and go
(45) a. X in, X out [e.g., Year in, year out.]
     b. in and out
(46) a. Once an X, always an X [e.g. Once a jerk, always a jerk
     b. (*once and always)[10]

By defining the variables in (41) loosely enough, we can reduce (47) and (48) to cases of the type in question:

(47) a. What's sauce for the goose is sauce for the gander.
     b. goose and gander
(48) a. While the cat's away, the mice will play.
     b. cat and mouse

The basic claim that we are advancing should have by now become clear. We can now restate the claim more generally as follows:

(49) Any phrase of the form shown in (41), or of the
generalized form:

$$X_1A_1X_2B_1X_3C_1X_4 \cdots X_nN_1X_{n+1} \cdots X_1'A_2X_2'B_2X_3'C_2X_4' \cdots X_n'N_2X_{n+1}'$$

where A_1 and A_2, B_1 and B_2, C_1 and $C_2 \ldots N_1$ and N_2
are freezes,
will have a better chance to become lexically viable
than will a phrase which does not have this structure.

Thus, we predict that, statistically, bipartite expressions will
tend to incorporate freezes, as the examples discussed above do.
It is not that no idioms can survive which go against the form
specified in (49)--one counterexample that comes to mind is (50):

(50) Cold hands, warm heart.

Clearly, the preferred order of the adjectives relevant to this
example is that in (51a):

(51) a. warm or cold
b. *cold or warm

With regard to the ordering of the nouns, however, our intuitions
are less sharp:

(52) a. heart and hands
b. ?hands and heart

Under the assumption that (51a) and (52a) represent the correct
freezes, (50) violates principle (49) because it is of the form (53):

(53) A_2B_2, A_1B_1

At present, we have no idea why such constructions as (50) should
be possible: they fall between the strands of our analytic net.
However, we do wish to make the claim that cases like (50) will be
rare, with cases like (31), (34), (37), (39), and (42)-(48)
predominating.
A good way of viewing our research to this point, which we
are grateful to Maurice Gross for helping us to understand, is
that principles such as (28), namely Me First, and the various
other phonological and syntactic principles that will be developed
below, are like adaptive mutations--traits which will assist any
construction possessing them, to stand the test of time, to become
conventional. While we daily see and hear numerous coordinate
structures, let us say those in (54),

(54) a. The paint and ginger ale were a lot more expensive
this week.
b. The old chest was filled with pebbles and bolts.

these are not retained in a frozen order in the language. In
order to achieve a freeze, the conjoined elements in question
must share a certain degree of similarity. Often, freezing
occurs for polarity items (e.g. love and hate) which differ by
one semantic feature but which share a number of major
semantic features (e.g. +animate, +emotive). Our search for
principles that can predict the conditions under which freezing
occurs is viewed as an attempt to account for portions of the
lexicon in Darwinian terms. We will amplify somewhat on this view below

3. Phonological Constraints on Conjunct Ordering (Why we don't
know whether to laugh or cry)

In the above section, we have concentrated on finding
semantic principles for the ordering of elements in freezes.
But it soon becomes apparent, when one expands the set of data
under consideration, that no purely semantic account of frozen
ordering can be sufficient. In some cases, idiomatic freezes
exist which contain elements having no independent meaning.
Some examples appear in (55):

(55) a. dribs and drabs [=small amounts]
b. spic and span [=neat]
c. by guess and by gosh [=some way or other]
d. by hook or by crook [=some way or other]
e. hem and haw [=fret]

In order to account for cases such as these, and many others
to be described, we propose the following set of phonological criteria.

(56) Compared to place 1 elements, place 2 elements contain,
other factors being equal:

a. more syllables [$\underline{P}$(Pāṇini's law)]
b. longer resonant nuclei [$\overline{V}$]
c. more initial consonants [$\underline{C}_i\#$(=number of initial C)]
d. a more obstruent initial segment, if both place 1
and place 2 elements start with only one consonant [$\underline{C}_i^1$]
e. vowel containing a lower second formant frequency [$\underline{F}_2$]
f. fewer final consonants [$\underline{C}_f\#$]
g. a less obstruent final segment, if both place 1
and place 2 elements end in a single consonant [$\underline{C}_f$]

/a syllabic
nucleus

The symbols in square braces to the right of (56a-f) will be
used as abbreviations for the subparts of (56).
Let us start by considering $\overline{V}$. In most cases, we base the
above phonological principles on examples containing conjoined
elements which differ minimally in the segment under investigation,
but for $\overline{V}$, no minimal pairs have been found. A freeze like (57),
however, is close enough to this ideal for present purposes.

diphthong

(57)   stress and strain

This freeze, which we have no reason to believe to be attributable to semantic factors, differs primarily in the length of its vowels and by the fact that [s], the final consonant of place 1, is more obstruent than [n], the final consonant of place 2. The gradient of obstruency to which we adhere in the present discussion is represented in (58):

(58)   T[stops]-S[spirants]-N[nasals]-L[liquids]-G[glides][11]

    ←——————
    increasing obstruency

Another freeze suggesting the existence of $\bar{V}$ is (59):

(59)   Trick or treat.

In this case, since have have thus far found no law ordering velar and dental obstruents, we conclude that the only relevant difference is that between the vocalic nuclei--[I] vs. [ɪ(y)].
As in the case of (57), we will consider this difference primarily one of vowel length, disregarding differences in the tenseness and height of the vowels.

Mention Jakobson

Example (59) is particularly interesting, because it is one of the clearest instances we have found of a phonological law overriding a semantactic one. Many sentences exist of the general form shown in (60a) which have paraphrases involving negatives, as in (60b):

(60)   a.   A or B.
      b.   If not A, then B.

or either or . these can be collapsed under (13) & (17) if considered either or +

Some examples follow:

(61)   a.   Hands up, (or) I'll shoot. =
      b.   If you don't put your hands up, I'll shoot.
(62)   a.   Drop the heater, or you're a dead man, Grillswetter. =
      b.   If you don't drop the heater, you're a dead man, Grillswetter.
(63)   a.   Your money or your life. =
      b.   If you don't give me your money, it will cost you your life.
(64)   a.   54'40" or fight. =
      b.   If we don't get 54'40", we will fight.
(65)   a.   Patria o muerte. =
           country or death
      b.   If we don't get our homeland, we choose death.

But the semantic principle (60) which governs the linear order in these cases is reversed in the case of (59). In order to conform to (60), (59) should be as follows:

(66)   a.   Treat or trick. =
      b.   If you don't give us a treat, we will play a trick on you.

It seems likely to us that (66a), which is semantically appropriate, but phonologically inappropriate, in that it violates $\bar{V}$, has been replaced by the phonologically proper (59), despite the fact that, by analogy with (60), (59) would have the following inappropriate meaning:

(67)   If we don't play a trick on you, you will give us a treat.

Let us pass on now to consider the phonological rule F_2. We wish to claim here that the sequence of vowels in a freeze should be a subsequence of that shown in (68):

(68)   i > I > ɛ > æ > a > ɔ > o > u

As Morris Halle has pointed out to us, this sequence can be defined acoustically by a monotonic decrease in the second formant frequency. The ordering of the elements in (55a) is based entirely on this principle, while the ordering in (55b) has two favorable properties: [æ] is lower in F_2 than [I], and [n] is less obstruent than [k], as specified in the gradient of (58). In the case of (55c), we know of no principle ordering the two spirants [s] and [š], so the only relevant difference would seem to be F_2.

Mention Jakobs

There exist many freezes which use subsequences of (68). Some examples are given in (69):

(69)   a.   ifs, ands, or buts
      b.   this and that
      c.   one or two
      d.   (It's raining) cats and dogs.
      e.   man and boy

Hund & Katz
chien & chat

Examples of this sort, however, are less than conclusive, since they differ in the phonological makeup of their elements not only in second formant frequency, but also in many other phonetic aspects, as well as along a number of semantic dimensions. What we need to establish the existence of (68) is a set of minimal pairs, like (55a), showing for each pair of vowels in (68) that their order conforms to that predicted.

Our search for such minimal pairs among the inventory of idiomatic coordinate freezes of English has not yielded a sufficient number. However, if we extend the data base to non-coordinate expressions such as those in (70), the evidence favoring (68) is more readily obtained:

(70)   a.   fiddle-faddle [I > æ]

b. criss cross [I > ɔ]
c. bibbity bobbity boo [I > a > u]
d. tic tac toe [I > æ > o]
e. mishmash [I > æ]
f. wigwag [I > æ]

In such words and expressions, while one element sometimes has an independent meaning (e.g. cross, mash, wag), the other typically does not. The ordering of these elements thus cannot be accounted for by appeal to semantic factors (sometimes the meaningful element occurs in place 1, as in fiddle-faddle, while in others, it occurs in place 2, as in wigwag).

The following examples of non-coordinate freezes provide evidence for particular subsequences of (68):

(71) [I > ɛ]: [No clearly non-semantic minimal pairs--the closest we have been able to find are bigger and better, forgive and forget, and kiss and tell, each of which is susceptible to alternative accounts.]

[I > æ]: wigwag
mishmash
flimflam
pitter-patter
fiddle-faddle
chitchat
bric-a-brac
tit for tat
zigzag
riffraff
knick-knack
shilly-shally

[I > a]: tick tock
King Kong
flip flop
hippity hop
hickory dickory dock

[I > ɔ]: singsong
ding dong
ping pong
crisscross

[i > ɔ]: seesaw
heehaw

[I > o]: [no 2-place minimal pairs, but cf. tic tac toe]

[I > u]: [no 2-place minimal pairs, but cf. bibbity bobbity boo].

[ɛ > æ]: [no minimal pairs]

[ɛ > a]: by guess and by gosh
[cf. also brain and brawn, though this may be semantically controlled]

[ɛ > ɔ]: [no minimal pairs]

[ɛ > o]: [no minimal pairs]
[ɛ > u]: [no minimal pairs]

In addition, we have found no minimal pairs for the following: æ > a, æ > ɔ, æ > o, æ > u, a > ɔ, a > o, a > u, ɔ > o, ɔ > u, o > u.

One serious counterexample we have found to the ordering in (68) is ooh and aah.

We turn now to a third phonological principle, $C_i \#$, stating that place 1 elements will have fewer initial consonants than place 2 elements, other factors being equal. We have found one phonologically minimal pair in support of this principle:

(72) sea and ski

However, it is conceivable that the ordering here is semantically determined. Another example of a minimal pair exists in a Yiddish dialect:

(73) money shmoney

A number of near-minimal pairs add further support to this principle:

(74) a. fair and square
b. sink or swim
c. make or break
d. by hook or by crook
e. fancy-shmancy (Yiddish)
f. helter-skelter; harum scarum
g. eeny-meeny(-miney-moe)

A fourth phonological principle concerns the obstruency of the initial consonant, C_i, in cases where neither place 1 nor place 2 elements contain a word-initial consonant cluster. The obstruency gradient, as defined in (58), is contained in a principle stating that the obstruency of the initial consonant of a place 2 element will be greater than the obstruency of the initial consonant of a place 1 element, other factors equated. A number of minimal pairs exist in support of this obstruency principle:

(75) a. wear and tear
b. walkie-talkie
c. hickory dickory (dock)
d. razzle-dazzle
e. rumdum
f. rub-a-dub-dub
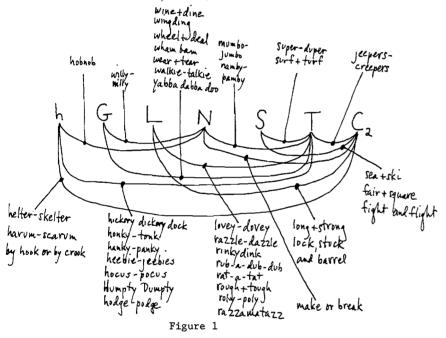g. wingding
h. wheel and deal
i. wham bam
j. roly-poly
k. razzamatazz
l. Mayday
m. namby-pamby

n. mumbo-jumbo
o. hobnob
p. willy-nilly
q. rough and tough
r. surf and turf (may be semantically determined; cf. (27))
s. super-duper

The increasing obstruency from place 1 to place 2 initial consonants displayed in examples of this sort is shown in Figure 1, along with examples which show the operation of the principle $C_i\#$ discussed above.

Initial Consonant Obstruency Increases

Figure 1

Some exceptions to the obstruency principle include <u>ding-a-ling</u>, <u>pell-mell</u>, <u>teeny weeny</u>, <u>tee hee</u>, <u>boo hoo,</u> and a class of cases in which [b] precedes [w], as in <u>boogie-woogie</u>, <u>bigwig</u>, and <u>bowwow</u>.[12]
A fifth phonological principle concerns the number of word-final consonants, $C_f\#$, which states that place 2 elements should have fewer final consonants than place 1 elements, other factors being equal. No minimal pairs have been found in support of this principle, but the following freezes are suggestive:

(76) a. sink or swim
b. betwixt and between
c. wax and wane

A class of apparent counterexamples exists to the $C_f\#$ principle:

(77) a. safe and sound
b. leaps and bounds

We are not yet certain whether the $C_f\#$ principle should be given up or whether the apparent counterexamples in (77) should be viewed not as true counterexamples but as instances of principle $\bar{V}$, where the [n] in place 2 is considered part of the vowel nucleus as opposed to a consonant contributing to a word-final cluster.[13]
A sixth phonological principle involves the obstruency of the final consonant, C_f, in cases where no word-final clusters appear in place 1 or place 2 elements. The following list includes minimal and near-minimal pairs which support this principle:

(78) a. slap dash
b. shit and piss
c. hit or miss
d. safe and sane

e. kith and kin
f. push and pull
g. spic and span
h. might and main
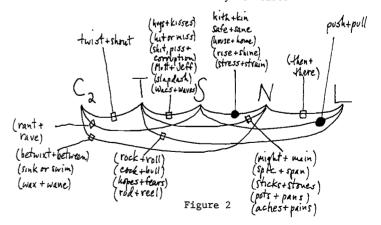i. slipshod
j. hem and haw
k. rock and roll
l. lock and key
m. thick and thin

Figure 2 shows the manner in which such examples support the obstruency gradient principle, in addition to $C_f\#$.[14]

Final Consonant Obstruency Decreases

Figure 2

There exists a seventh phonological principle governing freezes for which we have no minimal pairs, but which appears to override most of the other phonological principles in strength. It is thus possible to observe the operation of this principle in a number of non-minimal pairs. The principle, P, was first developed by Pāṇini (circa 350 B.C.) in the study of Dvandva compounds. The principle states that, other factors being nearly equal, place 1 elements contain fewer syllables than place 2 elements. In our data, we have considerable support for this principle, but only in the case where place 1 elements are monosyllabic. Consider the following examples:[15]

(79)
a. vim and vigor   (C_f)
b. hot and heavy   (F_2)
c. hale and hearty   ($C_f\#$ or C_f)
d. wild and woolly   (V)
e. rough and ready   (F_2 and C_f)
f. lock, stock, and barrel   ($C_i\#$ and F_2)
g. rough and tumble   ($C_f\#$)
h. Tom, Dick, and Harry   (C_f)
i. boots and saddles   (C_i, $\bar{V}$, and F_2)
j. free and easy   ($C_i\#$ and $C_f\#$)
k. bread and water   ($C_i\#$)
l. bull and oyster   ($C_i\#$, F_2, and $C_f\#$)
m. bag and baggage
o. bread and butter   ($C_i\#$)

Although Pāṇini's principle appears to be the most forceful of our phonological principles governing freezes, based on a preliminary but extensive examination of cases like those in (79), this principle often appears to work in the opposite direction for word combinations which are not accompanied by conjunctions:

(80)
a. hickory-dickory-dock
b. clackety-clack
c. blankety-blank

However, in examples such as these, the frozen ordering may be accounted for by yet another phonological principle, which states that a stress pattern of stressed-unstressed-stressed is to be preferred.

When we consider a large array of phonologically non-minimal pairs of frozen elements, we arrive at some further general tendencies. First, it is often the case that frozen elements contain two or more instances of the above phonological principles, with no negative phonological traits. Some of these appear below:

(81)
a. bill and coo ($\bar{V}$, F_2, and C_f)
b. black and blue ($\bar{V}$, F_2, $C_f\#$)
c. ebb and flow ($C_i\#$, $\bar{V}$, F_2, $C_f\#$)
d. deaf and dumb (F_2, C_f)
e. laugh or cry ($C_i\#$, $\bar{V}$, F_2, and C_f)

In the case of virtually each of the phonological principles discussed above, data from non-minimal pairs such as in (81) can be gathered to support the existence of the phonological regularity in question. Since such data consist of non-minimal pairs, however, strong support can only be provided by sampling a very large number of such pairs and stating the statistical probabilities of a phonological regularity of interest, regarding other phonological factors as undesirable "noise" in the data. Since English contains very few minimal pairs with which to test certain regularities, it appears necessary to resort to such statistical sampling procedures in the future if we hope to be able to state with any degree of certainty the existence of certain regularities, and, of at least equal importance, the relative strengths of these regularities.

Since it appears that a rather large set of independently-motivated phonological principles operate jointly to determine the fixed order of many conjoined elements, a predictively powerful formulation of these principles will definitely require a sharpened specification of relative strengths. As noted above, our preliminary data strongly suggest that Pāṇini's principle is the strongest of the phonological rules, based on the fact that this principle overrides other phonological rules when in competition, as in the following examples:

(82)
a. boots and saddles (P overrides $\bar{V}$)
b. free and easy (P overrides $C_f\#$)
c. bread and butter (P overrides $C_i\#$)
d. rough and ready (P overrides F_2)
e. hot and heavy (P overrides F_2)

One counterexample appears in (83):

(83) tattered and torn (F_2 overrides P)

By examining other cases of "tugs of war" between two or more phonological principles, it should be possible to approximate, in rank order at least, the relative strengths of the various phonological rules. The results of a preliminary study of this kind suggest the following strength ranking, in order of decreasing strength:

(84)
a. P
b. $\bar{V}$
c. $C_i\#$
d. C_i
e. F_2
f. $C_f\#$
g. C_f

Although certain subparts of this hierarchy are by no means firmly established (e.g. the relative strengths of C_i and $\overline{V}$), a few general conclusions do seem to have emerged. For one thing, it appears that the phonological principles that govern C_i are generally stronger than those that govern C_f. And in addition, the principles governing the number of C, for either $C_i\#$ or $C_f\#$, appear to be somewhat stronger than the principles governing the obstruency of C in either environment.

In addition to studying cases in which the strengths of two phonological rules are pitted against one another, we have begun to examine cases in which two rules are pitted against one, and cases in which three rules are pitted against one. In general, we find very few cases in which a single rule overrides two other rules, regardless of their individual strengths, and we have found almost no cases in which a single rule overrides three opposing phonological rules, regardless of the semantic factors involved. Some cases in which a single rule overrides two opposing rules appear below:

(85) a. life and limb (C_f overrides $\overline{V}$ and F_2)[16]
      b. skip and jump (F_2 overrides $C_i\#$ and $C_f\#$)
      c. back and fill (C_f overrides C_i and F_2)
      d. ball and chain ($\overline{V}$ overrides F_2 and C_f)

Because we have not studied the full range of examples necessary to provide more quantitative data on this matter, we will not pursue it further here.

One major theoretical question concerning the phonological principles suggested above which remains for us to solve is whether these individual rules actually represent specific instances of a more general principle, and, if so, whether this general principle serves some useful function.

Regarding the first part of this large question, we have come up with one very partial answer--that some of the phonological rules, specifically P, $C_i\#$, C_i, and $\overline{V}$, conspire to maximally reduce the phonetic content of place 1 elements in freezes. When these rules are considered, the "ideal" phonological freeze would appear to contain a place 1 element represented as an isolated short vowel and a place 2 element represented by a consonant cluster followed by a long vowel. However, the general phonological principle of reducing the place 1 element cannot account for the existence of other phonological regularities noted above, including F_2, $C_f\#$, and C_f. Furthermore, even if the general principle of reduction did turn out to be valid, it is far from clear what function such a principle might serve, either for speaker or listener.[17]

Up to this point in the discussion, we have discussed some semantic and phonological determinants of frozen order. We now turn to consider possible interactions between these two types of principle. We have found certain situations in which the two types ~~of principle~~ do appear to converge to account for the association between certain semantic relations and their phonological representations.

Our aim here is to provide some evidence favoring the controversial claim that in certain well-defined instances the relation between sound and meaning is not arbitrary (cf. Brown, 1970; Wescott, 1970 and references cited therein).

Consider first some data on pronouns in Latin. In this language, the demonstrative pronoun in the nominative case consists of hic, haec, and hoc, referring to masculine, feminine, and neuter pronouns. Based on the semantic rule for conjunct ordering for Masculine-Feminine and the phonological principle for F_2, we correctly predict the vowel quality relation of hic vs. haec in this case. Adding the semantic rule for Animate-Inanimate to our present case, we correctly predict the vowel quality relations between hic-haec and hoc. The relation observed between masculine and feminine hic and haec also applies to word-final vowels in the demonstratives ille and illa, as well as to the relative pronouns qui and quae. The systematic convergence of the semantic relations with F_2 breaks down when cases other than the nominative are considered. However, such a situation is just what we would expect, since the nominative is the strongest place 1 case relation (as in nominative and accusative / *accusative and nominative).

Ken Hale has informed us about a similar confluence of semantic and phonological ordering rules in the deictic systems of other languages:

(86) a. Northern Paiute: išu-mašu-ušu (this, that, and the other)
      b. Wik Munkan: in-an (this-that)
      c. German: hie-da; hier-dort (here-there)
      d. Hebrew: hena-šama (hither-thither)
      e. French: ci-la (this-that)
      f. Aztec: inin-inon (this-that)
      g. Hungarian: it-ot (here-there)
      h. Korean: igo-čogo (this-that)
      i. Chinese: je-na (this-that)

In each of these cases, the referent for proximal location contains a higher second-formant frequency than the referent for distal location. The English pairs here-there and this-that conform to this general regularity. Counterexamples to this principle are found in Walbiri. Tanz (1971) has also noted the present generality. We concur with Tanz that the deictic systems of a number of languages provide a particularly convincing class of examples in which the relation between form and meaning is not arbitrary. The important question which remains is why the deictic systems obey this tendency to a much greater extent than certain other semantic domains. As Tanz suggests, an answer may be found in the fact that deictic systems represent a particularly basic semantic domain; we might propose that since deictic referents were among the first referents to enter a language, and certainly among the most important, that speakers would take care to represent these referents in the most natural phonological manner consistent with the frozen order proximal-distal. We will refrain from

pursuing this teleological argument here; no doubt the reader interested in such an argument will have more fun pursuing it himself.

To conclude this Section, we note that a number of phonological constraints on frozen ordering exist and that these constraints appear to operate with varying degrees of strength. Furthermore, the phonological rule governing second-formant frequency relations between place 1 and place 2 conjuncts interacts systematically with at   least two of the semantic constraints on freezes discussed in Section 2, providing further evidence that the relation between sound and meaning is not arbitrary in certain specified cases.

4. The Freezing of Space-Axis Referents (*West by Westnorth)

To this point, we have presented a number of semantic and phonological constraints on freezing. Aside from the intrinsic importance which we accord to these constraints, we have presented them because they represent factors which should be neutralized wherever possible in any more in-depth study of a particular class of conjuncts whose ordering may be determined by constraints other than those already cited. In the study of space-axis referents below, an attempt is made to include examples which are either neutral with respect to the previously presented constraints or, as is more often the case, examples whose ordering on the basis of another principle is opposite that predicted on the basis of the previously presented constraints.

We will consider three separate semantic relations for space-axis information, including up vs. down, left vs. right, and the higher-order relation vertical vs. horizontal.

Up vs. Down

Our data indicate that conjuncts which refer to up generally precede those referring to down. Consider the following examples:

(87) a. up and down
      b. peak and valley
      c. rise and fall
      d. over and under
      e. upstairs and downstairs
      f. hill and dale
      g. high and low
      h. above and below
      i. raise or lower
      j. top and bottom
      k. ascending and descending
      l. upper and lower

This ordering of up-down conjuncts is in accord with previous studies attempting to characterize up-down referents in terms of markedness (Clark and Chase, 1971; Clark, Carpenter, and Just, 1973). Their evidence indicates that a general preference exists for stating that

A is above B rather than B is below A, and that A is higher than B rather than B is lower than A. In addition, a question regarding the relation between A and B is more apt to be phrased as How high is A? rather than How low is B? In addition to this evidence, up occurs more frequently than down as an affix (by about 30%, according to our rough estimate). A similar relation exists for affixation with pairs like high-low and top-bottom. Below are some examples:

(88) a. mountaintop / *mountainbottom
      b. upstart / *downstart
      c. uproar / *downroar
      d. highlight / *lowlight
      e. topside / *bottomside
      f. uphold / *downhold
      g. upbraid / *downbraid
      h. Seven-Up / *Seven Down

The primacy of up extends to certain classes of concrete referents as well, particularly to those which refer to basic aspects of the natural environment. The referents for body parts are included in this category, as illustrated in the following examples:

(89) a. head and shoulders
      b. nose and throat
      c. hands and feet
      d. cerebral-spinal
      e. fingers and toes
      f. arms and legs
      g. heads or tails
      h. head over heels
      i. head to toe
      j. tooth and nail
      k. skull and bones

One apparent counterexample appears in (90):

(90) hoof and mouth (disease)

However, given the phonological principles presented in Section 3, it is not difficult to account for this counterexample. If the ordering in this case were to obey the semantic constraint for up vs. down, then two phonological constraints would be violated, including the rules for obstruency of initial consonant and for the length of the vowel.   In the existing order (90), one phonological constraint is violated. It is thus possible that we have here a case in which the operation of two phonological constraints override the operation of one semantic constraint. However, it has been suggested to us that (90) can also be accounted for the chronological progression of the disease in question from hoof to mouth. Such a chronological constraint on freezes is observed in a number of other instances, although, interestingly, is itself violated in the following well-known example:

(91) He put on his (shoes and socks / ?socks and shoes).

However, it could in turn be argued that this apparent counterexample is merely an instance of semantic override for essential over nonessential referents, and so on.

Regardless of the status of (90), we have noted that in general there are many instances in which semantic factors override phonological constraints on freezes, whereas there are relatively few cases (e.g. trick or treat) in which phonological constraints appear to override the prevailing semantic tide. This principle will be incorporated in an overall evaluation of the relative strengths of the constraints proposed throughout our discussion, an evaluation which requires further testing with a large data base before it can be considered very useful.

Some cases in which the semantic relation for up-down overrides phonological constraints appear in (89 b, d, and e). The rule for final consonant obstruency is violated in (89b), whereas the Pāṇini's law is violated in (89d and e).

The ordering of body part referents noted above also appears with clothing referents, although to a much lesser extent. This state of affairs is predicted from the assumption that the ordering of conjuncts tends to be more rigidly fixed for referents of the most basic aspects of the environment (e.g. body parts, food) than for strictly non-essential items. Consider the following examples:

(92) a. hat and coat / coat and hat
       b. coat and trousers / *trousers and coat
       c. skirt and blouse / ?blouse and skirt
       d. hat and gloves / ??gloves and hat
       e. bra and girdle / ?girdle and bra [18]
       f. shoes and socks / ?socks and shoes
       g. panties and bra / bra and panties
       h. skirts and tops / ??tops and skirts
       i. shorts and halter / ?halter and shorts

Aside from body parts, one other sub-domain in which the up-down freezing order operates fairly systematically involves the referents for geographical direction. In English, North is referred to as up, while South is referred to as down.[19] Since up precedes down in the ordering of conjuncts, we predict that North should precede South, which it does:

(93) a. Everyone went to the (North-South / *South-North) game.
       b. This highway runs (North and South / *South and North).

We will return to this discussion of geographical referents when we consider the space-axis relations for right-left and vertical-horizontal.

Right vs. Left

So far we have considered the referents for spatial information along the vertical dimension only. We now turn to the horizontal. Unlike the vertical axis conjuncts noted above, the data for English do not reveal the presence of any highly systematic ordering relation between the basic referents for left and right. Consider the following:

(94) left-right motion / ?right-left motion (on the reading: leftwards and rightwards motion oscillating)
(95) right or left hand / left or right hand

When we turn to consider geographical direction, however, we find a systematic ordering of East and West:

(96) a. Everyone went to the (East-West / *West-East) game.
       b. This highway runs (East and West / *West and East).

The precedence of right over left shown for East and West is also observed in at least two other cases:

(97) right about face / *left about face
(98) downright / *downleft

A final point in favor of the primacy of right over left is provided by the fact that right occurs more often than left in affixation (by about 30% according to our rough estimate).

In the case of both up-down and right-left relations, we have noted a correlation between frozen ordering and affixation, such that the referent which appears in place 1 of conjoined freezes also appears more often as an affix. This correlation, in addition to certain of the semantic factors noted in Section 2, suggests that the place 1 position of conjuncts generally refers to the semantically more potent of the conjoined elements, where potency is roughly defined as the ability of a referent to participate in a number of semantic relations in addition to its fundamental meaning.

Vertical vs. Horizontal

We have noted that whereas a fairly strict order relation exists within the vertical dimension, with up preceding down, the ordering of conjuncts within the horizontal dimension is not frozen, at least for the basic referents left and right. We now turn to the question of whether a higher-order freezing exists when the referents of these two dimensions are combined.

The following data indicate the presence of a systematic relation, such that referents for the vertical dimension precede those for the horizontal:

(99) top right corner / ?*right top corner
(100) height and width / *width and height
(101) downright / *rightdown
(102) high, wide, and handsome / *wide, high, and handsome

Consider also the following examples:

(103) row and column / ??column and row
(104) latitude and longitude / *longitude and latitude
(105) ordinate and abscissa/ ?*abscissa and ordinate

In these cases, the place 1 conjunct specifies location along the vertical dimension. Thus, a given row, latitude, or ordinate value specifies vertical location, whereas column, longitude, and abscissa specify location along the horizontal axis. These orderings are thus analogous to those observed in (99)-(102) and provide further support for the existence of a rule positioning vertical referents in place 1 and horizontal referents in place 2 in coordinate structures in which both occur.

This same ordering relation is observed for the geographical referents as well, as exemplified by the following freezes:

(106) North, South, East, and West / *East, West, North, and South

(107) a. Northwest / *Westnorth
      b. Southeast / *Eastsouth

(108) a. North by Northwest / *West by Westnorth
      b. South by Southeast / *East by Eastsouth

In (106), both referents for the vertical direction are positioned before both referents for the horizontal. In compound word freezes like (107), the vertical direction is also positioned first, and in frozen phrases like (108), again the vertical referent is positioned first. We thus find a very systematic application of the vertical-horizontal ordering relation in the case of word compounds, conjoined words, and phrases in the case of geographical direction.

Interaction between Space-Axis factors and other semantic factors

The two systematic order relations noted above for space-axis referents, with up preceding down, and vertical preceding horizontal, interact with other semantic constraints on conjunct ordering to produce certain metaphors. Just as we suggested in Section 2 that proverbs were more likely to be retained in the language in cases where the linear ordering was consistent with freezing constraints, so now we suggest that metaphors are more likely to be retained in cases where a number of place 1 semantic factors are associated with one another and where place 2 factors are similarly associated with one another.

For example, we noted earlier than referents for Divine precede referents for Non-Divine. The following association of vertical directions indicates that the place 1 conjuncts for Divine are semantically associated with the place 1 conjuncts for verticality:

(109) up in heaven, down in hell / *up in hell, down in heaven
                                   ?*down in hell, up in heaven
                                   *down in heaven, up in hell

Similarly, we noted earlier that conjuncts denoting Friendly precede those denoting Unfriendly, and again up is associated with the place 1 conjunct, as in:

(110) love on Cloud 9 / *love underground

Although we have just begun to explore the range of metaphors whose occurrence or non-occurrence may be predicted on the basis of freezing rules, it appears that our freezing rules will provide one good metric for predicting the probability with which a given metaphor will be retained in the language.

Space-Axis Referents in Other Languages

The ordering relation for up-down in English is found in some other languages that we have considered, although at least one language, Yiddish, manifests an ordering in the reverse direction.

(111) sursum ac deorsum (high and low) Latin
(112) naik turun (ascend and descend) Indonesian
(113) auf und nieder (up down) German
(114) auf und ab (up and down) German
(115) oben und unten (above and below) German
(116) uber and unter (over and under) German
(117) orop un aroyf (down and up) Yiddish
(118) unten un oybn (below and above) Yiddish

In the case of geographical referents, the study of ordering relations in languages other than English seems particularly important. For languages spoken in the Northern Hemisphere, there exist few if any exceptions to the equation North = up and South = down. But what about languages of the Southern Hemisphere? Our search has revealed a number of departures from either the above equation or its opposite. Some cultures, such as in Shoa of Northeast Africa, associate North with right and South with left (Krapf, 1858). In cases such as this, however, the direction associated with right (or with up) is also typically associated with "goodness" and other qualities whose referents also appear in place 1 of freezes. The "good" direction is, in some cases, the direction from which the warm winds blow (Wieschhoff, 1973; Chelhod, 1973). In addition, the direction associated with right is often associated with masculinity. Such data lend some support to the general view of metaphor expressed above,

provided that we can show that the referents for right appear in
place 1 in freezes contained in the languages in question. Unfortunately,
we cannot yet do so.

There exist other cases in which the right direction is associated
with goodness and masculinity, the left direction with badness and
femininity. In English, the following examples are relevant:

(119) gauche (from French left)
(120) sinister (from Latin left)
(121) dexterous (from Latin right)

5. Psychological Evidence

As noted at the outset of this paper, one reason for our
interest in studying the space-axis referents in some detail
is the opportunity to compare our findings in this area with
psychological evidence concerning the processing of spatial
information. By comparing the closeness of the match between
order relations observed in language and order relations
observed in other realms of behavior, it becomes possible to
gain some hints about whether these order relations stem from
a common constraint on information processing. Ideally, pursuing
such a research strategy would lead to finding out any possible
processing functions that are contained in freezing principles,
although we are far from this goal at present. Below, we consider
psychological evidence which bears on the semantic relations
of up-down, right-left, and vertical-horizontal.

Up vs. Down

Recent evidence indicates that the processing of up
takes place more rapidly than the processing of down in
visual perception and performance. Seymour (1969) conducted
experiments in which subjects judged whether words were
presented above or below a reference square. Reaction times
were significantly faster for judgments when the words were above
the reference square then when they were below. Seymour originally
accounted for this above-below asymmetry by proposing that subjects
scanned the visual display starting at the top and moving downward.
Chase and Clark (1971) suggested, however, that subjects' ability
to encode the relevant words above and below was involved in the
asymmetry found in this task, with the time to encode above being
faster than the time to encode below. Regardless of the interpretation
of Seymour's basic finding, the link between this asymmetry in
processing time and linguistic freezing is difficult to establish.
Possibly, up referents are positioned in place 1 just because these
referents are encoded more easily than down. There might well be
a certain advantage to placing more easily processed elements before
more difficult ones in the linear ordering of a sentence, so that early
"heavy" processing of lexical material will not interfere with the
processing of material further along in a sentence. This view is

somewhat more plausible in the case of the linear ordering of larger
amounts of heavy material, as in the case of complex NPs. Following Bever
we suggest   that the obligatory extraposition of such complex NPs
might be required to avoid interrupting the stream of normal lightweight
processing which goes on until the end of a sentence is reached, at
which time the listener is better equipped to deal with heavier
information, since there is normally a pause break during which
there is no new influx of sentence material to be processed.

A second body of evidence which indicates a certain priority
of up over down concerns the fact that written languages are read
almost exclusively from top to bottom, line by line, as in English,
or character by character, as in Chinese. In addition, the motor
act of writing itself usually proceeds from top to bottom in cases
where strictly vertical strokes are required, as in printing. This
situation is illustrated by the following capital letters of the
Roman alphabet:

(122) B, D, E, F, H, I, J, K, L, M, N, P, R, T

In addition to the up-to-down writing of vertical strokes, there
appears to be a general principle stating that characters are
written so as to maximize the amount of up-to-down strokes, whether
these strokes are vertical lines, oblique lines, or curves. Aside
from the characters listed above, this general principle applies to
the characters A, C, G, Q, S, U, V, W, X, Y, and Z. A similar
principle holds for the writing of small letters. Here, the relation
to freezing in language is even less clear than in the case of the
reaction time data cited above, but again it is possible that a
relation does exist—namely that freezing obeys an up-to-down
sequence for vertical referents because up is more easily processed
than down, and easy processing of elements is most desirable at
the earlier portions of a sentence, since during the processing
of such information the greatest amount of new information is entering
the processing system.

Other psychological manifestations of the up-down asymmetry
are illustrated by human inventions, which relate not to processing
constraints such as the one suggested above but rather to the
application of freezing constraints to metaphor. For example,
the beginning of a day as measured on clocks is signified by upward-
pointing hands. In our country, machines which contain on-off
switches are designed so that the machine is on when the switch is
in the up position, off when the switch is down (e.g. light switches,
toggle switches in general). This psychological association of up
with on and down with off [20] is directly comparable to the linguistic
association noted in certain expressions (e.g. My computer is up/down),
and this association is predicted on the basis of the principle
derived from freezing rules—that metaphors combine the meanings of
place 1 elements as a group and place 2 elements as a group. We
would like to believe that the arrangement of toggle switches in

this country reflects proper man-machine engineering in the sense that it is more natural to learn the associations between up and on and between down and off than the associations between up and off and down and on, as is found in toggle switches in Great Britain, for example. Relatively simple experiments could of course be performed to determine whether our intuition is confirmed, and it is quite possible that these experiments already have been performed by man-machine engineering researchers, although we have not been able to discover them.

For variable pressure gauges, thermometers, etc., up is also associated with more, and again comparable to the linguistic freezes of up-down and more-less. Another example which shows the convergence of up-down with a second relation is the fact that escalators going upwards are usually built to the right of escalators going downwards. As we shall see later, the priority of right over left is more pronounced in extra-linguistic behavior than in the English language, where, as noted in Section 4, a systematic relation exists only for the geographical referents associated with right-left.

Right vs. Left

Psychological evidence pertaining to right-left differences revolves chiefly around problems of handedness and cerebral dominance. In numerous cultures, a high percentage of the population is right-handed, and the left side of the brain is dominant for language. However, it remains unknown to what extent this dominance of the right hand and the left cerebral hemisphere is attributable to genetic or environmental factors (Needham, 1973). In any case, it is difficult to find right-left differences in human behavior which cannot be traced to differences in either handedness or cerebral dominance, and consequently, it is difficult if not impossible to determine whether behavioral right-left differences are better regarded as psychological or biological in origin.(disregarding the trivial sense in which all psychological factors are biological in origin).

Aside from this problem, however, behavioral right-left differences exist which are of some interest from the standpoint of the linguistic freezing rule for metaphors noted above. For example, sliding doors (of the accordion type, as found in some closets) open to the right, screws turn inwards to the right, and volume controls move rightward for more volume. The conjunct freezes open and close, in and out, and more or less are thus systematically related to the priority of right direction behaviorally. Most languages are written and read in a rightward direction (exceptions: Arabic, Hebrew, others). Finally, most races begin with rightward motion with respect to the spectators (e.g. horse races). The fact that one runs rightwards to first base in baseball may be related to this last principle, if one assumes that the "ideal" spectator is seated behind home plate, as is usually the case in Little League play. These examples coincide with the freeze first and second.

Vertical vs. Horizontal

On the basis of linguistic data in Section 4, we have shown that the referents for the vertical dimension precede those for the horizontal in freezes. We now present evidence indicating that this order relation holds for psychological data as well, and that a general priority exists for processing vertical information.

We consider first a classical illusion in visual perception, the vertical-horizontal illusion. This effect refers to an observer's tendency to perceive a vertical line as being longer than a horizontal line of the same physical length. The illusion is often demonstrated with an "L"-like figure. When subjects are asked to match the length of the vertical or horizontal lines of such a figure to a line whose length the subjects can vary, the subjects typically indicate by their performance that they perceive the vertical line as being longer. This effect has been demonstrated not only with the "L"-like figure in a normal visual field but also with a variety of geometric figures (Sleight and Austin, 1962; Houck, Mefferd, and Greestein, 1972) and for lines presented in a circular visual field (Thompson and Schiffman, 1974). The presence of the illusion in this latter case is important, since this demonstration indicates that the effect cannot be attributed wholly to the relative difference in the size of the vertical and horizontal dimensions of the normal visual field.

It has been proposed that the vertical-horizontal difference observed in visual perception reflects the fact that our natural (as well as man-made) environment contains a larger percentage of vertical than horizontal lines. Natural environments contain a surplus of verticals because plants orient themselves with respect to gravity. It is thus possible that a physical basis, interacting with natural selection, accounts for the vertical-horizontal illusion in human vision. Regardless of the origin of this illusion, however, it is clear that the priority of the vertical dimension in vision is akin to the precedence of the vertical references as place 1 elements in freezes. As in the case of up-down relations, we suggest that vertical information is processed somewhat more easily than horizontal information by the human organism, and placing vertical information earlier in a sentence would thus be to the listener's advantage.

The vertical-horizontal asymmetry also extends to the realm of human action. We have recently conducted an informal experiment to test this possibility directly. Subjects were presented a square figure at eye level and were asked to move their finger along the square from one corner to another. Each corner was referred to by a color corresponding to the color of a dot placed at that corner of the figure. When subjects were asked, with reference to the color names, to move their finger from the lower left-hand corner to the top right-hand corner, most subjects performed the task by moving their finger from the lower left-hand upward and then rightward in sequence, rather than rightward and then upward. Similar results were obtained when the subjects were asked to move their

fingers from the bottom right-hand corner to the top left-hand
corner, although the results in this case were less clear-cut.
The results overall indicate that, as in the case of freezes,
a motor act involving both a vertical and a horizontal component
proceeds in the sequence vertical, then horizontal. Since the
subjects' instructions were given in terms of color names rather
than the usual referents for top-bottom and right-left, the
immediate confounding influence of the linguistic priority of
up over down was absent from the experiment.

Other evidence concerning vertical-horizontal relations
for motor acts involves writing. For the Roman alphabet, the
printing of vertical lines generally precedes that of horizontals,
as evidenced for the following capital letters:

    (123) E, F, H, I, J, L, T

In the Japanese and Chinese writing systems, however, the situation
is much less well-behaved. [Japanese characters, for example, are
written with horizontal strokes preceding verticals in many
well-defined cases; vertical tend to precede horizontals only
when these strokes are contained within a box-like part of a
character.]
We conclude this section on psychological evidence by
acknowledging the grim possibility that each of the factors we
have noted regarding asymmetries in the processing of spatial
information may be related to freezing principles coincidentally.
As a working hypothesis, however, we suggest that the psychological
evidence presented here adds credence to the view that the frozen
order of up-down and vertical-horizontal relations in particular
may exist for a definite psychological reason--conjuncts are positioned
in place 1 or place 2 according to their ease of perceptual processing
(to this we add the possibility that they are so positioned according
to their ease of processing in speech production). The various bits
of evidence we have just reviewed suggest that up relations are somewhat
more easily processed than down relations, and likewise for vertical
relations vs. horizontal.

6. Conclusions

We have noted that the study of frozen conjunct order reveals
a number of semantic and phonological constraints. These constraints
interact with one another to predict ordering relations for conjuncts
in non-minimal pairs and predict the likelihood of associating various
semantic features in metaphor. Finally, we suggested that frozen
conjunct order reflects a perceptual processing principle whereby
conjuncts which are easier to process tend to occupy place 1 in a
freeze, enabling the listener to handle the preliminary processing
of this conjunct while new information is still be presented to him
by the speaker.

In the remainder of this section, we will first show the full
range of environments in which freezing constraints seem to play
a role (§6.1). Then, we will discuss the extent to which the constraints
can be considered universal (§6.2). Finally, we will describe several
heuristics which we have relied on in our continuing search for
explanations (§6.3).

6.1 We have argued for the existence of several types of principles,
with which we have attempted to account for irreversibilities of
various sorts. Our examples have largely been drawn from coordinate
structures, but in trying to elucidate a set of phonological constraints,
we have also used single-word examples like zigzag or riffraff.
Also, we have shown how the primacy of vertical over horizontal
accounts for the ordering of morphemes within a word (cf. *Westnorth,
*rightup). Finally, we have indicated how we believe it may be
possible to account for some properties of proverbs with the
help of the proposed principles. What we would like to suggest
in this section, on the basis of rather limited evidence, is that
the restrictions to which these four types of structures are subject are
not uniform.   They vary in strength, as shown in the hierarchy
in (124), in order of decreasing restrictiveness.

    (124) a. Order of segments within a morpheme
           b. Order of morphemes within a word
           c. Order of conjuncts within a coordinate structure
               i. disjunctions
              ii. conjunctions
           d. Order of elements in proverb and fixed phrases

That is, we have found the smallest number of exceptions to
our ordering principles within words, like zigzag, which we will
refer to as single morphemes, though we are unsure as to how well
traditional notions of the concept morpheme would apply to such
cases. Our ordering principles are easier to violate when it is
clearer that there are two independent morphemes involved, with
the order being looser yet for coordinate structures. That is,
while we find certain reversible coordinates, such as day and night and
on and off, there appear to be no such cases within words. Our
impression is that there are stronger constraints on disjunctions
than on conjunctions, and that constraints on proverbs are weakest
of all.

There are two other environments in which we have found
evidence that the principles we have been studying can also
operate: in the ordering of prenominal adjectives, and in the
ordering of elements within a clause.
To take these up in order, let us first consider the case
of prenominal adjectives. As we have seen above, Me is adult and
male: this conclusion rests on such irreversibilities as those
in (125).

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(125) a. parent and child; father and son; men, women and
children
b. husband and wife; Adam and Eve; brother and sister;
boy and girl scouts

When we ask the higher-order questions as to which of the two
dimensions--age or sex--has primacy over the other, the following
case provides crucial evidence:

(126) Please state your name, age, and sex / *sex and age.

We note also the irreversibility in (127)

(127) mother and son / ?*son and mother

which might be taken to provide more crucial evidence for the
ordering of age preceding sex, were it not for the fact that
mother seems to disrupt the general law of males first, as pointed
out in Footnote 4.
And when we try kinspeople other than mother, we find either no
ordering preference emerges or both orderings seem odd. Cf. (128).

(128) a. ?aunt and nephew / ?nephew and aunt
b. ?grandmother and son / ?son and grandmother

Looking elsewhere for evidence, we find that such cases
as those in (129) show a preference in the direction we would
postulate on the basis of (126).

(129) a. woman and boy / ?boy and woman
b. queen and prince / ?*prince and queen

Therefore, we will tentatively conclude that the ordering of
the dimension of age over that of sex has been established.
On this basis, note that in prenominal position,
adjectives referring to age must precede those referring to
sex.

(130) a. an old male rhino / *a male old rhino
b. a young female ocelot / *a female young ocelot
c. a middle-aged bisexual subject / ?a bisexual
middle-aged subject

It is probable that we will have to extend our principles so
that they will encompass not only the ordering found in prenominals,
but also in cases like (131), which parallel (130a):

(131) a. a male rhino that is old / ?an old rhino that is male
b. rhinos that are male that are old / ?rhinos that are
old that are male

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However, we will defer the complex task of formulating a constraint
that is not dependent on linear order until a later paper.
Another case that shows that order in coordinates can be
reflected prenominally is the case of the primacy of vertical
over horizontal, which was discussed in Section 4 above. In
the following examples, we see that adjectives like tall,
short, and high, which refer to vertical extension in their
basic senses, must precede adjectives like narrow, fat, skinny,
and thin, which refer to horizontal extension in their basic senses.

(132) a. a tall narrow aperture / *a narrow tall aperture
b. a short fat baker / *a fat short baker
c. a tall, skinny Sumo wrestler / *a skinny, tall
Sumo wrestler
d. a high thin scream / *a thin high scream

The ordering of high before thin in (132d) is especially
remarkable, for both terms are used metaphorically in this
example, and have nothing to do with height or width. Our
analysis makes the prediction that a language that did not
use this spatial metaphor to describe these two auditory
properties of sounds might have the adjectives in the reverse
order, but that no language which has freezes in which vertical
precedes horizontal and which uses the same metaphorical
extensions for tonal properties should be able to reverse the
order of its adjectives. We confess to being pessimistic about
the future of this prediction, but we want to make clear that it
does seem to be entailed by our analysis.
A final case of freezing principles showing up prenominally
is provided by the primacy of space over time. Consider the cases
in (133).

(133) a. space and time / ?time and space
b. space-time continuum / *time-space continuum
c. here and now / *now and here

These examples seem to indicate that Me's spatial location is
viewed as having primacy over Me's temporal location. Now notice
the parallel prenominal ordering of the adjectives in (134).

(134) a. a(n) {nearby, local, adjacent, distant, neighboring} {medieval, modern, antique, recent} monument

b.
$$*a(n) \cdot \begin{Bmatrix} \text{medieval} \\ \text{modern} \\ \text{antique} \\ \text{recent} \end{Bmatrix} \cdot \begin{Bmatrix} \text{nearby} \\ \text{local} \\ \text{adjacent} \\ \text{distant} \\ \text{neighboring} \end{Bmatrix} \text{monument}$$

It seems safe to conclude, on the basis of these and similar cases, that at least some of the principles governing the ordering of conjuncts and the ordering of prenominal adjectives are the same.

Let us pass on to the final case--the ordering of elements in clauses. Here the evidence is much less conclusive, so our proposals should be taken with an increased dosage of salt.

The clearest case of a language making use of freezing principles is Navajo. From various of the principles mentioned in (8)-(27), we concluded that

(135)   a.   Me is adult [men, women, and children]
           b.   Me is human [man and beast]
           c.   Me is animate [people and things]

Navajo makes use of a hierarchy which is defined by some of these same terms, as Ken Hale has pointed out to us. This hierarchy, roughly speaking, is given in (136).

(136)   Adult humans > Non-adult humans > Animals >
           Inanimate entities

Navajo uses a hierarchy like this one, including many finer gradations than (136)[21], in arriving at the basic structure of clauses at or near the level of shallow structure. The basic idea is this: the first NP in a Navajo clause must be higher in animacy [ie., further to the left in (136)] than the second. This requirement affects the operation of a rule which relates structures of the form (137a) and structures of the form (137b) [we take no position on the vexed question of which form is basic].

(137)   a.   Subj   Obj   yi-V
           b.   Obj   Subj   bi-V

The rule is optional when both subject and object are of the same height on the animacy hierarchy. When subject is higher than object on the hierarchy, the only (shallow) form the sentence can take is (137a). When the object is higher than the subject, only (137b) is possible.

In other words, whichever of the forms in (137) is basic (and it might even be argued that both are), the shallow order of the NP's in a sentence must mirror that given in the hierarchy.

This is a strong and pervasive constraint in Navajo syntax, and all would be well for our case that the order of clausemates is also in part determined by freezing constraints, were it not for the fact that concretes are rated more animate than abstracts, yet

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they seem to be frozen in the reverse order, in English at least. Cf. (138).

(138)   abstract and concrete, words and things, form and substance

Again, we have come to a point of conflict that our present analysis cannot resolve. Our hope is that further research will point the way to a more harmonious interconnection between the Navajo animacy hierarchy and the freezing constraints.

We note in passing that in the discussion of so-called "fake" NP's--ie., chunks of idioms like inroads in make inroads into, or expletive pronouns like it and there--given in Ross (1973)--it was pointed out that there are syntactic processes that will only work with "real" NP's. For example, prevent can passivize its object, but not if it is a fake NP: compare (139) and (140).

(139)   a.   We prevented many men from being present.
           b.   Many men were prevented by us from being present.

(140)   a.   We prevented there from being many men present.
           b.   *There were prevented by us from being many men
              present.

However, there appear to be no processes of the opposite type--processes which would apply to fake NP's but not to true NP's. This asymmetry seems clearly related to the existence of an ordering principle like that of Navajo, and to the ordering of the freezes in (135), on which we believe the Navajo hierarchy is based. As a consequence, we would predict that no languages could exist which made use of a clausemate ordering principle which was exactly the opposite of the Navajo one.

A final note on the applicability of the freezing constraints to the structure of clauses: note the freeze in (141).

(141)   subject and object

What we interpret this freeze to mean is that subjects are the place 1 elements of clauses: in other words, Me is a subject. This correctly predicts that subjects will be agents (cf. (20))--that is, it would make the prediction if we knew why prediction should hold of deep levels of representation, rather than surface structure. For it is of course not the case that surface subjects are agentive. Any number of advancement rules can have applied to displace and chomeurize[2] an underlying agentive subject.

Here, however, we have an answer to suggest: note the freeze in (142).

(142)   deep and surface structure

This freeze indicates that deep structure is also a place 1 entity, and hence, where Me is. Hence the tendency for subjects to bear

the properties of Me--humanness, agentivity, singularity, countness--
while it may be detectable in surface structure, should be stronger
at underlying levels of representation.

It would take us too far afield to explore fully all of the
predictions that linking Me, deep structure, and subject position
would lead to, but we will list a sample, to give some indication
of the areas in which we will seek confirmation of this hypothesis:

(143) Deep subjects should be

    a. "more" singular than plural
    b. "more" animate than inanimate
    c. "more" true than fake
       etc.

We have enclosed the "more"'s of (143) in quotes to signal a
special sense in which we intend this term to be taken. The claim
of (143a), for instance, is that there will be more predicates
that select underlying subjects that are of necessity semantically
singular than predicates that are of necessity semantically plural.
That is, predicates like those in (144a) should outnumber predicates
like those in (144b).

(144) a. sneeze, hoarse, hiccough, stumble, wince, etc.
       b. embrace, contrast, similar, differ, etc.

Similarly, we predict that the number of predicates that
require animate deep subjects will exceed the number of predicates
tht require inanimate deep subjects: (145a) over (145b).

(145) a. dream, marry, elope, stare, die, giggle, glimpse,
          swarthy, friend, etc.
       b. subject, elapse, coagulate, coterminous,
          sagittal, etc.

Finally, (143c) suggests an explanation for an observation
made some years ago by Edward Klima (personal communication) to
the effect that idioms which have a fixed, fake, subject are by
far outnumbered by those that have a fake object: idioms like
those in (146a) by far outnumber idioms like those in (146b).

(146) a. make inroads on, take umbrage at, give way to,
          give the lie to, pay heed to, set store by,
          go light on, etc.
       b. the jig be up, X's number be up, the shit hit the
          fan, the cat have X's tongue, etc.

In short, the identification of Me with deep structure yields
a number of quite specific hypotheses about the structure of the
lexicon, hypotheses which seem, at our present level of understanding,
to have a good chance of proving correct.

To conclude. We have been arguing for a connection between
freezing constraints and the order of elements in clauses. It
seems probable that a connection can be established along the
lines we have suggested. If so, then the full range of
phenomena for which we find evidence of the effects of freezing
constraints is shown in (147), which is an expanded version of
(124).

(147) The Domain of Freezing

    a. Order of segments within a morpheme
    b. Order of morphemes within a word   strongest
    c. Order of conjuncts within a coordinate   restriction
       structure
       (i) Disjunctive
       (ii) Conjunctive
    d. Order of corresponding elements in proverbs
       and fixed phrases
    e. Order of prenominal modifiers
    f. Order of terms in clauses   weakest
                                          restriction

The hypothesis that the ordering of subcases a-f of (147)
corresponds to the strength of the effects of the freezing
constraints is at present only our best guess, and it not based
on much evidence. This is an area that we need to concentrate
on in our future studies. Although it has been noticed previously
that a-f of (147) obey certain constraints of linear order, what we
hope to advance in our further work is the possibility, suggested
by the data reviewed in the present sub-section, that a-f can be
shown to obey a single class of freezing principles.

It is interesting to try to characterize precisely the set
of environments listed disjunctively in (147). Why should just
these areas, and no others, have manifested traces of the freezing
constraints? This is a difficult question, and again, we have only
a guess:

(148) Freezing takes over where syntax leaves off.

That is, to take the type of example with which we began this
paper, once coordinate structures are formed, whether this happens
in underlying structure or in the course of syntactic derivations
by means of some kind of transformation of Conjunction Reduction,
they are syntactically fixed. No transformations apply to

<u>coordinated elements in such a way as to affect the order of conjuncts</u>.
This is of course even more so within words [or morphemes!], and less
so for proverbs, some of which have moveable parts. Thus note
that rearranging (149a) by shifting the <u>while</u>-clause yields a weird
but intelligible (149b),

> (149) a. While the cat's away, the mice will play.
>   b. ??The mice will play while the cat's away.

but shifting the conjuncts of a coordinate idiomatic freeze usually[23]
produces gibberish, as in (150).

> (150) *He ran fro and to all morning.

Of course, when we come to clauses, we are in the midst
of syntax, and it is precisely here, where syntactic rules
of constituent ordering are the most in evidence, that the
more delicate, largely semantically-based, freezing constraints
are hardest to detect. It is, furthermore, probable that in
progressing from <u>a</u> to <u>f</u> of (147), we not only increase the
accessibility of the elements to syntactic reordering, but also
to syntactic deletions. Deletion is most possible for elements
in clauses, least for segments of morphemes, with intermediate
steps being roughly governed by the listed order in (147).

At any rate, whether or not it will prove tenable that
the freezing constraints are a kind of linguistic principle that
operates in the complement of the domain of syntax, it is obvious
that no mere listing of environments can be considered the basis
for an adequate theory of freezing. What seems a most important
step is linking the syntactic and freezing principles to distinct
underlying cognitive, and possibly emotive, functions, but as the
current status of research on functionalism indicates, this task
has just barely begun.

6.2 Let us now prod a sore spot: universality. To what extent
can it be maintained that the semantic and phonological parameters
we have isolated for English freezes are useful in other languages?

It is a little late in the day to attempt to be brief, but
the short answer, in the case of semantic parameters, at least, is:
almost none. The prospects of universality for certain phonological
constraints on freezing are somewhat brighter, although we will not
go into detail on this latter score here. We will rather focus
briefly on the semantic factors, to indicate just how bad things
seem to be.

We have found that for almost all of the constraints in (8)-(27),
there is some language which exhibits the reverse ordering from that
observed in English. Some examples follow.

(151) a. <u>Here</u>: Russian has <u>tam i syam</u> 'there and here';
           Finnish systematically orders all distal
           deictics in place 1 and proximal ones
           in place 2; and Japanese has <u>ači-koči</u>
           'yonder-hither'[24]

       b. <u>Now</u>: Spanish has <u>tarde o temprano</u> 'later or sooner'
           (cf. Abraham(1950))

       c. <u>Solid</u>: German has <u>Wasser und Land</u> 'water and land'
           (cf. Abraham(1950))

       d. <u>Positive</u>: Spanish has <u>frio y caliente</u> 'cold and
           hot' (cf. Abraham(1950)); Korean has
           <u>son-ik</u> "loss-gain'; Hindi has <u>bura</u>
           <u>bhəla</u> 'bad good'[25]

       e. <u>Up</u>: Yiddish has 'down and up (cf.(117)); Mandarin
           orders the points of the compass 'East-West-
           South-North' and has the equivalent of
           'left top'/'right top'.[26]

This array of examples should serve to squelch any would-be
universal semantic constraints on freezing for certain dimensions.
When the would-be universalist considers Hindi, matters become
still worse. For this language, a staggering array of counterexamples
exists, some of which are listed in (152).[27]

(152) a. <u>do ek</u> 'two one'
       b. <u>nəshib o fəraz</u> 'low and high'/'bad and good'
       c. <u>der səwer</u> 'late early' [=sooner or later]
       d. <u>cand suraj</u> 'moon sun'
       e. <u>khətta mitha</u> 'sour sweet
       f. <u>kəm o beš</u> 'less and more'
       g. <u>xas o am</u> 'particular and general [Cf. the English
           freeze <u>In general X, and in particular Y</u>]
       h. <u>sərab kəbab</u> 'wine meat' [=meat and drink]
           BUT
       i. <u>hath pəir</u> 'hand foot'

In a way, Hindi would almost seem to be less problematic than
some of the other languages mentioned in (151), because these other
languages contradict the English order seemingly at random, whereas
Hindi contradicts the English ordering fairly systematically. For
Hindi, one might then try to invent some mechanism which would
invert place 1 and place 2 for the entire lexicon [minus annoyances
like (152i)]. However, while we definitely see a lot of merit in
such an approach, without severe constraints on the postulation of
such 'swing' rules, they will make it hard to retain a falsifiable
analysis, especially because of the existence of (152i), which seems
to indicate that if swing rules exist, they can have lexical exceptions.
And if they can have one exception, can they have two? Twenty?
Sixty-six? If so, where is falsifiability?

Only two potential semantic universals exist that we have not yet been able to shoot down. These are stated in (153).

(153) a. <u>Star-Extra</u>: Mick Jagger and the Rolling Stones,
                Van Cliburn and the Moscow Philharmonic,
                John Wayne and a cast of thousands,
                Snow White and the Seven Dwarfs
       b. <u>Chronology</u>: in a freeze of two verbs which are
                intended to be in a temporal sequence,
                the place 1 verb denotes the earlier
                action.

Principle (153a) was previously subsumed under (14), <u>Singular</u>, but we have found counterexamples to most of the other cases of (14). (153a) has not yet been refuted, however.

Principle (153b) is exemplified by a large number of freezes in English:

(154) wash and wear, wash and dry, eat and run, give and go,
       Mop and Glo, Shake and Bake, tear and compare, kiss
       and tell, show and tell, hide and seek, stop and shop

We are unable to understand why it is that the principles in (153) should have such good batting records across languages, when others among those in (8)-(27) that we would have expected to be at least as solid (based on English intuition) could not survive a cross-linguistic ordeal. It is probable that the two in (153) have only lasted this long because of a skew in our data base.

When it comes to phonological principles, as we noted above, the cross-linguistic picture is a little brighter. First of all, it seems that it will be possible to extend the type of data in (86) to a significant number of other languages. In Christine Tanz's (1971) excellent study, in an appendix in which she lists the words for 'here' and 'there' in 42 widely diverse languages, we find the following rough "scores" for six of our seven phonological freezing constraints:[28]

(155)

	Correct predictions	Incorrect predictions
a. P:	5	2
b. $C_i\#$:	3 [1 minimal pair]	3 [1 minimal pair]
c. C_i^1:	11 [2 minimal pairs]	2
d. F_2^1:	23 [8 minimal pairs]	4
e. $C_f^2\#$:	2	3
f. C_f^1:	1	0

The scores are to be read as follows: 5/2 in (155a) means that, of the 7 cases in which the words Tanz cites differed in their number of syllables, 5 times the word for 'there' was longer, 2 times the word for 'here' was longer. Similarly, for the 11/2 score in (155c): the

notation '[2 minimal pairs]' means that there were 2 languages whose only difference between the two words was a difference in initial obstruency, and that both cases went in the predicted direction. In brief, it appears that the interaction between our phonological constraints on freezing and the semantic relation proximal-distal does operate at a better than chance level cross-linguistically, although it is by no means universal. In addition to this phonological-semantic interaction, a preliminary survey indicates that the freezing constraints for P, F_2 and possibly other phonological constraints appear systematically in other languages, although no claim for universality can be made.

6.3 We wish to conclude our discussion by noting some of the guidelines which we continue to use when confronted with the baffling array of freezing phenomena (actually, we have but scratched the surface in this preliminary paper). Firstly, we note that when a freeze is observed which overrides postulated semantic constraints it appears that the freeze does so for very good phonological reasons, as in the case of <u>trick or treat</u> noted in Section 3. Conversely, a freeze which overrides prevailing semantic tendencies normally does so for good semantic reasons, and so we regard such cases as semantically important. In general, semantic factors outweigh phonological factors, however. That is, we find many cases in which the prevailing phonological tide is overridden for semantic reasons, but very few cases of the converse type.

Secondly, we attempt wherever possible to explore possible functional motivation for freezing constraints, as in the case of the "ease of processing" notion discussed in Section 5 for speech perception. We feel at present that such attempts represent the most likely route to formulating an analysis of the entire range of freezing constraints which captures the basis of the phenomenon in its entirety.

Finally, related to the above point, we attempt to relate our findings to a general framework of man's view of himself in the world. The principle of Me First, which appears to account for a fairly wide range of freezing constraints, coupled with the assumption that place 1 conjuncts reflect the traits of the prototypical speaker, might give some indication about how we view this speaker. Although we have up until now been tacit on this matter, we hereby forsake the guise of linguistics proper and admit to being card-carrying Whorfers.

*****

Whorfers of the world! Unite! You have nothing to lose but your brain

FOOTNOTES

1. For our speech, freezes are the only area of the lexicon in which two items can be combined in two linear orders, with both orders yielding an idiomatic output.

2. Note here two instances of three-place freezes: more will be cited among the examples to follow. There appears to be no limit in principle to the number of places a freeze can have, but, except for freezes made up out of a subsequence of a longer series (e.g. Monday, Tuesday, Wednesday, Thursday, and Friday; March, April, May, June, July, and August), in practice, freezes with more than three places are extremely uncommon.

One thing is important to note, in connection with all freezes of order higher than two: the normally optional rule of Conjunction Deletion, which can convert (i) to (ii), or (iii) to (iv), as in

(i) The President, and the Secretary of State, and the Chief Justice drink Ovaltine.

(ii) The President, the Secretary of State, and the Chief Justice drink Ovaltine.

(iii) It might rain or hail or snow or sleet.

(iv) It might rain, hail, snow, or sleet.

by deleting the first (n-1) elements of a sequence of n identical conjunctions, is not optional in freezes, but obligatory. The following examples all have an exceedingly peculiar ring:

(v) a. ?this and that and the other
b. ?hither and thither and yon
c. every Tom and Dick and Harry [≠ everybody]
d. ?*high and wide and handsome
e. ?hop and skip and jump

It seems to be generally the case that reduction rules which are usually optional become obligatory in freezes. Thus, the rules of rapid speech which allow and [æ nd] to be realized as [n̩], and or [ɔr] as [ɚ], produce bizarre results if they are not applied in freezes: cf. (vi):

(vi) a. ?*odds and [æ nd] ends.
b. ?I didn't know whether I was coming or [ɔɚ] going.
c. ??By hook or [ɔɚ] by crook.

Intuitively, we would like to say that this obligatoriness exists because freezes are on the way to becoming words--they are "wording up". But this claim, even if evidence can be found to provide it with an empirical basis, cannot be sufficient. for it is clear that there are phonological processes that apply optionally within sequences that are clearly words--an example is the assimilation of the final nasal in words like bacon, to yield the velar [ŋ]: [bēyk(ə)n̩] or [bēykŋ].

Thus, at present, we have no satisfactory account for the fact that otherwise optional rules seem to become obligatory in freezes.

3. It appears that this freeze represents a politeness convention. Politeness conventions are in general contrary to natural tendencies.

4. This freeze points up the place 1 position of mother, found also in such freezes as ma and pa. We believe that mothers are special.

5. Jerry Morgan has brought to our attention a particularly clear case of this kind. In Yugoslavia, whether one says srpskohrvatski "Serbo-Croatian" or hrvatskosrpski "Croat-Serbian(?)" depends on the cultural group that the speaker identifies with.

Note that here, we are talking not of the order of conjuncts in a coordinate structure, but rather of the order of prefix and stem in a "compound" (whatever thay may mean) word. We intend the term "freeze" to be taken to cover both of these types of cases, as well as others that will be introduced in following sections.

6. We know of no exceptions to the rule that specifies that in naming mixed drinks, the alcoholic ingredient must be named first. Additional examples include: Scoth and soda, rye and ginger, rum and coke, seven and seven [we are informed that the first occurrence of seven feels like the alcoholic one, the drink consisting of Seagram's Seven and Seven-Up].

Interestingly, when both ingredients contain alcohol, the rule seems to be to put the most alcoholic ingredient first: gin and vermouth. Whether this latter principle can stand the strain of being subjected to the (doubtless) scores of such drinks of whose existence we are not mixologists enough to have heard is a question whose answer we are awaiting with bated breath.

7. Note that the rough hierarchy given at the head of (27) does not cover several of the cases we have listed here (e.g. milk and honey, sugar and spice, oil and vinegar--this list is easy to extend). We include these in the hope that future researchers in this area will be able to propose revised hierarchies that are detailed enough to predict these orderings too.

One tendency we have noted in some freezes is for green vegetables to precede others: peas and carrots; pepper and onion; bacon, lettuce, and tomato (the latter two are reversed for some speakers); lima beans and corn. If this is in general true, it is an especially tantalizing mystery.

We observe in passing that there are a number of counterexamples to (27), such as spaghetti and meatballs/hamburger and beans and franks, which would seem to support the alternative hypothesis given in (i)

(i) Main ingredients (measured by weight or volume) precede subordinate ingredients

We feel that this hypothesis has a lot of merit, but that its inability to account for such cases as bacon and eggs, ham and eggs, meat and potatoes, ham and cheese, etc., where it is not the case that the place 1 elements must outweigh or outmass the place 2 ones, suggests that (27) is necessary in addition to it. We have thus far been unable to discover which of these two principles "wins" when they are in conflict.

A particularly puzzling case is lox and bagels / bagels and lox. /informants
We have found vehement ~~informers~~ for each of the two orders, though no one seems to accept both indifferently. It has been suggested to us that bagels and lox is the preferred order in the Jewish community, and that lox and bagels is only used by non-Jews. We have as yet not conducted a survey to find out whether this hypothesis is true or not. If it is, it would seem to indicate that the two subgroups rank principle (27) and (i) in the opposite order, in this case at any rate. An explanation of this would be hard to come by.

8. We have been informed that (31) represents the ordering used by the poet Longfellow in recounting this famous scene, but that historically, the order represented in (32a) is probably correct. We believe that the poet in this case would be more sensitive to the naturalness constraints on proverbs that we are proposing here, and thus take Longfellow's data ~~and~~ the more important for /as
our consideration--a Bicentennial fudge which for which some /a
readers will not readily forgive us.

9. It is worth pointing out here that the fact that (38a) is normal, and not (i),
    (i) *I and you
while seeming to be a totally damning counterexample to Me First, in fact turns out to be relatively unimportant superficial fact of English, representing a politeness convention (cf. Footnote 3), as far as we can tell. As Bruce Fraser has observed, it is the case for all English coordinate structures involving the nominative first-person singular pronoun I, that this pronoun must occupy the last conjunct position: cf. (ii):
    (ii) a. *I and Tom
        b. ?*They believe that I and you are similar.
        c. *I and Grace weigh 200 and 300, respectively.
        d. ??They expect that either I or you will do the wallaby.
    Evidence that this constraint is to be stated as an output constraint, and not at any deep level, is provided by the sentences in (iii), which are related transformationally, we would argue, to those in (ii):
    (iii) a. They believe me and you to be similar.
        b. I weigh 200, and Grace weighs 300.
        c. They expect either me or you to do the wallaby.

Further indications that *(i) should not be construed as a deep counterexample to (28) is provided by (iv):
    (iv) a. we and they
        b. ??they and we
We have been told of the existence of a Bantu language which requires the order 1st person-2nd person, and in the absence of cases of other languages which clearly require the opposite order in all syntactic environments, we will tentatively conclude that the fact that (38a) is superior to (i) is a local aberration of English, and not a mortal wound to (28).

10. We would regard the non-existence of this freeze as not too critical, since a freeze does exist which is synonymous and which seems to fill the gap left by the oddness of (46b); namely (i):
    (i) once and for all
Note also the common pattern specific-universal, which we see in (ii)-(v):
    (ii) now and forever
    (iii) here (there) and everywhere
    (iv) some or all
    (v) you, me, and everybody
This pattern, coupled with the existence of (i) in place of the non-occurring (46b), leads us to postulate a concept of possible but non-occurring freezes.

Another probable instance of this concept is provided by the fixed phrase in (vi):
    (vi) In for a penny, in for a pound.
While there is no freeze (*penny and pound), it would seem to be merely accidentally absent. Note the phrase in (vii),
    (vii) penny wise and pound foolish ✓

which the postulation of the non-occurring freeze in question would allow us to reduce to a case of the covarying kind that was discussed in connection with (33).

11. We note in passing the close similarity of this obstruency hierarchy to that described in Hankamer and Aissen (1974) for a rule of consonant assimilation in Pali: the two hierarchies differ only with respect to the treatment of [v] and [r]. One area of the skeletal universal hierarchy that Hankamer and Aissen argue must be specified in phonological theory is subject to language-particular sonority indications, and this is precisely the area containing glides and liquids.

12. We are aware that our principle of increasing initial obstruency in going from lower to higher places of a freeze is in conflict with a generalization arrived at by a number of scholars to the effect that place 2 elements begin with a labial. This generalization is mentioned and supported for English in Jespersen (1961), Volume 6, §10.41, and is shown to exist for a variety of Slavic languages in Jakobson (1972). Karl Zimmer has told us of a productive process in Turkish whereby kitab 'book' becomes kitab mitab 'books and stuff', a process that

replaces any initial consonant with [m]. In addition, Lloyd Anderson
has informed us of as yet unpublished work by Mary Ann Campbell, who
also attributes this tendency towards place 2 labialization to the
same cause as the lowering of F_2 in place 2--namely a tendency to
flat in this position.

We do not know how to resolve this conflict at the moment.
It is clear that we cannot say that some languages use the obstruency
hierarchy and some use labialization, because English seems to use
both, conflictingly: on the one hand, wine and dine, wear and tear;
on the other hand, teeny-weeny and tootsy-wootsy.

We have chosen to argue for an alternative obstruency-based
account not because we are convinced that it is right, but because
we hope that future researchers will be able to find crucial evidence
that will resolve our present dilemma.

13. A case arguing most forcefully for considering [VN] to be
equivalent to [VG] or [VL] ~~id~~., that what is relevant is a long   /i.e.
sonorant nucleus, is odds and ends. This is an idiomatic freeze,
and unless [çn] in place 2 can be considered to be an instance
of $\bar{V}$, this freeze would have 2 phonological strikes against it,
namely F_2 and $C_f\#$. Viewing [çn] as $\bar{V}$, however, we have a "tug of
war" between $\bar{V}$ and F_2, which it would be possible for $\bar{V}$ to "win", thus
accounting for the order.

So far, our investigations seem to indicate that it is correct
to view $\bar{V}$ as being phonetically defined as [V[+son]]. This definition   /$\bar{V}$
will make the following freezes conform to more subparts of (56)
than they would if vowel+sonorant sequences are viewed as being
instances of short nuclei:

(i)

leaps and bounds	nuts and bolts
(hop) skip and jump	short and sweet
run and jump	fits and starts
have and hold	root and branch
toss and turn	twist and turn
stocks and bonds	

On the other hand, the following freezes will have more phonological
strikes against them under the proposed analysis:

(ii) hard and fast
bump and grind
grunt and groan
curds and whey
born and bred

Thus, we tentatively favor making this assumption at the present,
while admitting that the support for this move is not overwhelming.

14. In Figure 2, the two dots on the lines indicate links of the
hierarchy that are supported by minimal pairs; all other links, being
supported by non-minimal pairs (which we enclose in parentheses), are
boxed.

15. The parenthesized subrules of (56) which appear after the
elements of (79) indicate which of the phonological principles we
have discussed so far is being overriden by $\underline{P}$ in the example in question.

16. As mentioned in Footnote 13, this case would be improved by

---

treating [um] as an instance of $\bar{V}$.

17. We are struck, however, by the fact that the rule mentioned
in Footnote 2 deletes the first n-1 conjunctions in a coordinate
structure, not the last n-1. And paradigms like (i)-(iv) below,

(i) {more simple} and more rapid
    {simpler}

(ii) more rapid and {more simple}
                    {?simpler}

(iii) {?*more simple} and quicker
      {simpler}

(iv) quicker and {?more simple}
                 {simpler}

which seem to indicate that the sometimes optional move → -er rule
must be applied in place 1 if it is to be applied to place 2,
may also point to a more general conspiracy of rules on various
levels which apply preferentially to shorten place 1 elements relative
to place 2 elements.

18. These represent our judgments--we have found informants who have
the opposite preference.

19. Cf., e.g., up North/*South; down South/*North.

20. Note that we would predict on the basis of purely linguistic
evidence, that up and on should both be associated, because both are
place 1 elements.

(i) They were jumping {up and down/*down and up.
                       {on and off the train/*off and
                                          on the train.}

This type of metaphorical association seems to be clearly related
to the type of contiguity of place 1 elements that was discussed
above in Section 2, in connection with (33) and (49).

21. For details, cf. Hale (1973) and especially Creamer (1974).

22. These terms are drawn from the framework of relational grammar
that is now being developed by Perlmutter and Postal. Cf. Postal (to appe
for some preliminary characterizations.

23. The counterexamples we know of appear in Section 1 above.

24. We are indebted to Bill Darden, Lauri Karttunen, and Susan
Martin, respectively, for these observations.

25. We are grateful to Wha-Chun Kim and Ahmad Siddiqi, respectively,
for these latter two observations.

26. We owe these latter facts to Hsiu Ying Chen.

27. Our thanks to Ahmad Siddiqi for compiling a long list of bad news,
only part of which we have presented here.

28. We were unable to check the score of $\bar{V}$ because of the absence of
indications of vowel length differences in the transcriptions, if indeed
there were any such differences.

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